Hidden Trends in NFL Data

A Senior Project

presented to

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Introduction

The main goal of this analysis is to find hidden trends in National Football League game data that can ultimately determine which factors are statistically significant to award a team with their ultimate objective, a win. Whether it be a preseason game, or the Super Bowl with over 100 million people watching, the goal is to figure out what teams should focus on to increase their chances of winning a game. The hope is to find trends and patterns in the data that can help statistically predict a team's total wins for a season. To go about this, we need to find what combinations of explanatory variables would fit the best model to attempt to explain how a team wins a game. These explanatory variables can be anything from the game being a home game, to the top three wide receivers receptions in a game, to the average punt length in a game.

The main response variable to be examined is total wins throughout the regular season. These total number of wins can span from zero to sixteen wins, since each team plays sixteen games in the regular season. Another response variable to be analyzed will be spread; the difference between a team's points scored, and points against. Spread is analyzed to provide a different quantitative response variable that can be both positive and negative. Intuitively, a higher spread should be strongly positively associated with higher winning percentage, so maximizing spread should be a decent indicator of winning. Spread is also more variable than wins and losses since there can be values outside of the range of zero to sixteen, which is hypothesized to be a better indicator of how good a team really is rather than wins.

A final goal is to write a program to compute as many statistics as possible, so we can do several more analyses for this project, and many projects for the future. This allows us to use the same program with any past or future game data inputs for more robust results.

Data Source

Originally, I was going to search Google to find a database that had all of these statistics readily available in an Excel spreadsheet. However, after hours of searching, I was unsuccessful. The next option was to either directly read in data from box scores from a source like ESPN.com via an html reading function in SAS, or manually enter the numbers into a user-defined program to calculate all the statistics needed. Due to the vast number of different data I wanted and specificity of the data desired, the html reading option would have taken hours and hours, and would have been beyond the scope of this project. So, I decided to go with the second option, and wrote a program in SAS that would calculate several different statistics based on a user's input of game statistics from the box scores. For example, if the user entered a running back's carries and his rushing yards, the program would calculate the average yards per rush. This program calculates many different averages, totals, groups variables into certain categories, and does all kinds of different calculations. The goal was to have the user enter as little data as possible for each game, and the program would calculate and sort the rest. ESPN.com has box scores for each game that contain a very descriptive summary of each game, individual player's statistics, and team summary statistics. So, ESPN.com is the source of my data (sample box score can be found in Appendix (A)).

Data Collection in SAS

Due to the lengthy and tedious nature of manual data entry, the goal is to create a function so that its parameters can be minimized as much as possible, while still computing all the statistics desired. For example, consider a user entering the teams playing in a certain game, and the final score. Using only these four inputs, the function will then be able to calculate: win/loss/tie, points for for each team, points against, spread (points for minus points against), and either a home/away, conference/non-conference, division/non-division win/loss/tie (shown in *Figure 1* below). In order to do this, we start with a dataset that has all of 32 teams, their conferences, and their divisions. Another example would be if the user entered a receiver's total receiving yards, and his total receptions, the function would calculate the yards per catch. This minimizing inputs technique to create as many statistics as possible occurs throughout the data collection process. In fact, the finished function has 182 parameters for each game (spelled out in Appendix (A)) and produces 46,592 total statistics for the entire season. Manually entering data was done with the help of the number keypad below, and took approximately seven total hours to enter all the data for the whole season.

Figure 1:

Obs	Team	Conf	Div	Week	Win	Loss	Tie	Win_pct	Loss_pct	PF	PA	spread	home_win	home_ loss	home_ games	home_ win_pct
1	SEA	NFC	WEST	14	0	1	0	0	1	17	19	-2	.	.	0	.
2	SFO	NFC	WEST	14	1	0	0	1	0	19	17	2	1	0	1	1

Obs	home_ loss_pct	away_win	away_ loss	away_ games	away_ win_pct	away_ loss_pct	div_win	div_loss	div_ games	div_win_ pct	div_ loss_pct
1	.	0	1	1	0	1	0	1	0	.	.
2	0	.	.	0	.	.	1	0	1	1	0

Obs	conf_win	conf_ loss	conf_ games	conf_ win_pct	conf_ loss_pct
1	0	1	1	0	1
2	1	0	1	1	0

Once we have data for each game, we need to combine all game datasets together for an aggregate season dataset of statistics. We first want datasets for each week, then ultimately the final season dataset. First, we simply stack all the datasets (each game) on top of each other for datasets that have the same week to create weekly datasets (*Figure 2*).

Figure 2:

Obs	Team	Conf	Div	Week	Win	Loss	Tie	Win_pct	Loss_pct	PF	PA	spread	home_win	home_ loss	home_ games	home_ win_pct
1	ARI	NFC	WEST	10	1	0	0	1	0	27	24	3	1	0	1	1
2	ATL	NFC	SOUTH	10	0	1	0	0	1	10	33	-23	0	1	1	0
3	BAL	AFC	NORTH	10	1	0	0	1	0	20	17	3	1	0	1	1
4	BUF	AFC	EAST	10	0	1	0	0	1	10	23	-13	.	.	0	.
5	CAR	NFC	SOUTH	10	1	0	0	1	0	10	9	1	.	.	0	.
6	CHI	NFC	NORTH	10	0	1	0	0	1	19	21	-2	0	1	1	0
7	CIN	AFC	NORTH	10	0	1	0	0	1	17	20	-3	.	.	0	.
8	DAL	NFC	EAST	10	0	1	0	0	1	17	49	-32	.	.	0	.
9	DEN	AFC	WEST	10	1	0	0	1	0	28	20	8	.	.	0	.
10	DET	NFC	NORTH	10	1	0	0	1	0	21	19	2	.	.	0	.
11	GBP	NFC	NORTH	10	0	1	0	0	1	13	27	-14	0	1	1	0
12	HOU	AFC	SOUTH	10	0	1	0	0	1	24	27	-3	.	.	0	.
13	IND	AFC	SOUTH	10	0	1	0	0	1	8	38	-30	0	1	1	0
14	JAX	AFC	SOUTH	10	1	0	0	1	0	29	27	2	.	.	0	.
15	MIA	AFC	EAST	10	0	1	0	0	1	19	22	-3	.	.	0	.
16	MIN	NFC	NORTH	10	1	0	0	1	0	34	27	7	1	0	1	1
17	NOS	NFC	SOUTH	10	1	0	0	1	0	49	17	32	1	0	1	1
18	NYG	NFC	EAST	10	1	0	0	1	0	24	20	4	1	0	1	1
19	OAK	AFC	WEST	10	0	1	0	0	1	20	24	-4	.	.	0	.
20	PHI	NFC	EAST	10	1	0	0	1	0	27	13	14	.	.	0	.
21	PIT	AFC	NORTH	10	1	0	0	1	0	23	10	13	1	0	1	1
22	SDC	AFC	WEST	10	0	1	0	0	1	20	28	-8	0	1	1	0
23	SEA	NFC	WEST	10	1	0	0	1	0	33	10	23	.	.	0	.
24	SFO	NFC	WEST	10	0	1	0	0	1	9	10	-1	0	1	1	0
25	STL	NFC	WEST	10	1	0	0	1	0	38	8	30	.	.	0	.
26	TBB	NFC	SOUTH	10	1	0	0	1	0	22	19	3	1	0	1	1
27	TEN	AFC	SOUTH	10	0	1	0	0	1	27	29	-2	0	1	1	0
28	WAS	NFC	EAST	10	0	1	0	0	1	27	34	-7	.	.	0	.

*Note: Week 10 has four teams with byes. This figure only prints out first sixteen columns of 182 columns.

Since some teams have bye weeks in weeks four through twelve (*Figure 3*), we are not able to add weekly datasets together directly. This is because observation numbers will change based on how many teams have a game that week. However, once we can figure out which teams had a bye each week, and enter a row of zeros for every variable for that team on a bye (*Figure 4*), then each team will have the same observation number for each week to add datasets together later. When we add datasets later, integer statistics will be correct, but averages and percentages will have to be adjusted.

Figure 3:

2013 NFL Bye Weeks

	Teams
Week 1	None
Week 2	None
Week 3	None
Week 4	Carolina, Green Bay
Week 5	Minnesota, Pittsburgh, Tampa Bay, Washington
Week 6	Atlanta, Miami
Week 7	New Orleans, Oakland
Week 8	Baltimore, Chicago, Houston, Indianapolis, San Diego, Tennessee
Week 9	Arizona, Denver, Detroit, Jacksonville, New York Giants, San Francisco
Week 10	Cleveland, Kansas City, New England, New York Jets
Week 11	Dallas, St. Louis
Week 12	Buffalo, Cincinnati, Philadelphia, Seattle
Week 13	None
Week 14	None
Week 15	None
Week 16	None
Week 17	None

Figure 4:

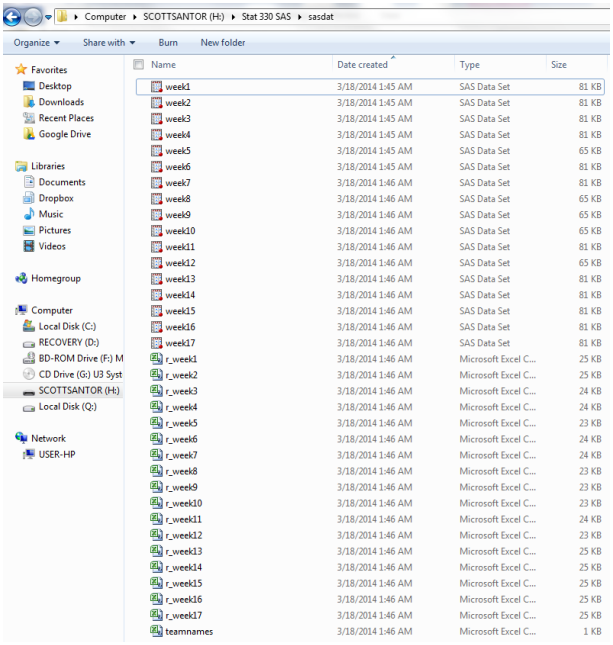
Obs	Team	Conf	Div	Week	Win	Loss	Tie	Win_pct	Loss_pct	PF	PA	spread	home_win	home_ loss	home_ games	home_ win_pct
1	ARI	NFC	WEST	10	1	0	0	1	0	27	24	3	1	0	1	1
2	ATL	NFC	SOUTH	10	0	1	0	0	1	10	33	-23	0	1	1	0
3	BAL	AFC	NORTH	10	1	0	0	1	0	20	17	3	1	0	1	1
4	BUF	AFC	EAST	10	0	1	0	0	1	10	23	-13	.	.	0	.
5	CAR	NFC	SOUTH	10	1	0	0	1	0	10	9	1	.	.	0	.
6	CHI	NFC	NORTH	10	0	1	0	0	1	19	21	-2	0	1	1	0
7	CIN	AFC	NORTH	10	0	1	0	0	1	17	20	-3	.	.	0	.
8	CLE			.	0	0	0	0	0	0	0	0	0	0	0	0
9	DAL	NFC	EAST	10	0	1	0	0	1	17	49	-32	.	.	0	.
10	DEN	AFC	WEST	10	1	0	0	1	0	28	20	8	.	.	0	.
11	DET	NFC	NORTH	10	1	0	0	1	0	21	19	2	.	.	0	.
12	GBP	NFC	NORTH	10	0	1	0	0	1	13	27	-14	0	1	1	0
13	HOU	AFC	SOUTH	10	0	1	0	0	1	24	27	-3	.	.	0	.
14	IND	AFC	SOUTH	10	0	1	0	0	1	8	38	-30	0	1	1	0
15	JAX	AFC	SOUTH	10	1	0	0	1	0	29	27	2	.	.	0	.
16	KCC			.	0	0	0	0	0	0	0	0	0	0	0	0
17	MIA	AFC	EAST	10	0	1	0	0	1	19	22	-3	.	.	0	.
18	MIN	NFC	NORTH	10	1	0	0	1	0	34	27	7	1	0	1	1
19	NEP			.	0	0	0	0	0	0	0	0	0	0	0	0
20	NOS	NFC	SOUTH	10	1	0	0	1	0	49	17	32	1	0	1	1
21	NYG	NFC	EAST	10	1	0	0	1	0	24	20	4	1	0	1	1
22	NYJ			.	0	0	0	0	0	0	0	0	0	0	0	0
23	OAK	AFC	WEST	10	0	1	0	0	1	20	24	-4	.	.	0	.
24	PHI	NFC	EAST	10	1	0	0	1	0	27	13	14	.	.	0	.
25	PIT	AFC	NORTH	10	1	0	0	1	0	23	10	13	1	0	1	1
26	SDC	AFC	WEST	10	0	1	0	0	1	20	28	-8	0	1	1	0
27	SEA	NFC	WEST	10	1	0	0	1	0	33	10	23	.	.	0	.
28	SFO	NFC	WEST	10	0	1	0	0	1	9	10	-1	0	1	1	0
29	STL	NFC	WEST	10	1	0	0	1	0	38	8	30	.	.	0	.
30	TBB	NFC	SOUTH	10	1	0	0	1	0	22	19	3	1	0	1	1
31	TEN	AFC	SOUTH	10	0	1	0	0	1	27	29	-2	0	1	1	0
32	WAS	NFC	EAST	10	0	1	0	0	1	27	34	-7	.	.	0	.

*Note: Week 10 has CLE, KCC, NEP and NYJ with a bye. This figure only prints out first sixteen columns of 182 columns.

Aggregating Data in R:

Once we have a dataset for every week, we can add weekly datasets together to get an aggregate season dataset. Due to the line-by-line nature of how SAS is structured, it is not the ideal software for dealing with manipulations of entire columns. I chose to use R to do the rest of the analyses, being great with handling column shaping, and powerful with creating regression models for end results. The next step is to export all the weekly datasets from SAS into Excel files (.csv), to then read into R. Running the entire SAS program creates the original dataset with teams and their respective conferences and divisions, makes a weekly SAS dataset that accounts for bye weeks, exports these SAS weekly datasets in a SAS dataset format, and finally exports Excel files that are readable into R. This SAS programs runs in approximately 1 minute and 30 seconds, and transforms an empty computer folder into what is shown in *Figure 5* with seventeen week's worth of SAS datasets, and Excel files ready to read into R. The program creates SAS datasets for each week for a clean looking weekly dataset, and for purposes of time series analyses by week for future projects.

Figure 5:



*Note: "teamnames" Excel file is just used for combining datasets in R analysis.

Once we read in all weekly Excel files into R and added them together, we have our aggregate season dataset. All integer counting variables, such as wins or passing yards will have correct summed values. However, percentages/averages cannot be simply added together together to be correct. Since there are seventeen week's worth of percentages/averages being added, and each team has one bye week where we entered zeros for every variable, we divide by sixteen to get the proper percentages/averages. This final dataset (called nfl) shows each team's total wins, losses, points scored, points against, total passing yards, total rushing yards, average yards a pass, average yards a rush, and many, many other statistics for each team across the season. *Figure 6* shows a small portion of the final dataset (nfl) (More of dataset printout is in Appendix (C)). Variable names similar to SAS macro variable names (Appendix B) without "macro_a" or "macro_h" (away and home). *Figure 7* shows all 183 variable names in R dataset.

Figure 6:

```
> nfl
   Team Win Loss Tie Win_pct Loss_pct  PF  PA spread home_win home_loss home_games home_win_pct home_loss_pct away_win away_loss away_games away_win_pct away_loss_pct
1   ARI  10    6   0  0.6250   0.3750 379 324     55        6         2          8        0.750         0.250        4         4          8        0.500         0.500
2   ATL   4   12   0  0.2500   0.7500 353 443    -90        3         5          8        0.375         0.625        1         7          8        0.125         0.875
3   BAL   8    8   0  0.5000   0.5000 320 352    -32        6         2          8        0.750         0.250        2         6          8        0.250         0.750
4   BUF   6   10   0  0.3750   0.6250 339 388    -49        4         4          8        0.500         0.500        2         6          8        0.250         0.750
5   CAR  12    4   0  0.7500   0.2500 366 241    125        7         1          8        0.875         0.125        5         3          8        0.625         0.375
6   CHI   8    8   0  0.5000   0.5000 445 478    -33        5         3          8        0.625         0.375        3         5          8        0.375         0.625
7   CIN  11    5   0  0.6875   0.3125 430 305    125        8         0          8        1.000         0.000        3         5          8        0.375         0.625
8   CLE   4   12   0  0.2500   0.7500 308 406    -98        3         5          8        0.375         0.625        1         7          8        0.125         0.875
9   DAL   8    8   0  0.5000   0.5000 439 432      7        5         3          8        0.625         0.375        3         5          8        0.375         0.625
10  DEN  13    3   0  0.8125   0.1875 606 399    207        7         1          8        0.875         0.125        6         2          8        0.750         0.250
11  DET   7    9   0  0.4375   0.5625 395 376     19        4         4          8        0.500         0.500        3         5          8        0.375         0.625
12  GBP   8    7   1  0.5000   0.4375 417 428    -11        4         4          8        0.500         0.500        4         4          8        0.500         0.500
13  HOU   2   14   0  0.1250   0.8750 276 428   -152        1         7          8        0.125         0.875        1         7          8        0.125         0.875
14  IND  11    5   0  0.6875   0.3125 391 336     55        6         2          8        0.750         0.250        5         3          8        0.625         0.375
15  JAX   4   12   0  0.2500   0.7500 247 449   -202        1         7          8        0.125         0.875        3         5          8        0.375         0.625
16  KCC  11    5   0  0.6875   0.3125 430 305    125        5         3          8        0.625         0.375        6         2          8        0.750         0.250
17  MIA   8    8   0  0.5000   0.5000 317 335    -18        4         4          8        0.500         0.500        4         4          8        0.500         0.500
18  MIN   5   10   1  0.3125   0.6250 391 480    -89        5         3          8        0.625         0.375        0         8          8        0.000         1.000
19  NEP  12    4   0  0.7500   0.2500 444 338    106        8         0          8        1.000         0.000        4         4          8        0.500         0.500
20  NOS  11    5   0  0.6875   0.3125 414 304    110        8         0          8        1.000         0.000        3         5          8        0.375         0.625
21  NYG   7    9   0  0.4375   0.5625 294 383    -89        4         4          8        0.500         0.500        3         5          8        0.375         0.625
22  NYJ   8    8   0  0.5000   0.5000 290 387    -97        6         2          8        0.750         0.250        2         6          8        0.250         0.750
23  OAK   4   12   0  0.2500   0.7500 322 453   -131        3         5          8        0.375         0.625        1         7          8        0.125         0.875
24  PHI  10    6   0  0.6250   0.3750 442 382     60        4         4          8        0.500         0.500        6         2          8        0.750         0.250
25  PIT   8    8   0  0.5000   0.5000 379 370      9        5         3          8        0.625         0.375        3         5          8        0.375         0.625
26  SDC   9    7   0  0.5625   0.4375 396 348     48        5         3          8        0.625         0.375        4         4          8        0.500         0.500
27  SEA  13    3   0  0.8125   0.1875 417 231    186        7         1          8        0.875         0.125        6         2          8        0.750         0.250
28  SFO  12    4   0  0.7500   0.2500 406 272    134        6         2          8        0.750         0.250        6         2          8        0.750         0.250
29  STL   7    9   0  0.4375   0.5625 348 364    -16        5         3          8        0.625         0.375        2         6          8        0.250         0.750
30  TBB   4   12   0  0.2500   0.7500 288 389   -101        3         5          8        0.375         0.625        1         7          8        0.125         0.875
31  TEN   7    9   0  0.4375   0.5625 362 381    -19        3         5          8        0.375         0.625        4         4          8        0.500         0.500
32  WAS   3   13   0  0.1875   0.8125 334 478   -144        2         6          8        0.250         0.750        1         7          8        0.125         0.875
```

*Note: This figure only prints out first nineteen columns of 182 columns.

Figure 7:

```
names(nfl)
 [1] "Team"                "Win"                 "Loss"                "Tie"                 "Win_pct"             "Loss_pct"            "PF"                  "PA"
 [9] "spread"              "home_win"            "home_loss"           "home_games"          "home_win_pct"        "home_loss_pct"       "away_win"            "away_loss"
[17] "away_games"          "away_win_pct"        "away_loss_pct"       "div_win"             "div_loss"            "div_games"           "div_win_pct"         "div_loss_pct"
[25] "conf_win"            "conf_loss"           "conf_games"          "conf_win_pct"        "conf_loss_pct"       "q1_points"           "q2_points"           "q3_points"
[33] "q4_points"           "ot_points"           "firsthalf"           "secondhalf"          "firstthree"          "pfirstdowns"         "rfirstdowns"         "penalty_fdowns"
[41] "total_first_downs"   "thirddown_suc"       "thirddown_fail"      "thirddown_att"       "thirddown_convpct"   "thirddown_failpct"   "fourthdown_suc"      "fourthdown_fail"
[49] "fourthdown_att"      "fourthdown_convpct"  "fourthdown_failpct"  "total_yds"           "total_plays"         "total_drives"        "total_plays_drive"   "total_yds_play"
[57] "total_yds_drive"     "redzone_suc"         "redzone_fail"        "redzone_att"         "redzone_convpct"     "redzone_failpct"     "num_penalties"       "penalty_yards"
[65] "yards_per_penalty"   "dst_tds"            "picksixes"           "dst_td_fum"          "top"                 "fqb_comp"            "fqb_incomp"          "fqb_att"
[73] "fqb_comp_pct"        "fqb_incomp_pct"      "fqb_pass_yds"        "fqb_yds_comp"        "fqb_pass_tds"        "fqb_tds_comp"        "fqb_ints"            "fqb_rating"
[81] "fqb_sack_yds"        "total_comps"         "total_att"           "total_comp_pct"      "total_incomps"       "total_incomp_pct"    "total_passing_yds"   "total_yds_comp"
[89] "total_pass_tds"      "total_tds_comp"      "total_ints"          "total_sacks"         "total_sack_yds"      "fr_car"              "fr_yds"              "fr_yds_car"
[97] "fr_tds"              "fr_tds_car"          "sr_car"              "sr_yds"              "sr_yds_car"          "sr_tds"              "sr_tds_car"          "toptwo_car"
[105] "toptwo_yds"         "toptwo_yds_car"      "toptwo_tds"          "toptwo_tds_car"      "total_carries"       "total_rush_yds"      "total_yds_car"       "total_rush_tds"
[113] "total_tds_car"      "fwr_rec"             "fwr_yds"             "fwr_yds_rec"         "fwr_tar"             "fwr_comp_pct"        "fwr_tds"             "fwr_tds_rec"
[121] "fwr_lg"             "swr_rec"             "swr_yds"             "swr_yds_rec"         "swr_tar"             "swr_comp_pct"        "swr_tds"             "swr_tds_rec"
[129] "swr_lg"             "twr_rec"             "twr_yds"             "twr_yds_rec"         "twr_tar"             "twr_comp_pct"        "twr_tds"             "twr_tds_rec"
[137] "twr_lg"             "topthree_rec"        "topthree_rec_yds"    "topthree_yds_rec"    "topthree_tar"        "topthree_comp_pct"   "topthree_rec_tds"    "topthree_tds_rec"
[145] "topthree_lg"        "total_rec"           "total_rec_yds"       "total_yds_rec"       "total_rec_tds"       "total_tds_rec"       "total_tar"           "lg_rec"
[153] "off_tds"            "fum_lost"            "turnovers"           "total_tackles"       "solo_tackles"        "joint_tackles"       "tfl"                 "pds"
[161] "qb_hits"            "num_krs"             "kr_yds"              "kr_avg"              "kr_lg"               "kr_tds"              "num_pr"              "pr_yds"
[169] "pr_avg"             "pr_lg"               "pr_tds"              "fg_att"              "fg_made"             "fg_pct"              "fg_lg"               "xp_made"
[177] "kick_points"        "punts"               "punt_yds"            "punt_avg"            "punt_lg"             "tbs"                 "und_twenty"
```

Statistical Analysis (Regression):

Now that we have our final dataset, we need to figure out which combinations of explanatory variables will fit the best model to predict how a team wins a game. We will use the ordinary least squares linear regression method to determine the best fitting model, due to the fact that we have both a quantitative response variable and quantitative predictors. The model that fits the data best will be the one that minimizes deviation from the predictive values of the model to the data itself (residuals/error). Deviation represents the distance between the predictive model's regression line to actual data points. Since deviation can be positive or negative (data points above or below predicted line), we square these deviations, then sum each data points squared deviation to get a residual estimate for the model (SSres=Sum of Squared Residuals). Due to variation from sample to sample due to unexplained randomness (SSrandom), SSres does not cover all of the deviation the model creates. Therefore, the total deviation in the model (SStot) = SSres+SSrandom. Since it is impossible to control or predict SSrandom, the best fit model minimizes SSres and has all of its variation in SSrandom.

Adjusted R Squared:

We define a statistic R^2 to be $R^2 \equiv 1 - \frac{SS_{\text{res}}}{SS_{\text{tot}}}$., where the closest R^2 is to one is the best fitting model to the data. A high R^2 will be computed with little sampling variation (SSres minimized), and the rest of the variation in unexplainable random error (SSrandom higher than SSres, so SStot higher than SSres). A better statistic is actually called Adjusted R^2 with adds a penalty to R^2 for including unnecessary predictors in the model. Adjusted R^2 is defined as

Adjusted R^2:

$R^2 = 1 - (1 - R^2)\frac{n-1}{n-k-1}$, where right-hand R^2 is the original R^2, n is the sample size, and k is the number of explanatory variables in the model. We still want Adjusted R^2 to be closest to one to be the

best fit of the model to the data. The interpretation of Adjusted R^2 is: "100 x Adjusted R^2" percent of the variation in the response variable can be explained by the predictors in the model. Using a team's total wins as the response variable, this is exactly what we want, so this will be the primary method of determining the best combinations of variables to explain how a team wins a game.

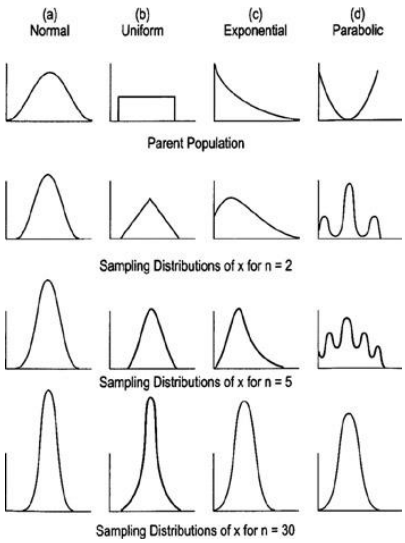
Overall Significance Test:

In addition to finding the model that explains the most sampling variation in the data, we must test to see if the model is statistically significant. To test this, we use an F Statistic where the test uses the null hypothesis that none of the predictors in the model are significant (Ho: $B_1=B_2=\ldots=B_k=0$) and the alternative hypothesis that at least one of the predictors is significant (Ha: at least one $B_k \neq 0$). The test statistic for this test is defined as, $F^0 = \frac{(SSR_R - SSR_{UR})/q}{SSR_{UR}/(n-k-1)} \sim F_{q,n-k-1}$ where SSR_R is sum of squared residuals in restricted model (no predictors), SSR_{UR} is the sum of squared residuals in the unrestricted model (all predictors included), q is the difference in the number of predictors between the unrestricted and restricted model, n is the sample size, and k is the number of predictors in unrestricted model. Using 0.05 as the significance level, this F statistic used with the F distribution obtains a p-value value to either reject the null hypothesis or fail to reject the null hypothesis. A p-value is defined as the probability of obtaining data as extreme or more extreme than the data observed, assuming the null hypothesis is true. So, a small p-value leads us to believe that the model is in fact helpful, and results are not obtained through pure random chance (null hypothesis). If the test rejects the null hypothesis, then we can conclude with 95% confidence that the overall model is statistically significant, which is our goal.

Central Limit Theorem:

In order for our F test of overall significance and conclusions from our regression models to be valid, we first must assume that the data itself came from a normal distribution. We do not know the distribution of each of the 182 individual variables (183 minus team names variable), however we do know that we have 32 observations from each variable since there are 32 teams and every team contributes one statistic to each variable. The central limit theorem states that as the sample size increases, the sampling distribution become approximately normal (*Figure 8).* Generally, a sample size of 30 or greater is sufficient for assume approximate normality, so since all of our variables have 32 observations, we will assume normality making our conclusions from regression models and our overall significance test to be valid.

Figure 8:

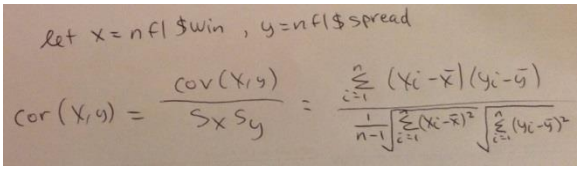


Creating Multiple Models on Large Scale:

The original goal of this project was to pick the very best model to fit the data gathered for the NFL season. To do that, we must create as many models as possible on a large scale to compare against to find the ultimate model. After examining the 182 potential explanatory variables to create regression models with, I narrowed it down to 156 and created a subset of the data, due to zero variability in some variables. For example, all teams play six division games in a season, so we cannot use div_games as an explanatory variable in regression. Also, if we are including home winning percentage as a predictor for example, we wouldn't also want to include the number of home wins they had as well because it would be redundant. Using wins as the response variable, we now want to create all possible models using the remaining 155 explanatory variables. I focused on creating three functions in R to create all possible regression models for one predictor, two predictor, and three predictor models respectively.

Alternative Response Variables:

Our primary response variable we are interested in analyzing is a team's total wins throughout the season. However, I wrote the three functions to be able to input any other response variable of the 183 variables in the dataset as a parameter. In this project, I decided to choose wins and spread as the two response variables to look into, but any other variable can be easily selected and analyzed for future studies. Spread was chosen to provide a more variable quantitative response variable that can be positive and negative, and intuitively should be a good indicator of wins, in general. This is because if a team scores more points than their opponent in any given game (positive spread), that is the definition of a win. So, spread should be a very good indication of a win, however it is not a perfect indication. The adjusted R squared value of 0.889 implies that 88.9% of the variability in wins can be explained by spread. This is lower than expected; consider the following situation. Team A is playing Team B and Team A wins 40-10. The next week, Team A plays Team C and Team A loses 10-14. Although Team A's total record is 1-1, they have an aggregate total spread of positive 26. If just given that a team had played two games and had a spread of positive 26, most people would think they would be 2-0, but that could not be the case. In fact, we can see the correlation between spread and wins through the formula



which R calculates for us

```
> cor(final$Win,final$spread)
[1] 0.9448372
```

. The correlation is 0.945 which is not exactly one, so we can use spread as a predictor for wins, and vice versa when interchanging response variables, without worrying about multicollinearity.

One Predictor Models:

I created the one predictor model function, oneway.function(), where its only parameter is the response variable desired. Using wins as the response variable, all one would type into R would be oneway.function('nfl$Win~'). This function will loop through the subset of all of the 155 explanatory variables desired, and create a regression model with wins as the response variable, and each explanatory as the sole predictor. Since we have 155 variables to choose from, and want groups of 1, the total number of models will be 155 choose 1, which equals 155. So, the function will create 155 different regression models, and for each model it will: save the p-value for the overall significance test, test if the p-value is statistically significant or not (<0.05 is significant), and store the adjusted R squared value. After the function loops through all 155 models and has a p-value, significant/not significant result, and an adjusted R squared value, it will delete all models that are not significant overall, then if they are significant, it will sort the rest by their adjusted R squared values. Hence, the end result is a table of p-values, significance results, and sorted adjusted R squared values to determine the best fitting model.

One Predictor Model Analysis: Win as Response:

Figure 9 displays the contents of the table, with 60 observations indicating that only 60 of the predictors were significant in regressing wins. *Figure 10* shows the table of one predictor models, sorted by adjusted R squared, with wins as response.

Figure 9:

```
> str(oneway.function('nfl$Win~'))
[1] "Models using Win as the response variable"
'data.frame':   60 obs. of  3 variables:
 $ p.value           : num  4.37e-16 7.28e-15 1.09e-10 9.54
 $ significant       : chr  "yes" "yes" "yes" "yes" ...
 $ adjusted.r.squared: num  0.889 0.866 0.747 0.709 0.565 .
```

Figure 10:

```
> oneway.function('nfl$Win~')
[1] "Models using Win as the response variable"
                       p.value significant adjusted.r.squared
spread              4.372498e-16         yes         0.88914126
conf_win_pct        7.279029e-15         yes         0.86638463
home_win_pct        1.090188e-10         yes         0.74746641
away_win_pct        9.544725e-10         yes         0.70862148
PA                  4.252697e-07         yes         0.56526694
PF                  7.058136e-06         yes         0.47818216
secondhalf          2.405972e-05         yes         0.43519279
redzone_suc         2.532020e-05         yes         0.43333300
fqb_tds_comp        5.401516e-05         yes         0.40506465
kick_points         5.948889e-05         yes         0.40137168
q4_points           7.478109e-05         yes         0.39253514
div_win_pct         8.698670e-05         yes         0.38663040
firstthree          9.204579e-05         yes         0.38440925
total_tds_rec       1.320438e-04         yes         0.37005923
total_tds_comp      1.390605e-04         yes         0.36797578
fqb_rating          1.705120e-04         yes         0.35971085
off_tds             1.943849e-04         yes         0.35434866
xp_made             2.080856e-04         yes         0.35154581
fourthdown_fail     2.375360e-04         yes         0.34606767
topthree_tds_rec    6.044781e-04         yes         0.30625154
total_ints          8.758203e-04         yes         0.28988083
q3_points           9.777141e-04         yes         0.28496027
total_incomps       1.160074e-03         yes         0.27725832
turnovers           1.272548e-03         yes         0.27306275
fqb_ints            1.734414e-03         yes         0.25888073
fqb_pass_tds        1.856774e-03         yes         0.25572915
firsthalf           2.425429e-03         yes         0.24327689
q2_points           2.708916e-03         yes         0.23807823
topthree_rec_tds    2.754708e-03         yes         0.23728751
total_pass_tds      2.888155e-03         yes         0.23505272
total_rec_tds       2.888155e-03         yes         0.23505272
redzone_convpct     5.584675e-03         yes         0.20340170
thirddown_fail      6.242494e-03         yes         0.19796779
total_first_downs   6.346724e-03         yes         0.19715763
sr_yds              8.759435e-03         yes         0.18128837
pds                 9.741461e-03         yes         0.17601207
topthree_comp_pct   1.048906e-02         yes         0.17232859
rfirstdowns         1.283687e-02         yes         0.16221836
swr_tds             1.310071e-02         yes         0.16119626
total_sack_yds      1.528276e-02         yes         0.15343535
punts               1.581959e-02         yes         0.15169121
fqb_incomp          1.650778e-02         yes         0.14953748
sr_car              1.717210e-02         yes         0.14753965
total_incomp_pct    1.787721e-02         yes         0.14549973
total_carries       1.814222e-02         yes         0.14475323
fqb_incomp_pct      2.107056e-02         yes         0.13714576
fqb_comp_pct        2.107056e-02         yes         0.13714576
fqb_yds_comp        2.261686e-02         yes         0.13353553
fourthdown_convpct  2.733764e-02         yes         0.12384399
fqb_sack_yds        2.736247e-02         yes         0.12379750
total_sacks         2.841699e-02         yes         0.12185987
total_rush_tds      2.923555e-02         yes         0.12040390
kr_yds              3.238601e-02         yes         0.11515126
total_comp_pct      3.287530e-02         yes         0.11438097
fwr_tds             3.551877e-02         yes         0.11040555
thirddown_convpct   3.595374e-02         yes         0.10977954
total_yds_drive     3.686175e-02         yes         0.10849653
punt_yds            3.935101e-02         yes         0.10513342
total_yds_rec       4.163574e-02         yes         0.10222731
q1_points           4.936266e-02         yes         0.09345589
```

Spread was the very best predictor for a team's total wins in a season, which makes sense and validates our decision to analyze spread as a response variable later as well. Going down the table, conference winning percentage explains 86.8% of the variability in wins, home winning percentage explains 74.7%, away winning percentage explains 70.9%, points against explains 56.5%, points for explains 47.8%, and second half points explain 43.5% of the variability in wins etc. Some takeaway points here are that conference wins are more important than home wins, home wins are more influential than away wins, points against is more crucial points for, and second half points are more essential than first half points. If we were to present these findings to coaches in the NFL, we could conclude that conference home games are very important, a good defense is better than a good offense (since points against is a better indicator than a points for), and the second half is where they should really turn it up a notch and fight for the most points.

Going farther down the table, we have redzone successes, top quarterback's completed touchdowns, kicker's points, fourth quarter points, division winning percentage, and then the first three quarters combined points, in that order. Again showing these results to NFL coaches and scouts, we would advise teams to urge the importance of putting the ball in the endzone when within the twenty yard line, and the kicker's total points scored is more influential than fourth quarter points. So, kickers really are a crucial piece of the puzzle, and should be taken more seriously in the draft, trades, free agency, etc. Also, we can see that fourth quarter points are more important than the first three quarters put together, so the clutch factor is real.

One Predictor Model Analysis: Spread as Response:

Using spread as the response variable, and including wins as a predictor, we obtain the following summary and output. *Figure 11* shows the contents, and in *Figure 12*, I used the head() function in R to only print out 50 observations for conciseness of displaying the table.

Figure 11:

```
> str(oneway.function('nfl$spread~'))
[1] "Models using Spread as the response variable"
'data.frame':   70 obs. of  3 variables:
 $ p.value           : num  4.37e-16 6.14e-11 9.84e-09 3.25e-(
 $ significant       : chr  "yes" "yes" "yes" "yes" ...
 $ adjusted.r.squared: num  0.889 0.757 0.66 0.633 0.613 ...
 '
```

Figure 12:

```
> head(oneway.function('nfl$spread~'),50)
[1] "Models using Spread as the response variable"
                      p.value significant adjusted.r.squared
Win                4.372498e-16         yes          0.8891413
conf_win_pct       6.135514e-11         yes          0.7568717
home_win_pct       9.837983e-09         yes          0.6602903
away_win_pct       3.246377e-08         yes          0.6326022
PF                 7.310038e-08         yes          0.6125325
fqb_tds_comp       1.356189e-07         yes          0.5965409
redzone_suc        4.014649e-07         yes          0.5668978
PA                 5.481907e-07         yes          0.5580078
fqb_rating         1.266329e-06         yes          0.5332349
firstthree         1.271299e-06         yes          0.5331160
total_tds_comp     1.520294e-06         yes          0.5276523
total_tds_rec      1.596186e-06         yes          0.5261538
xp_made            2.582728e-06         yes          0.5111035
off_tds            2.967207e-06         yes          0.5066794
secondhalf         7.689724e-06         yes          0.4752806
q4_points          1.805523e-05         yes          0.4455441
fqb_pass_tds       4.074238e-05         yes          0.4157343
firsthalf          4.975420e-05         yes          0.4081920
total_ints         6.632876e-05         yes          0.3971826
q2_points          6.751288e-05         yes          0.3964990
topthree_tds_rec   8.098703e-05         yes          0.3894280
total_pass_tds     9.018946e-05         yes          0.3852106
total_rec_tds      9.018946e-05         yes          0.3852106
fqb_ints           1.900178e-04         yes          0.3552814
topthree_rec_tds   2.757649e-04         yes          0.3398430
redzone_convpct    3.091983e-04         yes          0.3350345
kick_points        3.886770e-04         yes          0.3253304
fourthdown_fail    4.472464e-04         yes          0.3193159
total_first_downs  6.748720e-04         yes          0.3014215
div_win_pct        7.509067e-04         yes          0.2967135
q3_points          8.415503e-04         yes          0.2916585
turnovers          1.142962e-03         yes          0.2779302
thirddown_fail     1.607545e-03         yes          0.2623801
total_incomps      1.799215e-03         yes          0.2571863
topthree_comp_pct  2.494742e-03         yes          0.2419543
punts              2.581950e-03         yes          0.2403391
fqb_incomp_pct     3.330308e-03         yes          0.2282939
fqb_comp_pct       3.330308e-03         yes          0.2282939
total_sack_yds     3.786155e-03         yes          0.2221694
pds                3.962172e-03         yes          0.2199915
total_incomp_pct   4.238825e-03         yes          0.2167487
total_sacks        5.398503e-03         yes          0.2050512
total_comp_pct     6.169865e-03         yes          0.1985400
total_yds_drive    6.189455e-03         yes          0.1983851
fwr_tds            7.041027e-03         yes          0.1920661
swr_tds            7.211519e-03         yes          0.1908897
punt_yds           7.312478e-03         yes          0.1902056
fqb_sack_yds       7.411795e-03         yes          0.1895414
rfirstdowns        7.639381e-03         yes          0.1880512
fourthdown_convpct 8.305901e-03         yes          0.1839205
```

Similar to using win as the response and spread being the most important variable, win is the most influential predictor using spread as the response. It in fact has the same adjusted R squared and p-value because regressing win on spread has the exact same variability regressing spread on win. Also, we see conference winning percentage, home winning percentage, and away winning percentage are the next three significant predictors, which was similar to using win as the response. Comparing the two, with spread as the response, we have conference winning percentage as explaining 75.7%, home winning percentage explaining 66%, and away winning percentage explaining 63.5% of the variability in spread. However, using win as the response, conference winning percentage was 88.6%, home winning percentage was 74.7%, and away winning percentage was 70.9%. All three predictors explained more variability in wins than spread. Continuing down the table, we have a few small differences from win models. The best fitting order goes from points for, top quarterback touchdowns completed, redzone successes, to points against, whereas the win models went from points against, points for, second half points, redzone successes, to top quarterback touchdowns completed. Not too many differences between using win and spread as the response variables for one predictor models, so we will examine multiple predictor models in multiple regression to make more sophisticated conclusions.

Two Predictor Models:

Creating multiple models with two explanatory variables is the same concept as one predictor models, but with groups of two. Utilizing data from one predictor models, we will only create two predictor models using variables that were solely significant. Since at least 50 variables were significant using for both wins and spread as response, we will examine only the top 50 variables from each table. With 50 variables to choose from, and want groups of 2, the total number of models will be 50 choose 2, which equals 1225. Looking ahead to three predictor models, we would have 50 choose 3 models, which equals 19,600. Both of these are a little overkill, and after doing some tests with a high number of variables to choose from, it was clear that the most influential predictors from the one explanatory variable models pulled too much weight to uncover deeper underlying trends. For example, the two way models with win as response had spread plus another predictor in almost all of the top models. To fix this problem, I implemented two strategies. The first was to add a parameter to the two way and three way functions to specify how many explanatory variables the user wanted to make combinations of. After some trial and error, I found that when combining all sixty significant sole variables and computing adjusted R squareds, the top sole predictors were prevalent in all the best fit models. So, I chose to only use the top fifteen explanatory variables. Secondly, I added a final parameter to specify how deep into the predictors we wanted to start at to uncover further trends. To do this, one could specify to either keep all the best predictors to be chosen for variable combinations ('top'), omit the top four predictors that solely had the highest adjusted R squareds' ('deeper'), or delete the top eight solo predictors ('deepest'). The deeper and deepest analyses will be conducted at the end. So, per my fifteen top variables to combine specification,

the two way function will create 15 choose 2, which equals 105 different regression models. For each one it will still: save the p-value for the overall significance test, test if the p-value is statistically significant or not (<0.05 is significant), and store the adjusted R squared value.

Two Predictor Model Analysis: Win as Response:

By specifying fifteen as the number of variables to make combinations of, win as the response variable, and 'top' for the deeper type, I got the following output. *Figure 13* displays the contents of the table, with 104 observations. We were expecting 105 observations, but I included a line of code that deletes models with an adjusted R squared equal to one, which should be omitted due to multicollinearity. One of the models was regressing wins on home winning percentage plus away winning percentage, which is a linear scale of total wins, so that model was deleted from the table. *Figure 14* shows the table of the top 50 two predictor models, and I again only printed out 50 observations for the tables.

Figure 13:

```
> str(twoways.function(15,'nfl$Win~','top'))
[1] "Models using Win as the response variable"
[1] "Top Predictors"
'data.frame':   104 obs. of  3 variables:
 $ p.value           : num  1.41e-18 3.18e-17 1.19e-
 $ significant       : chr  "yes" "yes" "yes" "yes"
 $ adjusted.r.squared: num  0.937 0.922 0.915 0.909
```

Figure 14:

```
> head(twoways.function(15,'nfl$Win~','top'),50)
[1] "Models using Win as the response variable"
[1] "Top Predictors"
                                p.value significant adjusted.r.squared
spread+conf_win_pct         1.411501e-18         yes           0.9372076
conf_win_pct+home_win_pct   3.178642e-17         yes           0.9221628
spread+home_win_pct         1.186505e-16         yes           0.9147612
spread+away_win_pct         3.032915e-16         yes           0.9090616
spread+fqb_tds_comp         5.118171e-16         yes           0.9057199
spread+div_win_pct          8.769652e-16         yes           0.9021527
spread+kick_points          1.357025e-15         yes           0.8991618
spread+total_tds_comp       1.654767e-15         yes           0.8977729
spread+total_tds_rec        1.876539e-15         yes           0.8968823
spread+firstthree           2.464057e-15         yes           0.8949270
spread+redzone_suc          4.076221e-15         yes           0.8912153
spread+PF                   4.371431e-15         yes           0.8906895
spread+PA                   4.371431e-15         yes           0.8906895
PA+PF                       4.371431e-15         yes           0.8906895
conf_win_pct+PF             5.310625e-15         yes           0.8892124
spread+secondhalf           8.510534e-15         yes           0.8855500
conf_win_pct+redzone_suc    8.536295e-15         yes           0.8855261
spread+q4_points            8.760165e-15         yes           0.8853216
conf_win_pct+firstthree     1.335633e-14         yes           0.8819368
PA+secondhalf               1.417387e-14         yes           0.8814521
conf_win_pct+fqb_tds_comp   1.422891e-14         yes           0.8814204
conf_win_pct+q4_points      1.612877e-14         yes           0.8803910
conf_win_pct+away_win_pct   2.217234e-14         yes           0.8777369
conf_win_pct+kick_points    2.379484e-14         yes           0.8771399
conf_win_pct+secondhalf     2.449465e-14         yes           0.8768941
conf_win_pct+total_tds_rec  2.740356e-14         yes           0.8759376
conf_win_pct+total_tds_comp 3.032766e-14         yes           0.8750671
conf_win_pct+PA             3.453788e-14         yes           0.8739420
conf_win_pct+div_win_pct    1.203543e-13         yes           0.8626081
PA+redzone_suc              6.064180e-13         yes           0.8463982
PA+q4_points                2.113695e-12         yes           0.8325851
PA+firstthree               5.340923e-12         yes           0.8215330
home_win_pct+PA             1.763189e-11         yes           0.8062110
home_win_pct+fqb_tds_comp   3.403814e-11         yes           0.7972176
home_win_pct+PF             6.018656e-11         yes           0.7890879
home_win_pct+redzone_suc    6.552643e-11         yes           0.7878478
home_win_pct+total_tds_comp 7.824656e-11         yes           0.7852361
home_win_pct+total_tds_rec  7.959199e-11         yes           0.7849834
home_win_pct+secondhalf     9.119136e-11         yes           0.7829565
home_win_pct+firstthree     9.866762e-11         yes           0.7817739
away_win_pct+PA             1.037870e-10         yes           0.7810112
away_win_pct+div_win_pct    1.289422e-10         yes           0.7777090
home_win_pct+q4_points      1.977412e-10         yes           0.7710561
away_win_pct+kick_points    2.143612e-10         yes           0.7697783
away_win_pct+PF             3.065079e-10         yes           0.7640303
home_win_pct+kick_points    3.228196e-10         yes           0.7631850
away_win_pct+q4_points      5.112276e-10         yes           0.7555565
away_win_pct+secondhalf     5.121348e-10         yes           0.7555266
home_win_pct+div_win_pct    5.147845e-10         yes           0.7554396
away_win_pct+redzone_suc    7.287033e-10         yes           0.7495075
```

We see that analyzing two way models is comparative to looking at the one way models, since the most significant two way models are combinations of the top one way models. The top three one way predictors of wins were spread, conference winning percentage, and home winning percentage, and we can see from this two way output that the top grouping has spread plus another predictor, then the next obvious group is conference winning percentage plus another predictor, and the bottom group has home winning percentage plus other predictors. However, the adjusted R squareds did increase dramatically. In the one way models, spread had an adjusted R squared of 0.889 but once we add conference winning percentage to that model, we get an adjusted R squared of 0.937. Conference winning percentage on its own was 0.866 and home winning percentage was 0.747 but including both in the model increases the adjusted R squared up to 0.922. Since adjusted R squared accounts for adding unnecessary explanatory variables, this increase in adjusted R squared is valid and these two predictor models are doing a better job of predicting wins. To get even higher adjusted R squareds, we will analyze three way models later.

Two Predictor Model Analysis: Spread as Response:

Similar to the two way models with win as the response variable, *Figure 15* shows that there are only 104 observations, with one model omitted due to multicollinearity. In this case, points for plus points against equals spread, so that is the deleted model. *Figure 16* shows the table of the top 50 two way models.

Figure 15:

```
> str(twoways.function(15,'nfl$spread~','top'))
[1] "Models using Spread as the response variable"
[1] "Top Predictors"
'data.frame':   104 obs. of  3 variables:
 $ p.value           : num  1.29e-22 2.19e-20 4.62e
 $ significant       : chr  "yes" "yes" "yes" "yes"
 $ adjusted.r.squared: num  0.967 0.953 0.942 0.94
```

Figure 16:

```
> head(twoways.function(15,'nfl$spread~','top'),50)
[1] "Models using Spread as the response variable"
[1] "Top Predictors"
                                p.value significant adjusted.r.squared
PA+off_tds                  1.285048e-22         yes          0.9669452
redzone_suc+PA              2.186721e-20         yes          0.9528928
PA+firstthree               4.624335e-19         yes          0.9418588
PA+xp_made                  8.231194e-19         yes          0.9395002
Win+fqb_tds_comp            1.833986e-18         yes          0.9360634
Win+fqb_rating              9.760904e-18         yes          0.9282495
Win+total_tds_comp          2.426016e-17         yes          0.9235998
Win+xp_made                 2.590846e-17         yes          0.9232527
Win+total_tds_rec           3.021723e-17         yes          0.9224341
Win+off_tds                 4.027395e-17         yes          0.9208819
Win+firstthree              4.471427e-17         yes          0.9203092
Win+PF                      5.834599e-17         yes          0.9188332
Win+redzone_suc             8.271112e-17         yes          0.9168561
PA+secondhalf               2.691236e-16         yes          0.9098082
Win+secondhalf              2.926485e-15         yes          0.8936732
Win+PA                      5.557843e-15         yes          0.8888643
Win+conf_win_pct            8.305727e-15         yes          0.8857421
home_win_pct+away_win_pct   8.743919e-15         yes          0.8853362
Win+away_win_pct            8.743919e-15         yes          0.8853362
Win+home_win_pct            8.743919e-15         yes          0.8853362
conf_win_pct+fqb_tds_comp   5.893344e-14         yes          0.8692099
conf_win_pct+PF             2.359861e-13         yes          0.8560776
conf_win_pct+fqb_rating     3.252964e-13         yes          0.8528563
PA+fqb_rating               4.472507e-13         yes          0.8495897
conf_win_pct+redzone_suc    5.643507e-13         yes          0.8471579
conf_win_pct+firstthree     5.914365e-13         yes          0.8466630
conf_win_pct+total_tds_rec  1.234577e-12         yes          0.8386797
conf_win_pct+total_tds_comp 1.240564e-12         yes          0.8386258
home_win_pct+fqb_tds_comp   1.994961e-12         yes          0.8332512
conf_win_pct+xp_made        2.366273e-12         yes          0.8312767
fqb_tds_comp+PA             3.096633e-12         yes          0.8281174
conf_win_pct+off_tds        3.770433e-12         yes          0.8257677
conf_win_pct+home_win_pct   1.923183e-11         yes          0.8050467
home_win_pct+fqb_rating     2.186607e-11         yes          0.8033131
PA+total_tds_comp           2.924295e-11         yes          0.7993300
PA+total_tds_rec            3.235662e-11         yes          0.7979249
home_win_pct+total_tds_comp 3.931629e-11         yes          0.7951915
home_win_pct+total_tds_rec  4.673785e-11         yes          0.7927345
conf_win_pct+secondhalf     4.957718e-11         yes          0.7918897
home_win_pct+PF             5.089634e-11         yes          0.7915125
home_win_pct+xp_made        6.324027e-11         yes          0.7883667
home_win_pct+redzone_suc    7.348124e-11         yes          0.7861647
home_win_pct+firstthree     8.337405e-11         yes          0.7842939
away_win_pct+PF             9.995096e-11         yes          0.7815793
conf_win_pct+PA             1.328098e-10         yes          0.7772554
home_win_pct+off_tds        1.467514e-10         yes          0.7757167
away_win_pct+fqb_tds_comp   2.366342e-10         yes          0.7682034
conf_win_pct+away_win_pct   2.608776e-10         yes          0.7666390
away_win_pct+redzone_suc    4.030470e-10         yes          0.7595321
away_win_pct+firstthree     5.684077e-10         yes          0.7537626
```

This two way table of spread is also similar to its one way counterpart. The top groupings of two way models are in the same order as the one predictor models of spread. The top three one way models of spread were wins, conference winning percentage, and home winning percentage, which are parallel to the order of groupings of the top two way models. However, the very best two predictor model of spread is points against plus offensive touchdowns, which is surprising considering neither of the two were at the very top of the one

way predictor models. We see more top two way models with points against as a predictor, instead of points for, reiterating that a good defense is more important than a good offense. However, almost all of the explanatory variables are offensive statistics, so points against (defense) plus offensive statistics is going to explain more variability in the response than points for (offense) plus more offensive statistics. The defense statistics are not as significant solely, so future analyses could be examining points for with some of the defense statistics farther down.

Next, we observe that the second best two way model is points against plus red zone successes, and the third is points against plus first three quarter's combined points. This third model is just missing the fourth quarter's points to be a perfect multicollinearity model, while redzone successes are still more necessary than first three quarter's points. This is a very powerful conclusion, and coaches should focus more on having well thoughout out, successful redzone plays. Again we see that the two way model's adjusted R squareds are consistently higher than the one way models for spread, concluding that these new predictors are valid in helping to further explain spread. For even more explainability, we will introduce three way models to investigate more in depth predictive types.

Three Predictor Models:

Creating multiple models with three explanatory variables is the same concept as the two predictor models, but with groups of three. Selecting fifteen of the top predictors as a parameter in the three way function, and wanting groups of 3, the total number of models the function will create will be 15 choose 3, which equals 455 different regression models. For each one it will still: save the p-value for the overall significance test, test if the p-value is statistically significant or not (<0.05 is significant), and store the adjusted R squared value.

Three Predictor Model Analysis: Win as Response:

Similar to the two way models, *Figure 17* shows that there are only 442 observations, with 13 models omitted due to multicollinearity. In this case, wins is a perfect linear combination of home plus away winning percentage plus any other variable, since like in the two way case, home plus away winning percentage is linear scale of wins. *Figure 18* shows the table of the top 50 two way models.

Figure 17:

```
> str(threeways.function(15,'nfl$Win~','top'))
[1] "Models using Win as the response variable"
[1] "Top Predictors"
'data.frame':   442 obs. of  3 variables:
 $ p.value           : num  2.79e-19 6.68e-18 8.02e
 $ significant       : chr  "yes" "yes" "yes" "yes"
 $ adjusted.r.squared: num  0.953 0.941 0.94 0.939
```

Figure 18:

```
> head(threeways.function(15,'nfl$Win~','top'),50)
[1] "Models using Win as the response variable"
[1] "Top Predictors"
```

	p.value	significant	adjusted.r.squared
spread+conf_win_pct+home_win_pct	2.791715e-19	yes	0.9527886
spread+conf_win_pct+kick_points	6.675895e-18	yes	0.9407503
spread+conf_win_pct+fqb_tds_comp	8.017388e-18	yes	0.9399688
spread+conf_win_pct+total_tds_comp	1.034851e-17	yes	0.9388622
spread+conf_win_pct+total_tds_rec	1.175147e-17	yes	0.9383034
spread+conf_win_pct+away_win_pct	1.245062e-17	yes	0.9380477
spread+conf_win_pct+div_win_pct	1.760046e-17	yes	0.9364936
spread+conf_win_pct+firstthree	1.775420e-17	yes	0.9364541
spread+conf_win_pct+redzone_suc	2.180676e-17	yes	0.9355121
spread+conf_win_pct+PF	2.273455e-17	yes	0.9353195
spread+conf_win_pct+PA	2.273455e-17	yes	0.9353195
conf_win_pct+PA+PF	2.273455e-17	yes	0.9353195
spread+conf_win_pct+q4_points	2.359879e-17	yes	0.9351465
spread+conf_win_pct+secondhalf	2.402543e-17	yes	0.9350633
conf_win_pct+home_win_pct+fqb_tds_comp	5.487731e-17	yes	0.9311081
conf_win_pct+home_win_pct+PF	6.386721e-17	yes	0.9303558
conf_win_pct+home_win_pct+redzone_suc	6.812956e-17	yes	0.9300330
conf_win_pct+home_win_pct+firstthree	9.006373e-17	yes	0.9286209
conf_win_pct+home_win_pct+total_tds_rec	1.306260e-16	yes	0.9266952
conf_win_pct+home_win_pct+total_tds_comp	1.394068e-16	yes	0.9263530
conf_win_pct+home_win_pct+q4_points	1.696881e-16	yes	0.9253092
conf_win_pct+home_win_pct+secondhalf	1.874358e-16	yes	0.9247753
spread+away_win_pct+fqb_tds_comp	2.115490e-16	yes	0.9241206
conf_win_pct+home_win_pct+PA	2.532856e-16	yes	0.9231359
conf_win_pct+home_win_pct+kick_points	2.935439e-16	yes	0.9223197
spread+away_win_pct+div_win_pct	3.095612e-16	yes	0.9220236
conf_win_pct+PA+secondhalf	3.689153e-16	yes	0.9210380
conf_win_pct+PA+redzone_suc	4.135350e-16	yes	0.9203897
conf_win_pct+home_win_pct+div_win_pct	4.201289e-16	yes	0.9202995
spread+home_win_pct+fqb_tds_comp	4.275497e-16	yes	0.9201995
spread+fqb_tds_comp+div_win_pct	4.805286e-16	yes	0.9195291
spread+away_win_pct+kick_points	6.228341e-16	yes	0.9180202
spread+home_win_pct+div_win_pct	6.412354e-16	yes	0.9178491
spread+home_win_pct+kick_points	6.938263e-16	yes	0.9173840
spread+home_win_pct+total_tds_comp	7.194099e-16	yes	0.9171695
spread+home_win_pct+total_tds_rec	7.680499e-16	yes	0.9167805
spread+home_win_pct+firstthree	8.033034e-16	yes	0.9165125
spread+away_win_pct+total_tds_comp	8.394207e-16	yes	0.9162491
spread+away_win_pct+total_tds_rec	9.554569e-16	yes	0.9154689
spread+home_win_pct+PF	1.036051e-15	yes	0.9149771
spread+home_win_pct+PA	1.036051e-15	yes	0.9149771
home_win_pct+PA+PF	1.036051e-15	yes	0.9149771
spread+div_win_pct+total_tds_comp	1.043600e-15	yes	0.9149329
spread+home_win_pct+redzone_suc	1.107474e-15	yes	0.9145702
spread+div_win_pct+total_tds_rec	1.343532e-15	yes	0.9133796
conf_win_pct+PA+q4_points	1.344772e-15	yes	0.9133739
spread+away_win_pct+firstthree	1.415265e-15	yes	0.9130562
conf_win_pct+PA+firstthree	1.445559e-15	yes	0.9129242
spread+div_win_pct+firstthree	1.623283e-15	yes	0.9121980
spread+home_win_pct+secondhalf	1.717701e-15	yes	0.9118417

As expected, the top groupings of three way models were combinations of the top two way models. However, if three way models that have two way models nested inside them have a lower adjusted R squared than the two way model, then the added predictor in the three way model is useless. We will combine all types of models together later and see how these three way models compare to the one way and two way models.

Three Predictor Model Analysis: Spread as Response:

Similar to the three way models with win as the response variable, *Figure 19* shows that there are only 442 observations, with 13 models omitted due to multicollinearity. In this case, spread is a linear scale of points for plus points against plus any other 13 variables, so those 13 models were deleted. *Figure 20* shows the table of the top 50 two way models.

Figure 19:

```
> str(threeways.function(15,'nfl$spread~','top'))
[1] "Models using Spread as the response variable"
[1] "Top Predictors"
'data.frame':   442 obs. of  3 variables:
 $ p.value           : num  6.07e-28 3.23e-24 4.06e-
 $ significant       : chr  "yes" "yes" "yes" "yes"
 $ adjusted.r.squared: num  0.989 0.979 0.979 0.978
```

Figure 20:

```
> head(threeways.function(15,'nfl$spread~','top'),50)
[1] "Models using Spread as the response variable"
[1] "Top Predictors"
                                      p.value significant adjusted.r.squared
PA+firstthree+secondhalf         6.069989e-28         yes           0.9886550
Win+PA+off_tds                   3.228972e-24         yes           0.9790558
PA+off_tds+secondhalf            4.058557e-24         yes           0.9787107
PA+xp_made+secondhalf            6.888094e-24         yes           0.9778903
redzone_suc+PA+off_tds           1.986181e-23         yes           0.9761517
redzone_suc+PA+firstthree        3.184415e-23         yes           0.9753333
home_win_pct+PA+off_tds          2.643850e-22         yes           0.9713039
PA+firstthree+off_tds            2.862480e-22         yes           0.9711404
PA+xp_made+off_tds               9.526940e-22         yes           0.9685496
away_win_pct+PA+off_tds          1.030438e-21         yes           0.9683728
Win+PA+xp_made                   1.573119e-21         yes           0.9674014
redzone_suc+PA+xp_made           2.245541e-21         yes           0.9665613
conf_win_pct+PA+off_tds          2.394044e-21         yes           0.9664078
PA+total_tds_comp+off_tds        2.506825e-21         yes           0.9662970
PA+total_tds_rec+off_tds         2.654485e-21         yes           0.9661588
fqb_tds_comp+PA+off_tds          3.023833e-21         yes           0.9658421
PA+fqb_rating+off_tds            3.026924e-21         yes           0.9658396
Win+redzone_suc+PA               3.480571e-21         yes           0.9654968
Win+PA+firstthree                4.828174e-21         yes           0.9646798
redzone_suc+PA+secondhalf        5.275710e-21         yes           0.9644553
fqb_tds_comp+redzone_suc+PA      1.739811e-20         yes           0.9612890
redzone_suc+PA+fqb_rating        3.626641e-20         yes           0.9592011
redzone_suc+PA+total_tds_rec     3.863139e-20         yes           0.9590164
redzone_suc+PA+total_tds_comp    4.815223e-20         yes           0.9583655
fqb_tds_comp+PA+secondhalf       5.184052e-20         yes           0.9581452
home_win_pct+redzone_suc+PA      6.175391e-20         yes           0.9576180
conf_win_pct+redzone_suc+PA      6.481513e-20         yes           0.9574711
PA+firstthree+xp_made            1.898852e-19         yes           0.9540724
home_win_pct+PA+xp_made          2.302227e-19         yes           0.9534352
away_win_pct+redzone_suc+PA      2.319509e-19         yes           0.9534102
conf_win_pct+PA+firstthree       4.347492e-19         yes           0.9512687
home_win_pct+PA+firstthree       4.348504e-19         yes           0.9512678
PA+fqb_rating+secondhalf         4.363279e-19         yes           0.9512560
PA+fqb_rating+xp_made            9.236779e-19         yes           0.9485693
PA+total_tds_rec+secondhalf      1.600470e-18         yes           0.9465063
PA+total_tds_comp+secondhalf     1.651104e-18         yes           0.9463870
away_win_pct+PA+firstthree       2.589556e-18         yes           0.9446324
conf_win_pct+PA+xp_made          2.680778e-18         yes           0.9444951
Win+fqb_tds_comp+PA              2.789770e-18         yes           0.9443366
Win+PA+fqb_rating                2.866553e-18         yes           0.9442284
PA+fqb_rating+firstthree         3.645023e-18         yes           0.9432613
away_win_pct+PA+xp_made          4.498657e-18         yes           0.9424005
Win+fqb_tds_comp+total_tds_rec   4.989564e-18         yes           0.9419720
fqb_tds_comp+PA+firstthree       8.347500e-18         yes           0.9397952
PA+firstthree+total_tds_rec      8.352701e-18         yes           0.9397925
PA+firstthree+total_tds_comp     8.365279e-18         yes           0.9397860
Win+fqb_tds_comp+total_tds_comp  8.617102e-18         yes           0.9396581
PA+total_tds_comp+xp_made        1.054247e-17         yes           0.9387809
fqb_tds_comp+PA+xp_made          1.060276e-17         yes           0.9387559
PA+total_tds_rec+xp_made         1.062263e-17         yes           0.9387477
```

Once again we see that the top three way spread models are combinations of the top two way models. In the next section, we will see how the three way models compare with the one way and two way models to see if these added third predictors are important statistically.

Combining Top Models:

I will now combine all the types of top models together to compare one way, two way, and three way models for similar response variables.

Top Win Models:

```
> head(top.win.allmodels.sorted,50)
                                              p.value significant adjusted.r.squared
spread+conf_win_pct+home_win_pct          2.791715e-19         yes           0.9527886
spread+conf_win_pct+kick_points           6.675895e-18         yes           0.9407503
spread+conf_win_pct+fqb_tds_comp          8.017388e-18         yes           0.9399688
spread+conf_win_pct+total_tds_comp        1.034851e-17         yes           0.9388622
spread+conf_win_pct+total_tds_rec         1.175147e-17         yes           0.9383034
spread+conf_win_pct+away_win_pct          1.245062e-17         yes           0.9380477
spread+conf_win_pct                       1.411501e-18         yes           0.9372076
spread+conf_win_pct+div_win_pct           1.760046e-17         yes           0.9364936
spread+conf_win_pct+firstthree            1.775420e-17         yes           0.9364541
spread+conf_win_pct+redzone_suc           2.180676e-17         yes           0.9355121
spread+conf_win_pct+PF                    2.273455e-17         yes           0.9353195
spread+conf_win_pct+PA                    2.273455e-17         yes           0.9353195
conf_win_pct+PA+PF                        2.273455e-17         yes           0.9353195
spread+conf_win_pct+q4_points             2.359879e-17         yes           0.9351465
spread+conf_win_pct+secondhalf            2.402543e-17         yes           0.9350633
conf_win_pct+home_win_pct+fqb_tds_comp    5.487731e-17         yes           0.9311081
conf_win_pct+home_win_pct+PF              6.386721e-17         yes           0.9303558
conf_win_pct+home_win_pct+redzone_suc     6.812956e-17         yes           0.9300330
conf_win_pct+home_win_pct+firstthree      9.006373e-17         yes           0.9286209
conf_win_pct+home_win_pct+total_tds_rec   1.306260e-16         yes           0.9266952
conf_win_pct+home_win_pct+total_tds_comp  1.394068e-16         yes           0.9263530
conf_win_pct+home_win_pct+q4_points       1.696881e-16         yes           0.9253092
conf_win_pct+home_win_pct+secondhalf      1.874358e-16         yes           0.9247753
spread+away_win_pct+fqb_tds_comp          2.115490e-16         yes           0.9241206
conf_win_pct+home_win_pct+PA              2.532856e-16         yes           0.9231359
conf_win_pct+home_win_pct+kick_points     2.935439e-16         yes           0.9223197
conf_win_pct+home_win_pct                 3.178642e-17         yes           0.9221628
spread+away_win_pct+div_win_pct           3.095612e-16         yes           0.9220236
conf_win_pct+PA+secondhalf                3.689153e-16         yes           0.9210380
conf_win_pct+PA+redzone_suc               4.135350e-16         yes           0.9203897
conf_win_pct+home_win_pct+div_win_pct     4.201289e-16         yes           0.9202995
spread+home_win_pct+fqb_tds_comp          4.275497e-16         yes           0.9201995
spread+fqb_tds_comp+div_win_pct           4.805286e-16         yes           0.9195291
spread+away_win_pct+kick_points           6.228341e-16         yes           0.9180202
spread+home_win_pct+div_win_pct           6.412354e-16         yes           0.9178491
spread+home_win_pct+kick_points           6.938263e-16         yes           0.9173840
spread+home_win_pct+total_tds_comp        7.194099e-16         yes           0.9171695
spread+home_win_pct+total_tds_rec         7.680499e-16         yes           0.9167805
spread+home_win_pct+firstthree            8.033034e-16         yes           0.9165125
spread+away_win_pct+total_tds_comp        8.394207e-16         yes           0.9162491
spread+away_win_pct+total_tds_rec         9.554569e-16         yes           0.9154689
spread+home_win_pct+PF                    1.036051e-15         yes           0.9149771
spread+home_win_pct+PA                    1.036051e-15         yes           0.9149771
home_win_pct+PA+PF                        1.036051e-15         yes           0.9149771
spread+div_win_pct+total_tds_comp         1.043600e-15         yes           0.9149329
spread+home_win_pct                       1.186505e-16         yes           0.9147612
spread+home_win_pct+redzone_suc           1.107474e-15         yes           0.9145702
spread+div_win_pct+total_tds_rec          1.343532e-15         yes           0.9133796
conf_win_pct+PA+q4_points                 1.344772e-15         yes           0.9133739
spread+away_win_pct+firstthree            1.415265e-15         yes           0.9130562
```

This table of combining all types of models lets us easily see the very best models to explain the variability in wins. Any model higher than another model on the table is a better predictor of wins, making the table very self-explanatory. We observe once again the association between a higher adjusted R squared when adding a predictor that was very significant solely.

It allows us to see whether sole predictive models are superior to two way and three way models, and if two way models are better than three way models. If model A is nested inside model B, and model A has a higher adjusted R squared, then all the extra predictors in B are not necessary in the model. For example we see that the very best three way model is spread plus conference winning percentage plus home winning percentage, which has an adjusted R squared value of 0.953, while the two way model of spread plus conference winning percentage is 0.937 so home winning percentage was an acceptable addition. However, adding points for as the third predictor creates an adjusted R squared of 0.935 which is less than the two way, making points for not an acceptable addition. Another subtlety we notice is that division winning percentage does not help (0.920) when added to the conference winning percentage plus home winning percentage model (0.922).

After analyzing all types of top models predicting wins, we can conclude that the best fit models are the ones with linear combinations of most influential sole predictors of wins. The adjusted R squareds increase the most when very significant sole predictors are added to it, so the one way model table of predicting wins is an excellent indicator of what is the most important in a team's winning success.

Top Spread Models:

Here, I did the same thing, but in this case combining the top one way, two way, and three way predicting models of spread.

```
> head(top.spread.allmodels.sorted,50)
                                        p.value significant adjusted.r.squared
PA+firstthree+secondhalf           6.069989e-28         yes           0.9886550
Win+PA+off_tds                     3.228972e-24         yes           0.9790558
PA+off_tds+secondhalf              4.058557e-24         yes           0.9787107
PA+xp_made+secondhalf              6.888094e-24         yes           0.9778903
redzone_suc+PA+off_tds             1.986181e-23         yes           0.9761517
redzone_suc+PA+firstthree          3.184415e-23         yes           0.9753333
home_win_pct+PA+off_tds            2.643850e-22         yes           0.9713039
PA+firstthree+off_tds              2.862480e-22         yes           0.9711404
PA+xp_made+off_tds                 9.526940e-22         yes           0.9685496
away_win_pct+PA+off_tds            1.030438e-21         yes           0.9683728
Win+PA+xp_made                     1.573119e-21         yes           0.9674014
PA+off_tds                         1.285048e-22         yes           0.9669452
redzone_suc+PA+xp_made             2.245541e-21         yes           0.9665613
conf_win_pct+PA+off_tds            2.394044e-21         yes           0.9664078
PA+total_tds_comp+off_tds          2.506825e-21         yes           0.9662970
PA+total_tds_rec+off_tds           2.654485e-21         yes           0.9661588
fqb_tds_comp+PA+off_tds            3.023833e-21         yes           0.9658421
PA+fqb_rating+off_tds              3.026924e-21         yes           0.9658396
Win+redzone_suc+PA                 3.480571e-21         yes           0.9654968
Win+PA+firstthree                  4.828174e-21         yes           0.9646798
redzone_suc+PA+secondhalf          5.275710e-21         yes           0.9644553
fqb_tds_comp+redzone_suc+PA        1.739811e-20         yes           0.9612890
redzone_suc+PA+fqb_rating          3.626641e-20         yes           0.9592011
redzone_suc+PA+total_tds_rec       3.863139e-20         yes           0.9590164
redzone_suc+PA+total_tds_comp      4.815223e-20         yes           0.9583655
fqb_tds_comp+PA+secondhalf         5.184052e-20         yes           0.9581452
home_win_pct+redzone_suc+PA        6.175391e-20         yes           0.9576180
conf_win_pct+redzone_suc+PA        6.481513e-20         yes           0.9574711
PA+firstthree+xp_made              1.898852e-19         yes           0.9540724
home_win_pct+PA+xp_made            2.302227e-19         yes           0.9534352
away_win_pct+redzone_suc+PA        2.319509e-19         yes           0.9534102
redzone_suc+PA                     2.186721e-20         yes           0.9528928
conf_win_pct+PA+firstthree         4.347492e-19         yes           0.9512687
home_win_pct+PA+firstthree         4.348504e-19         yes           0.9512678
PA+fqb_rating+secondhalf           4.363279e-19         yes           0.9512560
PA+fqb_rating+xp_made              9.236779e-19         yes           0.9485693
PA+total_tds_rec+secondhalf        1.600470e-18         yes           0.9465063
PA+total_tds_comp+secondhalf       1.651104e-18         yes           0.9463870
away_win_pct+PA+firstthree         2.589556e-18         yes           0.9446324
conf_win_pct+PA+xp_made            2.680778e-18         yes           0.9444951
Win+fqb_tds_comp+PA                2.789770e-18         yes           0.9443366
Win+PA+fqb_rating                  2.866553e-18         yes           0.9442284
PA+fqb_rating+firstthree           3.645023e-18         yes           0.9432613
away_win_pct+PA+xp_made            4.498657e-18         yes           0.9424005
Win+fqb_tds_comp+total_tds_rec     4.989564e-18         yes           0.9419720
PA+firstthree                      4.624335e-19         yes           0.9418588
fqb_tds_comp+PA+firstthree         8.347500e-18         yes           0.9397952
PA+firstthree+total_tds_rec        8.352701e-18         yes           0.9397925
PA+firstthree+total_tds_comp       8.365279e-18         yes           0.9397860
Win+fqb_tds_comp+total_tds_comp    8.617102e-18         yes           0.9396581
```

Unlike combining win models, when we pool spread models we get a wide mix of predictors. The very best predictor of spread is points against, first three quarters combined, and second half points. The next best is wins, points against, and offensive TDs, and the third is points against, offensive TDs, and second half points. The fourth best also has points against and second half points, indicating that those two are very significant predictors of spread being nested in three of the top four overall models. We observe a consistent spattering of combinations of the sole predicting spread models as the best fit models overall. Also, we see that the two way model of points against plus offensive touchdowns (0.967) is better with the addition of wins (0.979), second half (0.979), redzone successes (0.976), home winning percentage (0.971), first three quarters combined (0.971), extra points made (0.969), and away winning percentage (0.968), but worse with the addition of conference winning percentage (0.966), total touchdowns completed (0.966), and total touchdowns received (0.966), etc.

Also differing from win models, the sole predictors of spread are not necessarily the best to use to combine for the best fitting models. So, the one way model of spread is not as influential as the one way model of wins. To find out the best fitting trends in spread, this table of combining all models is the best to use.

Deeper Trends:

As previously mentioned, we will now analyze the data deeper into the table. By removing the top four sole predictors of wins (spread, conference, home, and away winning percentages) and the top four explanatory variables for spread (wins, conference, home, and away winning percentages) we can attempt to see what is going on behind the intuitive fact that a higher conference, home, and away winning percentages contribute to both total wins and spread. Also, we saw in the two way and three way models that these most influential predictors pulled too much weight to uncover deeper underlying trends. To implement these deeper trends, one would specify 'deeper' as the last parameter in the two way and three way functions. As done before with combining the 'top' models, I will skip to the combining all of the types of number of predictor models for deeper models and sort them.

Combining Deeper Win Models:

Below is the table of combining one way, two way, and three way predictor models of wins, at a deeper level.

```
> head(deeper.win.allmodels.sorted,50)
                                 p.value significant adjusted.r.squared
PA+PF+div_win_pct             2.740370e-15         yes          0.9088418
PA+PF+kick_points             3.604250e-15         yes          0.9070345
PA+PF+fqb_tds_comp            7.031280e-15         yes          0.9024748
PA+secondhalf+firstthree      8.091175e-15         yes          0.9014886
PA+PF+secondhalf              8.210253e-15         yes          0.9013854
PA+PF+fqb_rating              1.303858e-14         yes          0.8980619
PA+PF+off_tds                 1.552460e-14         yes          0.8967789
PA+PF+xp_made                 1.572321e-14         yes          0.8966848
PA+kick_points+off_tds        1.630691e-14         yes          0.8964145
PA+PF+fourthdown_fail         1.640827e-14         yes          0.8963685
PA+PF+total_tds_comp          1.964787e-14         yes          0.8950215
PA+PF+total_tds_rec           2.179228e-14         yes          0.8942391
PA+q4_points+firstthree       2.990271e-14         yes          0.8918130
PA+PF+q4_points               2.995232e-14         yes          0.8918002
PA+PF+firstthree              3.080080e-14         yes          0.8915833
PA+PF                         4.371431e-15         yes          0.8906895
PA+secondhalf+xp_made         3.773088e-14         yes          0.8899945
PA+secondhalf+div_win_pct     3.889784e-14         yes          0.8897540
PA+secondhalf+kick_points     3.973608e-14         yes          0.8895854
PA+secondhalf+fourthdown_fail 4.959240e-14         yes          0.8878174
PA+secondhalf+redzone_suc     4.960199e-14         yes          0.8878158
PA+PF+redzone_suc             5.161125e-14         yes          0.8874960
PA+secondhalf+off_tds         5.214225e-14         yes          0.8874134
PA+secondhalf+total_tds_rec   1.058575e-13         yes          0.8815491
PA+secondhalf                 1.417387e-14         yes          0.8814521
PA+secondhalf+fqb_tds_comp    1.104367e-13         yes          0.8811888
PA+secondhalf+total_tds_comp  1.125866e-13         yes          0.8810244
PA+redzone_suc+kick_points    1.131740e-13         yes          0.8809800
PA+kick_points+firstthree     1.168604e-13         yes          0.8807061
PA+secondhalf+fqb_rating      1.230938e-13         yes          0.8802607
PA+secondhalf+q4_points       1.702706e-13         yes          0.8774418
PA+redzone_suc+div_win_pct    2.200297e-13         yes          0.8751673
PA+kick_points+xp_made        3.010733e-13         yes          0.8723273
PA+div_win_pct+off_tds        3.636906e-13         yes          0.8705849
PA+q4_points+off_tds          5.706786e-13         yes          0.8663333
PA+q4_points+div_win_pct      6.211656e-13         yes          0.8655178
PA+q4_points+xp_made          8.502822e-13         yes          0.8624534
PA+redzone_suc+q4_points      8.554596e-13         yes          0.8623934
PA+div_win_pct+firstthree     9.821995e-13         yes          0.8610223
PA+redzone_suc+fourthdown_fail 1.011739e-12        yes          0.8607264
PA+off_tds+fourthdown_fail    1.235489e-12         yes          0.8587149
PA+q4_points+fourthdown_fail  1.561910e-12         yes          0.8563172
PA+div_win_pct+xp_made        1.894495e-12         yes          0.8543123
PA+redzone_suc+firstthree     2.651329e-12         yes          0.8507540
PA+redzone_suc+off_tds        3.302980e-12         yes          0.8483804
PA+q4_points+total_tds_rec    3.784961e-12         yes          0.8468901
PA+redzone_suc                6.064180e-13         yes          0.8463982
PA+kick_points+q4_points      4.056556e-12         yes          0.8461263
PA+q4_points+total_tds_comp   4.137240e-12         yes          0.8459085
PA+firstthree+fourthdown_fail 4.171506e-12         yes          0.8458172
```

In every single one of these models, points against is present, so we can conclude that points against is a very important predictor of wins when looking at deeper trends. We see again that the same deeper sole predictors (points against, points for, second half points, etc.) are the best fitting variables to combine for new models. So, the one way model table predicting wins is a good indicator of deeper trends, if you look farther down the table. Additionally, the top quarterback's rating is almost nonexistent scanning the models. I originally hypothesized that this delicate quarterback rating calculation would be a better indication of winning, but it does not appear to be the case.

Combining Deeper Spread Models:

Here, I combined all the types of deeper spread models.

```
> head(deeper.spread.allmodels.sorted,50)
                                  p.value significant adjusted.r.squared
PA+secondhalf+firsthalf       6.475393e-48         yes          0.9995753
PA+firstthree+q4_points       7.734178e-48         yes          0.9995699
PA+firstthree+secondhalf      6.069989e-28         yes          0.9886550
PA+off_tds+secondhalf         4.058557e-24         yes          0.9787107
PA+xp_made+secondhalf         6.888094e-24         yes          0.9778903
PA+off_tds+q4_points          7.171422e-24         yes          0.9778265
redzone_suc+PA+off_tds        1.986181e-23         yes          0.9761517
redzone_suc+PA+firstthree     3.184415e-23         yes          0.9753333
PA+q4_points+firsthalf        2.006515e-22         yes          0.9718642
PA+firstthree+off_tds         2.862480e-22         yes          0.9711404
PA+xp_made+q4_points          3.716799e-22         yes          0.9705965
PA+off_tds+total_ints         6.646644e-22         yes          0.9693488
PA+xp_made+off_tds            9.526940e-22         yes          0.9685496
PA+off_tds+fqb_pass_tds       1.517028e-21         yes          0.9674859
PA+off_tds                    1.285048e-22         yes          0.9669452
redzone_suc+PA+xp_made        2.245541e-21         yes          0.9665613
PA+off_tds+firsthalf          2.488372e-21         yes          0.9663148
PA+total_tds_comp+off_tds     2.506825e-21         yes          0.9662970
PA+total_tds_rec+off_tds      2.654485e-21         yes          0.9661588
fqb_tds_comp+PA+off_tds       3.023833e-21         yes          0.9658421
PA+fqb_rating+off_tds         3.026924e-21         yes          0.9658396
redzone_suc+PA+secondhalf     5.275710e-21         yes          0.9644553
fqb_tds_comp+redzone_suc+PA   1.739811e-20         yes          0.9612890
redzone_suc+PA+firsthalf      3.040185e-20         yes          0.9597126
redzone_suc+PA+fqb_rating     3.626641e-20         yes          0.9592011
redzone_suc+PA+total_tds_rec  3.863139e-20         yes          0.9590164
redzone_suc+PA+total_tds_comp 4.815223e-20         yes          0.9583655
fqb_tds_comp+PA+secondhalf    5.184052e-20         yes          0.9581452
redzone_suc+PA+q4_points      7.048747e-20         yes          0.9572152
redzone_suc+PA+total_ints     1.121503e-19         yes          0.9557701
redzone_suc+PA+fqb_pass_tds   1.576031e-19         yes          0.9546805
PA+firstthree+xp_made         1.898852e-19         yes          0.9540724
redzone_suc+PA                2.186721e-20         yes          0.9528928
PA+fqb_rating+secondhalf      4.363279e-19         yes          0.9512560
fqb_tds_comp+PA+q4_points     9.154433e-19         yes          0.9486022
PA+fqb_rating+xp_made         9.236779e-19         yes          0.9485693
PA+total_tds_rec+secondhalf   1.600470e-18         yes          0.9465063
PA+secondhalf+fqb_pass_tds    1.610267e-18         yes          0.9464829
PA+total_tds_comp+secondhalf  1.651104e-18         yes          0.9463870
PA+firstthree+firsthalf       1.854188e-18         yes          0.9459401
PA+fqb_rating+firstthree      3.645023e-18         yes          0.9432613
PA+firstthree+fqb_pass_tds    3.665183e-18         yes          0.9432389
PA+firstthree                 4.624335e-19         yes          0.9418588
PA+xp_made+total_ints         5.747632e-18         yes          0.9413817
PA+xp_made+fqb_pass_tds       6.554742e-18         yes          0.9408279
PA+firstthree+total_ints      7.785114e-18         yes          0.9400950
fqb_tds_comp+PA+firstthree    8.347500e-18         yes          0.9397952
PA+firstthree+total_tds_rec   8.352701e-18         yes          0.9397925
PA+firstthree+total_tds_comp  8.365279e-18         yes          0.9397860
PA+xp_made                    8.231194e-19         yes          0.9395002
```

Once again, points against is present in a majority of the models. However, we do not see points for in any of these models, when it is the new top predictor of spread after removing the top four sole predictors. This is because any models with points for plus points against are perfect multicollinearity models of spread, so they have been accounted for in the program. After those have been omitted, points for doesn't show up in the top models because again points for accounts for many offensive statistics, so adding more offensive statistics does not help very much. We also see first three quarter's points combined in two of the top three models, and second half points in four of the top five. Second half points are not among the top sole predictors of spread, which is interesting to see it be so influential here. Also, the top quarterback's completed touchdowns are high up in the sole predictors of spread, and although it shows up in some models, it doesn't appear as much as expected. These deeper trends should be looked at skeptically because we see that the adjusted R squared skyrockets close to one, which is dangerously close to multicollinearity. In the very first model of points against plus first half plus second half, overtime points is the only variable left out to make perfect multicollinearity. These deeper trends pick up explanatory variables that are not as significant solely, but combined just right can appear falsely very strong.

Deepest Trends:

Diving deeper down the table, I will now remove the top eight sole predictors of wins (spread, conference, home, and away winning percentages, points for, points against, second half points, redzone successes) and spread (wins, conference, home, and away winning percentages, points for, top quarterbacks touchdowns completed, points against. By removing the top four sole predictors of wins (spread, conference, home, and away winning percentages) and the top four explanatory variables for spread (wins, conference, home, and away winning percentages) we can attempt to see what is going on behind the intuitive fact that a higher conference, home, and away winning percentages contribute to both total wins and spread. Also, we saw in the two way and three way models that these most influential predictors pulled too much weight to uncover deeper underlying trends. To implement these deepest trends, one would specify 'deepest' as the last parameter in the two way and three way functions. As done before with the 'top' models, I will skip to the combining all of the types of number of deepest predictor models and sorting them.

Combining Deepest Win Models:

Below, I combined all types of models using win as response and deepest predictors.

```
> head(deepest.win.allmodels.sorted,50)
```

	p.value	significant	adjusted.r.squared
fqb_tds_comp+kick_points+div_win_pct	4.123176e-07	yes	0.6466992
q4_points+div_win_pct+total_incomps	8.147997e-07	yes	0.6287966
kick_points+div_win_pct+total_tds_rec	9.742177e-07	yes	0.6239480
kick_points+div_win_pct+total_tds_comp	9.996159e-07	yes	0.6232444
fqb_tds_comp+kick_points	3.920966e-07	yes	0.6135185
fqb_tds_comp+kick_points+fourthdown_fail	1.424124e-06	yes	0.6134293
fqb_tds_comp+kick_points+total_incomps	1.440885e-06	yes	0.6131004
fqb_tds_comp+kick_points+fqb_rating	1.479106e-06	yes	0.6123635
fqb_tds_comp+kick_points+q4_points	1.674289e-06	yes	0.6088546
fqb_tds_comp+kick_points+q3_points	1.738059e-06	yes	0.6077901
fqb_tds_comp+div_win_pct+total_incomps	1.954893e-06	yes	0.6044224
div_win_pct+fourthdown_fail+total_ints	2.000738e-06	yes	0.6037549
fqb_tds_comp+kick_points+total_ints	2.157958e-06	yes	0.6015686
fqb_tds_comp+kick_points+topthree_tds_rec	2.168919e-06	yes	0.6014217
fqb_tds_comp+kick_points+off_tds	2.208899e-06	yes	0.6008918
fqb_tds_comp+kick_points+total_tds_rec	2.238329e-06	yes	0.6005073
fqb_tds_comp+kick_points+total_tds_comp	2.279252e-06	yes	0.5999804
fqb_tds_comp+div_win_pct+fourthdown_fail	2.284801e-06	yes	0.5999096
fqb_tds_comp+kick_points+firstthree	2.288080e-06	yes	0.5998679
fqb_tds_comp+kick_points+xp_made	2.292299e-06	yes	0.5998142
div_win_pct+xp_made+total_incomps	2.346548e-06	yes	0.5991326
kick_points+total_tds_comp+fourthdown_fail	2.361160e-06	yes	0.5989515
kick_points+total_tds_comp	6.881526e-07	yes	0.5982310
div_win_pct+firstthree+total_incomps	2.448502e-06	yes	0.5978902
kick_points+total_tds_rec+fourthdown_fail	2.477682e-06	yes	0.5975434
kick_points+total_tds_comp+total_incomps	2.560263e-06	yes	0.5965821
div_win_pct+off_tds+total_incomps	2.591369e-06	yes	0.5962274
kick_points+total_tds_rec	7.398302e-07	yes	0.5962196
kick_points+q4_points+total_tds_comp	2.675370e-06	yes	0.5952889
kick_points+q4_points+total_tds_rec	2.755275e-06	yes	0.5944212
kick_points+total_tds_rec+total_incomps	2.838927e-06	yes	0.5935373
kick_points+total_tds_comp+fqb_rating	2.994781e-06	yes	0.5919530
kick_points+total_tds_comp+q3_points	3.031279e-06	yes	0.5915930
kick_points+total_tds_rec+q3_points	3.173037e-06	yes	0.5902318
kick_points+total_tds_rec+fqb_rating	3.233858e-06	yes	0.5896650
kick_points+div_win_pct+topthree_tds_rec	3.279530e-06	yes	0.5892458
fqb_tds_comp+q4_points+div_win_pct	3.378567e-06	yes	0.5883551
kick_points+firstthree+total_tds_comp	3.488638e-06	yes	0.5873930
kick_points+div_win_pct+total_incomps	3.490903e-06	yes	0.5873735
kick_points+total_tds_comp+xp_made	3.555402e-06	yes	0.5868230
kick_points+total_tds_comp+off_tds	3.565592e-06	yes	0.5867369
kick_points+div_win_pct+firstthree	3.609972e-06	yes	0.5863645
kick_points+total_tds_rec+total_tds_comp	3.618080e-06	yes	0.5862969
kick_points+total_tds_comp+topthree_tds_rec	3.638295e-06	yes	0.5861290
kick_points+firstthree+total_tds_rec	3.667746e-06	yes	0.5858859
kick_points+total_tds_rec+off_tds	3.723118e-06	yes	0.5854338
kick_points+total_tds_rec+xp_made	3.742244e-06	yes	0.5852790
kick_points+total_tds_rec+topthree_tds_rec	3.852329e-06	yes	0.5844024
kick_points+total_tds_comp+total_ints	3.903557e-06	yes	0.5840023
kick_points+total_tds_rec+total_ints	4.175942e-06	yes	0.5819534

Looking at the deepest trends in win models, we come to the same types of conclusions as earlier. After removing the top eight sole predictors of wins, the new top two deepest explanatory variables are top quarterback's touchdowns completed, kicker's points, and fourth quarter points. We see a large grouping of models with top quarterback's touchdowns completed, and then a big group of kicker's points after that. It appears that the deeper we go, the bigger the groupings of the new top predictors, indicating that there is a big drop-off in importance of predictors as we look deeper and deeper for trends. Once again, we can conclude that the one way predictor table of wins is an excellent indicator of the order of the most essential variables to fit a model of wins.

Combining Deepest Spread Models:

Lastly, I combined all types of models with spread as response and deepest predictors.

```
> head(deepest.spread.allmodels.sorted,50)
```

	p.value	significant	adjusted.r.squared
secondhalf+total_ints+q2_points	9.837792e-08	yes	0.6815393
total_tds_rec+q4_points+q2_points	1.435718e-07	yes	0.6727036
total_tds_comp+q4_points+q2_points	1.537253e-07	yes	0.6710799
q4_points+total_ints+q2_points	1.628410e-07	yes	0.6697047
total_tds_comp+secondhalf+total_ints	2.502663e-07	yes	0.6592590
total_tds_rec+secondhalf+total_ints	2.612605e-07	yes	0.6581957
total_tds_rec+secondhalf+q2_points	2.636239e-07	yes	0.6579725
total_tds_comp+q4_points+total_ints	2.730221e-07	yes	0.6571030
total_tds_comp+secondhalf+q2_points	2.800278e-07	yes	0.6564727
total_tds_rec+q4_points+total_ints	2.849492e-07	yes	0.6560386
q4_points+q2_points+topthree_tds_rec	3.177616e-07	yes	0.6533102
firstthree+total_tds_rec+q4_points	3.903559e-07	yes	0.6480989
firstthree+total_tds_comp+q4_points	3.943172e-07	yes	0.6478412
fqb_rating+q4_points+q2_points	3.954000e-07	yes	0.6477711
total_tds_comp+q4_points+total_rec_tds	4.227228e-07	yes	0.6460600
total_tds_comp+q4_points+total_pass_tds	4.227228e-07	yes	0.6460600
total_tds_rec+q4_points+firsthalf	4.240723e-07	yes	0.6459782
total_tds_comp+q4_points+firsthalf	4.267456e-07	yes	0.6458168
total_tds_rec+q4_points+total_rec_tds	4.274225e-07	yes	0.6457760
total_tds_rec+q4_points+total_pass_tds	4.274225e-07	yes	0.6457760
total_tds_rec+q4_points	1.123809e-07	yes	0.6454307
total_tds_comp+q4_points	1.138042e-07	yes	0.6451228
q4_points+q2_points	1.181851e-07	yes	0.6441972
off_tds+secondhalf+q2_points	4.989062e-07	yes	0.6417799
fqb_rating+secondhalf+q2_points	5.034265e-07	yes	0.6415454
total_tds_rec+secondhalf+firsthalf	5.402938e-07	yes	0.6397025
secondhalf+q4_points+q2_points	5.406061e-07	yes	0.6396874
secondhalf+q2_points	1.420079e-07	yes	0.6396626
total_tds_comp+secondhalf+firsthalf	5.443392e-07	yes	0.6395075
firstthree+q4_points+q2_points	5.549922e-07	yes	0.6390001
total_tds_comp+q4_points+fqb_pass_tds	5.804588e-07	yes	0.6378229
total_tds_rec+q4_points+fqb_pass_tds	5.812449e-07	yes	0.6377873
fqb_rating+total_tds_comp+q4_points	6.091660e-07	yes	0.6365519
fqb_rating+total_tds_rec+q4_points	6.153515e-07	yes	0.6362853
total_tds_rec+xp_made+q4_points	6.170826e-07	yes	0.6362112
total_tds_comp+xp_made+q4_points	6.249183e-07	yes	0.6358779
off_tds+q4_points+q2_points	6.310182e-07	yes	0.6356211
secondhalf+total_ints+topthree_tds_rec	6.400228e-07	yes	0.6352461
secondhalf+q2_points+topthree_tds_rec	6.435710e-07	yes	0.6350997
secondhalf+q2_points+total_rec_tds	6.625331e-07	yes	0.6343298
secondhalf+q2_points+total_pass_tds	6.625331e-07	yes	0.6343298
total_tds_comp+secondhalf+total_rec_tds	6.656762e-07	yes	0.6342042
total_tds_comp+secondhalf+total_pass_tds	6.656762e-07	yes	0.6342042
xp_made+q4_points+q2_points	6.668177e-07	yes	0.6341587
total_tds_rec+secondhalf+total_rec_tds	6.705936e-07	yes	0.6340087
total_tds_rec+secondhalf+total_pass_tds	6.705936e-07	yes	0.6340087
total_tds_rec+secondhalf+q4_points	6.747273e-07	yes	0.6338454
q4_points+q2_points+total_rec_tds	6.773572e-07	yes	0.6337420
q4_points+q2_points+total_pass_tds	6.773572e-07	yes	0.6337420
total_tds_comp+secondhalf+q4_points	6.842038e-07	yes	0.6334745

Examining this last table of deepest spread models, there is a fair mix of predictors prevalent. After removing the top eight sole predictors of spread, the new top predictor should be top quarterback rating, then first three quarter's points, then total touchdowns completed. We don't see top quarterback rating in any of the new top models, and there doesn't appear to be a rhyme or reason for the combinations of predictors here, other than total touchdowns completed. We finally see a total interceptions predictor in a best fitting model, which I thought would be a very essential statistic initially. Also, we see second quarter points in all of the new top four models, which is different. In all the other types of models with either wins or spread as the response, we only really saw first three quarter's points combined, first half, second half, or fourth quarter points as important statistics, but now we see second quarter's points as being influential. This leads us to conclude that the second quarter is more important than the first and third quarters, which makes sense watching the actual games. Teams who score right before the half (second quarter) usually go in to the locker room with momentum, and might even be getting the ball back after the half on kickoff, which is a huge moral boost and most people would deem to be a big factor in the outcome of the game.

Computing Time:

The SAS program that created the all of the 46,592 statistics/variables for the data, made seventeen weekly SAS datasets, and seventeen Excel datasets to read into R took approximately 1 minute and 32 seconds. The R program to combine all the Excel files for a final dataset called 'nfl', create, test for significance, produce adjusted R squared values, sort all types of models, and print out all the tables in this project took approximately 28 seconds. This miraculously stunning speed to compute over 46,000 statistics across an NFL season, test 1220 models in only two minutes is the foundation and immense possibility for the future of statistics.

Conclusions

After examining all types of models using wins and spread as response variables, I concluded that wins is the best variable to investigate. The best fit models of spread were just the ones that were obvious because it was usually the points directly that were the most influential explanatory variables. For example, variables like points against, second half points, and first three quarter's points had the highest adjusted R squareds. This does not help us find any hidden trends, so we looked into deeper and deepest models. The deeper models told a similar story, but the deepest spread models did help us find a few subtleties. For example, we noticed that the second quarter's points scored have a big impact on spread, in second place after the fourth quarter. Also, we saw that effect of points against was potentially overestimated and points for underestimated because the points against accounts for defensive statistics, which were rarer in the data than offensive statistics. Unfortunately, not too many new applicable conclusions were able to be drawn looking at spread as response.

After looking at all types of win models, the order of the most significant one way explanatory variables was generally the same order the best fitting two way and three way models were constructed. In other words, the two way and three way models that were the best fit could be predetermined by simply combining the top one way predictor models. Some might counter by saying that the way two way and three way models were inherently made by the method of combining the best fitting sole predictors of wins, which is why the results were that way. However, in initial trial and error tests using the two way and three way functions, I tried using all 60 significant one way predictors to combine, and got extremely similar results. The same models were at the top of the two way and three way tables, but with less variability in the amount of different predictors at the top. For example, the two way models of wins had spread

plus almost all of the other predictors as the top models, which does not help us much. In conclusion, if I were presenting this project's results to NFL coaches, I would present this one way win model table as the final results, for both simplicity reasons for coaches that don't know too much about statistics, and accuracy (we showed the best multiple regression models are just linear combinations of these win model's predictors).

Once I realized one way win models were really the best models to analyze, I dove back into that table to draw more conclusions. We already saw that conference winning percentage is more important than home winning percentage, which is more essential than away winning percentage. Also, points against is more crucial than points for, so a good defense is superior to a good offense (as shown by the Seattle Seahawk's number 1 defense blew out the Denver Bronco's number 1 offense in Super Bowl XLVIII). Next, we saw second half points are more important than first half points, and redzone successes, top quarterback's completed touchdowns, and kicker's points are the next grouping of the most significant predictors. So, a second half redzone passing touchdown, with the kicker making the extra point seems to be very, very influential to a team's victory. Additionally, kicker's points are very impactful as well, and should not be overlooked as just a skills position. Scanning the one way table, we see the order of quarter scoring importance goes from fourth, to third, to second, to first quarter. So, as the game goes on, the points scored in those quarters becomes more and more influential. Also, we see top quarterback rating is higher than the total offensive touchdowns, so QB's are very necessary for success. Another interesting point is that fourth down fails explain more of the variability in wins than total interceptions thrown by that team's quarterback(s). Since fourth down successes is not present anywhere near the top, I would conclude that the risk of turnover on downs outweighs the possibility of getting a first down on that play, so I would advise not

going for it on fourth down. Also, we observe that redzone successes are superior to rezone conversion percent. This is because redzone conversion percent takes into account the redzone fails, which usually ends up in a made field goal since they are already within the twenty yardline. A redzone success (6, 7, or 8 points) is twice as powerful as a field goal (3 points).

There are countless more conclusions that can be drawn from this table, and the other tables presented in this report. Furthermore, the testing of significant of adding another predictor to a model can be seen in the table by observing if the nested two way model has a higher/lower adjusted R squared than the new three way model with that new variable added to the model. The same technique can be used with nested one way predictor models in two way models. In conclusion, I personally recorded my most interesting findings, but any new conclusions can easily be drawn by simply looking to see which models are higher than others in any of the tables.

Future Directions

For future analyses, I could do countless more statistical analyses on the 5,824 statistics in the R dataset. I could write functions to create models for four or more combinations of predictor variables to see if their adjusted r squareds are higher than the ones in this project. Additionally, I could study more response variables other than just win and spread. The functions created already have the ability to enter any response variable desired, so many more tests and findings could be made with new dependent variables. Non-linear models could also be studied to see if there are interactions, quadratic, higher-power, or other non-linear relationships that appear in the data to create a better best model. Also, I would absolutely figure out a way to read in the data from an HTML searching function in SAS so I could replicate my analyses for multiple NFL seasons much quicker, and without manual data entry. Also, I could do a time series analysis from week to week to find any time trends that exist. Next, I could write functions in R to compare any two models and see which has a higher adjusted R squared, and return that model. Finally, I could create a new power rankings based on the significant results from this study, and even revised seedings for what the playoffs should've been based on the significant statistics and trends found in this research.

Appendix

(A) Sample ESPN.com Box Score

Every yellow highlighted number is a macro variable in SAS function. Numbers entered after week number, game number, 'away team', and 'home team'.

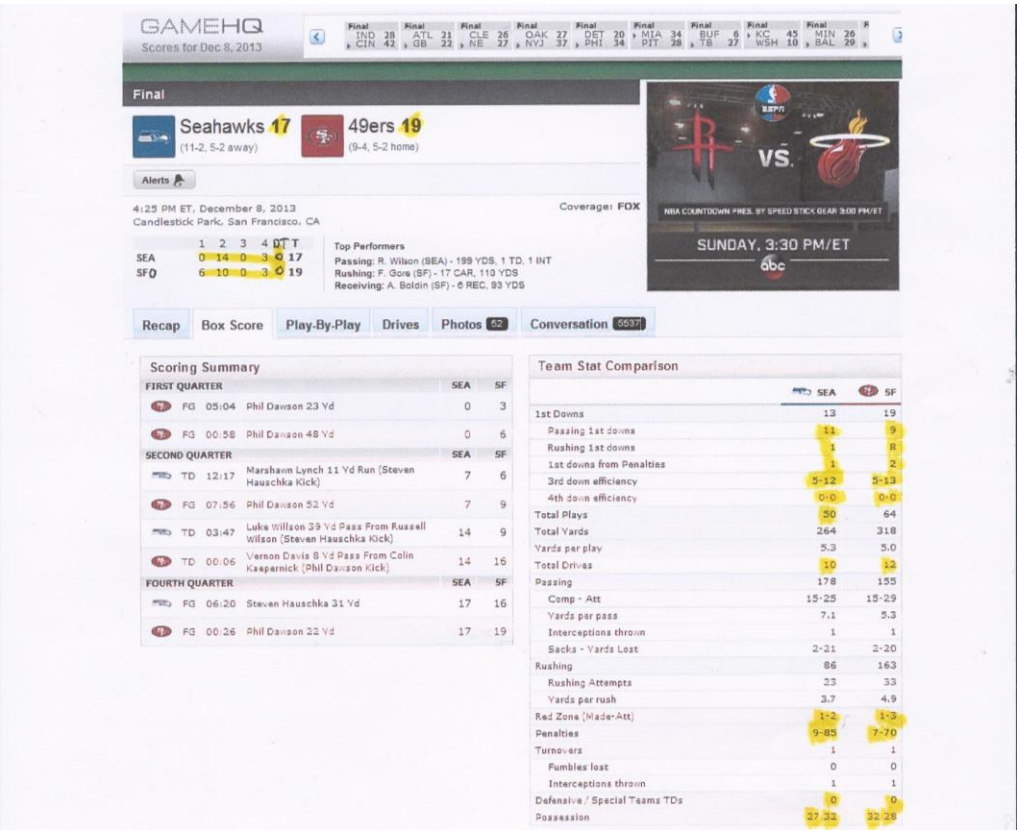
Sample macro function for a game:

Week 14 Game 1: SEA @ SFO http://scores.espn.go.com/nfl/boxscore?gameId=331208025

**Note: Macro function reads all away team's statistics for each section of each page first, then goes to home teams' section.

Page 1 of sample Box Score:

```
%nfl(14,1,'SEA','SFO',17,19,0,14,0,3,0,6,10,0,3,0,11,1,1,5,12,0,0,50,10,1,2,9,85,0,27,32,9,8,2,5,
13,0,0,64,12,1,3,7,70,0,32,28,
```



Page 2 of sample Box Score:

**Note: Numbers for this page start at red bracket in macro function.

```
%nfl(14,1,'SEA','SFO',17,19,0,14,0,3,0,6,10,0,3,0,11,1,1,5,12,0,0,50,10,1,2,9,85,0,27,32,9,8,2,5,
13,0,0,64,12,1,3,7,70,0,32,28,15,25,199,1,1,2,21,15,25,178,1,1,2,21,20,72,1,2,12,0,23,86,1,3,70,1
,39,4,6,65,0,25,8,3,36,0,14,4,15,199,1,39,25,0,15,29,175,1,1,2,20,15,29,155,1,1,2,20,17,110,0,9,3
1,0,33,163,0,6,93,0,27,8,4,40,0,17,8,3,21,0,11,5,15,175,1,27,29,0,
```

Seattle Passing

	C/ATT	YDS	AVG	TD	INT	SACKS	QBR	RTG
R. Wilson	15/25	199	8.0	1	1	2-21	48.1	81.9
Team	15/25	178	7.1	1	1	2-21	--	--

San Francisco Passing

	C/ATT	YDS	AVG	TD	INT	SACKS	QBR	RTG
C. Kaepernick	15/29	175	6.0	1	1	2-20	41.5	67.5
Team	15/29	155	5.3	1	1	2-20	--	--

Seattle Rushing

	CAR	YDS	AVG	TD	LG
M. Lynch	20	72	3.6	1	11
R. Turbin	2	12	6.0	0	8
R. Wilson	1	2	2.0	0	2
Team	23	86	3.7	1	11

San Francisco Rushing

	CAR	YDS	AVG	TD	LG
F. Gore	17	110	6.5	0	51
C. Kaepernick	9	31	3.4	0	9
K. Hunter	4	16	4.0	0	7
B. Miller	3	6	2.0	0	4
Team	33	163	4.9	0	51

Seattle Receiving

	REC	YDS	AVG	TD	LG	TGTS
L. Willson	3	70	23.3	1	39	4
G. Tate	6	65	10.8	0	25	8
D. Baldwin	3	36	12.0	0	14	4
J. Kearse	2	15	7.5	0	9	5
Z. Miller	1	13	13.0	0	13	3
R. Turbin	0	0	0.0	0	0	1
Team	15	199	13.3	1	39	25

San Francisco Receiving

	REC	YDS	AVG	TD	LG	TGTS
A. Boldin	6	93	15.5	0	27	8
M. Crabtree	4	40	10.0	0	17	8
B. Miller	3	21	7.0	0	11	5
V. Davis	2	21	10.5	1	13	3
M. Manningham	0	0	0.0	0	0	4
F. Gore	0	0	0.0	0	0	1
Team	15	175	11.7	1	27	29

Seattle Fumbles

	FUM	LOST	REC
R. Wilson	1	0	0
Team	1	0	0

San Francisco Fumbles

	FUM	LOST	REC
Team	0	0	0

Page 3 of sample Box Score:

**Note: Numbers for this page start at red bracket in macro function.

```
%nfl(14,1,'SEA','SFO',17,19,0,14,0,3,0,6,10,0,3,0,11,1,1,5,12,0,0,50,10,1,2,9,85,0,27,32,9,8,2,5,
13,0,0,64,12,1,3,7,70,0,32,28,15,25,199,1,1,2,21,15,25,178,1,1,2,21,20,72,1,2,12,0,23,86,1,3,70,1
,39,4,6,65,0,25,8,3,36,0,14,4,15,199,1,39,25,0,15,29,175,1,1,2,20,15,29,155,1,1,2,20,17,110,0,9,3
1,0,33,163,0,6,93,0,27,8,4,40,0,17,8,3,21,0,11,5,15,175,1,27,29,0,0,60,51,6,6,3,4,79,27,0,3,49,38
,0,1,1,31,2,6,186,0,1,47,0,57,45,1,5,1,3,81,31,0,1,0,0,0,4,4,52,1,4,199,0,2,54);
```

Seattle Defensive

	TACKLES					MISC	
	TOT	SOLO	SACKS	TFL	PD	QB HTS	TD
B. Wagner	9	7	0	0	0	0	0
K. Chancellor	6	6	0	1	0	0	0
B. Irvin	6	5	0	0	0	0	0
B. Maxwell	5	5	0	0	3	0	0
E. Thomas	5	4	0	0	0	0	0
M. Smith	4	3	0	1	0	0	0
C. McDonald	3	3	1	1	0	1	0
R. Sherman	3	3	0	0	0	0	0
C. Clemons	3	2	1	1	0	1	0
R. Bryant	3	2	0	1	0	0	0
K. Wright	3	2	0	0	0	0	0
C. Avril	2	2	0	1	0	1	0
B. Mebane	2	2	0	0	0	0	0
C. Maragos	2	2	0	0	0	0	0
J. Lane	2	1	0	0	3	0	0
D. Shead	1	1	0	0	0	0	0
J. Kearse	1	1	0	0	0	0	0
Team	60	51	2	6	6	3	0

San Francisco Defensive

	TACKLES					MISC	
	TOT	SOLO	SACKS	TFL	PD	QB HTS	TD
N. Bowman	9	8	1	0	0	0	0
C. Rogers	8	7	0	0	0	0	0
A. Brooks	5	5	0	0	1	0	0
P. Willis	5	4	0	0	0	0	0
E. Reid	5	3	0	0	0	0	0
R. McDonald	4	4	1	1	0	1	0
D. Whitner	4	2	0	0	1	0	0
R. Ventrone	3	3	0	0	0	0	0
D. Skuta	3	3	0	0	0	0	0
G. Dorsey	3	1	0	0	0	0	0
C. Spillman	1	1	0	0	0	0	0
B. Miller	1	1	0	0	0	0	0
K. Hunter	1	1	0	0	0	0	0
A. Smith	1	1	0	0	0	0	0
T. Jerod-Eddie	1	1	0	0	0	0	0
K. Osgood	1	0	0	0	0	0	0
N. Moody	1	0	0	0	0	0	0
D. Morris	1	0	0	0	0	0	0
T. Brock	0	0	0	0	1	0	0
E. Wright	0	0	0	0	2	0	0
Team	57	45	2	1	5	1	0

Seattle Kick Returns

	NO	YDS	AVG	LG	TD
R. Turbin	2	49	24.5	27	0
G. Tate	1	15	15.0	15	0
L. Willson	1	15	15.0	15	0
Team	4	79	19.8	27	0

San Francisco Kick Returns

	NO	YDS	AVG	LG	TD
L. James	3	81	27.0	31	0
Team	3	81	27.0	31	0

Seattle Punt Returns

	NO	YDS	AVG	LG	TD
G. Tate	3	49	16.3	38	0
Team	3	49	16.3	38	0

San Francisco Punt Returns

	NO	YDS	AVG	LG	TD
L. James	1	0	0.0	0	0
Team	1	0	0.0	0	0

Seattle Kicking

	FG	PCT	LONG	XP	PTS
S. Hauschka	1/1	100.0	31	2/2	5
Team	1/1	100.0	31	2/2	5

San Francisco Kicking

	FG	PCT	LONG	XP	PTS
P. Dawson	4/4	100.0	52	1/1	13
Team	4/4	100.0	52	1/1	13

Seattle Punting

	TOT	YDS	AVG	TB	-20	LG
J. Ryan	5	186	37.2	0	1	47
Team	6	186	31.0	0	1	47

San Francisco Punting

	TOT	YDS	AVG	TB	-20	LG
A. Lee	4	199	49.8	0	2	54
Team	4	199	49.8	0	2	54

(B) SAS Macro Variable Name Definitions

*Note: macro_a = away team's statistic, macro_h = home team's statistic

Macro Variable Name	Variable Name
weeknum	Week Number
gamenum	Game Number
macro_team1	Away Team
macro_team2	Home Team
macro_pf1	Away PF
macro_pf2	Home PF
macro_aq1	Away Q1 Points
macro_aq2	Away Q2 Points
macro_aq3	Away Q3 Points
macro_aq4	Away Q4 Points
macro_aot	Away OT Points
macro_hq1	Home Q1 Points
macro_hq2	Home Q2 Points
macro_hq3	Home Q3 Points
macro_hq4	Home Q4 Points
macro_hot	Home OT Points
macro_apfirst	Away Passing First Downs
macro_arfirst	Away Rushing First Downs
macro_apenaltyfdown	Away Penalty First Downs
macro_atdown_suc	Away Third Down Conversions
macro_atdown_att	Away Third Down Attempts
macro_afourthdown_suc	Away Fourth Down Conversions
macro_afourthdown_att	Away Fourth Down Attempts
macro_atotalplays	Away Total Plays
macro_atotaldrives	Away Total Drives
macro_aredzoneconv	Away Redzone Conversions
macro_aredzoneatt	Away Redzone Attempts
macro_anumpenalties	Away Penalties
macro_apenaltyyards	Away Penalty Yards
macro_adsttds	Away Defensive/Special Teams TDs
macro_atopmin	Away Time of Possession: Minutes
macro_atopsec	Away Time of Possession: Seconds
macro_hpfirst	Home Passing First Downs
macro_hrfirst	Home Rushing First Downs
macro_hpenaltyfdown	Home Penalty First Downs
macro_htdown_suc	Home Third Down Conversions
macro_htdown_att	Home Third Down Attempts
macro_hfourthdown_suc	Home Fourth Down Conversions
macro_hfourthdown_att	Home Fourth Down Attempts
macro_htotalplays	Home Total Plays
macro_htotaldrives	Home Total Drives
macro_hredzone_suc	Home Redzone Conversions
macro_hredzoneatt	Home Redzone Attempts
macro_hnumpenalties	Home Penalties
macro_hpenaltyyards	Home Penalty yards
macro_hdsttds	Home Defensive/Special Teams Tds
macro_htopmin	Home Time of Possession: Minutes
macro_htopsec	Home Time of Possession: Seconds
macro_afqbcomp	Away First QB Completions
macro_afqbatt	Away First QB Attempts
macro_afqbpassyds	Away First QB Passing Yards
macro_afqbpasstds	Away First QB Passing Tds
macro_afqbints	Away First QB ints
macro_afqbsacks	Away First QB sacks
macro_afqbsackyds	Away First QB sack yards
macro_atotalcomps	Away Total Completions

macro_atotalatt	Away Total Attempts
macro_atotalpassyds	Away Total Pass Yards
macro_atotalpasstds	Away Total Pass Tds
macro_atotalints	Away Total ints
macro_atotalsacks	Away total sacks
macro_atotalsackyds	Away total sack yards
macro_afrcar	Away First RB carries
macro_afryds	Away First RB yards
macro_afrtds	Away First RB tds
macro_asrcar	Away Second RB carries
macro_asryds	Away Second RB yards
macro_asrtds	Away Second RB tds
macro_atotalcarries	Away total carries
macro_atotalrushyds	Away Total Rush Yards
macro_atotalrushtds	Away Total rush tds
macro_afwrrec	Away First WR Receptions
macro_afwryds	Away First WR yards
macro_afwrtds	Away First WR tds
macro_afwrlg	Away First WR Longest Catch
macro_afwrtar	Away First WR Targets
macro_aswrrec	Away Second WR Receptions
macro_aswryds	Away Second WR yards
macro_aswrtds	Away Second WR tds
macro_aswrlg	Away Second WR longest catch
macro_aswrtar	Away Second WR targets
macro_atwrrec	Away Third WR Receptions
macro_atwryds	Away Third WR Yards
macro_atwrtds	Away Third WR Tds
macro_atwrlg	Away Third WR longest catch
macro_atwrtar	Away Third WR targets
macro_atotalrec	Away Total Receptions
macro_atotalrecyds	Away Total Receiving Yards
macro_atotalrectds	Away Total Receiving tds
macro_algrec	Away Longest Reception
macro_atotaltar	Away Total Targets
macro_afumlost	Away Fumbles Lost
macro_hfqbcomp	Home First QB Completions
macro_hfqbatt	Home First QB Attempts
macro_hfqbpassyds	Home First QB Pass Yards
macro_hfqbpasstds	Home First QB Pass Tds
macro_hfqbints	Home First QB ints
macro_hfqbsacks	Home First QB sacks
macro_hfqbsackyds	Home First QB sack yards
macro_htotalcomps	Home Total Completions
macro_htotalatt	Home Total Attempts
macro_htotalpassyds	Home Total Pass yards
macro_htotalpasstds	Home Total Pass tds
macro_htotalints	Home Total ints
macro_htotalsacks	Home Total sacks
macro_htotalsackyds	Home total sack yards
macro_hfrcar	Home First RB carries
macro_hfryds	Home First RB yards
macro_hfrtds	Home First RB tds
macro_hsrcar	Home Second RB carries
macro_hsryds	Home Second RB yards
macro_hsrtds	Home Second RB tds
macro_htotalcarries	Home Total Carries
macro_htotalrushyds	Home Total Rush yards
macro_htotalrushtds	Home Total Rush tds
macro_hfwrrec	Home First WR Receptions
macro_hfwryds	Home First WR Yards
macro_hfwrtds	Home First WR tds
macro_hfwrlg	Home First WR Longest Catch

macro_hfwrtar	Home First WR targets
macro_hswrrec	Home Second WR Receptions
macro_hswryds	Home Second WR Yards
macro_hswrtds	Home Second WR tds
macro_hswrlg	Home Second WR Longest Catch
macro_hswrtar	Home Second WR targets
macro_htwrrec	Home Third WR Receptions
macro_htwryds	Home Third WR yards
macro_htwrtds	Home Third WR Tds
macro_htwrlg	Home Third WR Longest Catch
macro_htwrtar	Home Third WR Targets
macro_htotalrec	Home Total Receptions
macro_htotalrecyds	Home Total Reception Yards
macro_htotalrectds	Home Total Receiving Tds
macro_hlgrec	Home Longest Reception
macro_htotaltar	Home Total Targets
macro_hfumlost	Home Fumbles Lost
macro_apicksixes	Away Pick Sixes
macro_atotaltackles	Away Total Tackles
macro_asolotackles	Away Solo Tackles
macro_atfl	Away Tackles for Losses
macro_apds	Away Pass Deflections
macro_aqbhits	Away QB Hits
macro_anumkrs	Away Kick Returns
macro_akryds	Away Kick Return Yards
macro_akrlg	Away Longest Kick Return
macro_akrtds	Away Kick Return Tds
macro_anumpr	Away Punt Returns
macro_apryds	Away Punt Return yards
macro_aprlg	Away Longest Punt
macro_aprtds	Away Punt Return Yards
macro_afgmade	Away Field Goal Attempts
macro_afgatt	Away Field Goal Makes
macro_afglg	Away Longest Field Goal
macro_axpmade	Away Extra Points Made
macro_apunts	Away Punts
macro_apuntyds	Away Punt Yards
macro_atbs	Away Punted Touchbacks
macro_aundtwenty	Away Punt Under 20 Yards Away
macro_apuntlg	Away Longest Punt
macro_hpicksixes	Home Pick Sixes
macro_htotaltackles	Home Total Tackles
macro_hsolotackles	Home Solo Tackles
macro_htfl	Home Tackles for Losses
macro_hpds	Home Pass Deflections
macro_hqbhits	Home QB Hits
macro_hnumkrs	Home Kick Returns
macro_hkryds	Home Kick Return Yards
macro_hkrlg	Home Longest Kick Return
macro_hkrtds	Home Kick Return Tds
macro_hnumpr	Home Punt Returns
macro_hpryds	Home Punt Return Yards
macro_hprlg	Home Longest Punt
macro_hprtds	Home Punt Return yards
macro_hfgmade	Home Field Goal Attempts
macro_hfgatt	Home Field Goals Made
macro_hfglg	Home Longest Field Goal
macro_hxpmade	Home Extra Points Made
macro_hpunts	Home Punts
macro_hpuntyds	Home Punt Yards
macro_htbs	Home Punted Touchbacks
macro_hundtwenty	Home Punt Under 20 Yards
macro_hpuntlg	Home Longest Punt

(C) R Final Dataset

*Note: Only first six teams alphabetically displayed

```
> head(nfl)
  Team Win Loss Tie Win_pct Loss_pct  PF  PA spread home_win home_loss home_games home_win_pct home_loss_pct away_win away_loss away_games away_win_pct away_loss_pct div_win div_loss div_games
1  ARI  10    6   0   0.625    0.375 379 324     55        6         2          8       0.750       0.250        4         4          8       0.500       0.500       2        4         6
2  ATL   4   12   0   0.250    0.750 353 443    -90        3         5          8       0.375       0.625        1         7          8       0.125       0.875       1        5         6
3  BAL   8    8   0   0.500    0.500 320 352    -32        6         2          8       0.750       0.250        2         6          8       0.250       0.750       5        1         6
4  BUF   6   10   0   0.375    0.625 339 388    -49        4         4          8       0.500       0.500        2         6          8       0.250       0.750       3        3         6
5  CAR  12    4   0   0.750    0.250 366 241    125        7         1          8       0.875       0.125        5         3          8       0.625       0.375       5        1         6
6  CHI   8    8   0   0.500    0.500 445 478    -33        5         3          8       0.625       0.375        3         5          8       0.375       0.625       6        0         6
  div_win_pct div_loss_pct conf_win conf_loss conf_games conf_win_pct conf_loss_pct q1_points q2_points q3_points q4_points ot_points firsthalf secondhalf firstthree pfirstdowns rfirstdowns
1   0.3333333    0.6666667        6         6         12    0.5000000    0.5000000        49       122        93       112         3      171       205       264         205          84
2   0.1666667    0.8333333        3         9         12    0.2500000    0.7500000        79       122        56        93         3      201       149       257         227          64
3   0.3333333    0.1666667        6         6         12    0.5000000    0.5000000        59        79        64       115         3      138       179       202         189          68
4   0.5000000    0.5000000        5         7         12    0.4166667    0.5833333        73       103        75        88         0      176       163       251         149         113
5   0.8333333    0.1666667        9         3         12    0.7500000    0.2500000        64       115        86       101         0      179       187       265         169         122
6   1.0000000    0.0000000        4         8         12    0.3333333    0.6666667        96       124        90       132         3      220       222       310         215         102
  penalty_fdowns total_first_downs thirddown_suc thirddown_fail thirddown_att thirddown_convpct thirddown_failpct fourthdown_suc fourthdown_fail fourthdown_att fourthdown_convpct
1             40              329            74             136           210        0.3454078        0.6545922             5              4             9        0.5555556
2             39              330            89             118           207        0.4155562        0.5844438             6              8            14        0.4285714
3             38              295            92             161           253        0.3588729        0.6411271             6             10            16        0.3750000
4             39              301            83             161           244        0.3330914        0.6669086             4             10            14        0.2857143
5             28              319            91             117           208        0.4294749        0.5705251            10              3            13        0.7692308
6             27              344            83             114           197        0.4225468        0.5774532             8              5            13        0.6153846
  fourthdown_failpct total_yds total_plays total_drives total_plays_drive total_yds_play total_yds_drive redzone_suc redzone_fail redzone_att redzone_convpct redzone_failpct num_penalties
1          0.4444444      5837         1037          201          5.207617       5.634756       29.35124          26          24          50       0.5200000       0.4800000             97
2          0.5714286      5788         1024          180          5.784284       5.693689       32.84554          27          25          52       0.5192308       0.4807692             91
3          0.6250000      5232         1090          208          5.458982       4.823195       26.21974          24          28          52       0.4615385       0.5384615            112
4          0.7142857      5750         1086          217          5.031042       5.432746       27.02502          21          23          44       0.4772727       0.5227273            110
5          0.2307692      5411          999          172          5.926159       5.440100       32.29517          29          21          50       0.5800000       0.4200000             80
6          0.3846154      6278         1013          195          5.315051       6.236244       33.05271          35          25          60       0.5833333       0.4166667             85
  penalty_yards yards_per_penalty dst_tds picksixes dst_td_fum      top fqb_comp fqb_incomp fqb_att fqb_comp_pct fqb_incomp_pct fqb_pass_yds fqb_yds_comp fqb_pass_tds fqb_tds_comp fqb_ints
1           744          7.709524       5         4          1 494.9833      362        210     572     0.6367147       0.3632853        4574      12.56036           24     0.06836164       22
2           788          9.030184       3         2          1 485.4500      439        212     651     0.6790400       0.3209600        4515      10.42920           26     0.06348591       17
3           939          8.640179       3         1          0 485.5500      352        262     614     0.5793502       0.4206498        3912      12.10332           19     0.05681675       22
4           952          8.482549       3         2          1 460.0333      291        211     502     0.5836214       0.4163786        3293      11.60628           16     0.05551313       14
5           671          8.505456       4         4          0 510.2833      292        181     473     0.6308567       0.3691433        3379      11.74428           24     0.08404300       13
6           708          8.337672       6         5          0 496.5333      362        196     558     0.6510878       0.3489122        4340      12.14903           31     0.08562721       12
  fqb_rating fqb_sack_yds total_comps total_att total_comp_pct total_incomps total_incomp_pct total_passing_yds total_yds_comp total_pass_tds total_tds_comp total_ints total_sacks total_sack_yds
1   1347.191          289         363       574       0.6488277         211       0.3637599             4297      11.87352           24     0.06823812       22          41             289
2   1456.874          298         445       659       0.6918202         214       0.3187907             4541      10.31519           26     0.06202145       17          44             298
3   1186.807          324         363       619       0.5956949         256       0.4057390             3914      11.00789           19     0.05056675       23          48             324
4   1244.975          259         299       522       0.5827608         223       0.4210661             3443      11.80389           16     0.05551313       15          48             270
5   1480.385          336         292       473       0.6368103         181       0.3691433             3385      11.76772           24     0.08404300       13          42             336
6   1594.071          160         373       579       0.6560443         206       0.3535474             4450      12.06318           32     0.08620875       13          30             169
  fr_car fr_yds fr_yds_car fr_tds fr_tds_car sr_car sr_yds sr_yds_car sr_tds sr_tds_car toptwo_car toptwo_yds toptwo_yds_car toptwo_tds toptwo_tds_car total_carries total_rush_yds total_yds_car
1    181    895    6.210776      7 0.03776744    175    533  3.480538      4 0.03046218       356      1428     3.975210       11 0.03268624          422          1540      14.59585
2    178    813    7.732996     10 0.09300919     86    343  6.746753      2 0.07031250       264      1156     4.757032       12 0.04109182          321          1247      18.91009
3    222    771    3.833380      6 0.01823160    121    368  4.776139      0 0.00000000       343      1139     3.395736        6 0.01268878          423          1318      14.26707
4    206   1204    6.013718      6 0.02920612    193    718  4.569262      5 0.02270738       399      1922     4.818488       11 0.02615628          546          2307      10.94582
5    205   1026    5.601290      5 0.04013122    132    533  4.679630      5 0.03370154       337      1559     4.828241       10 0.03153772          483          2026      11.67230
6    289   1339    4.591021      9 0.03166474     56    343  8.016369      1 0.02083333       345      1682     4.864977       10 0.02904685          404          1828      16.19430
  total_rush_tds total_tds_car fwr_rec fwr_yds fwr_yds_rec fwr_tar fwr_comp_pct fwr_tds fwr_tds_rec fwr_lg swr_rec swr_yds swr_yds_rec swr_tar swr_comp_pct swr_tds swr_tds_rec swr_lg twr_rec
1            12    0.02923611      83    1404    21.90201     121    0.7226574       6  0.08229167     613      68     900    16.46071     111    0.6136025       7  0.14166667     452      58
2            12    0.03504802     132    1763    14.44917     176    0.7561548       8  0.05888122     619      90    1035    13.42560     126    0.7771100       7  0.12559524     391      70
3             7    0.01360996      81    1377    17.98296     145    0.5686331       5  0.05997024     643      68     846    14.03408     112    0.6379352       6  0.07916667     423      60
4            15    0.02773993      75    1126    16.32879     135    0.5832459       7  0.10736607     531      60     803    14.90432      91    0.6697578       5  0.11145833     374      39
5            14    0.02727961      75    1177    17.78854     107    0.7323796       5  0.06830357     540      68     860    15.74658     101    0.6867560       6  0.08705357     416      53
6            13    0.03260078     111    1841    17.14226     170    0.6463386      13  0.10324901     618      88    1100    13.27351     133    0.7124256       8  0.10223214     412      84

  twr_yds twr_yds_rec twr_tar twr_comp_pct twr_tds twr_tds_rec twr_lg topthree_rec topthree_rec_yds topthree_yds_rec topthree_tar topthree_comp_pct topthree_rec_tds topthree_tds_rec topthree_lg
1     669    12.895833      87    0.7200893       5  0.05937500     312          209          2973        15.12362          319        0.6502725              18       0.10094697          669
2     656     9.899479     101    0.7300032       3  0.04427083     275          292          3454        11.80716          403        0.7396438              18       0.06325559          690
3     639    11.988542      90    0.7074405       2  0.02812500     349          209          2862        14.44836          347        0.6009052              13       0.06087394          646
4     604    17.411458      58    0.7375000       1  0.03125000     382          174          2533        15.04448          284        0.6187145              13       0.08061550          583
5     606    11.870833      93    0.6212414       6  0.11354167     277          196          2643        14.06432          301        0.6671466              17       0.08681865          630
6     767     9.408185     110    0.8055556       4  0.05267857     310          283          3708        13.23091          413        0.6950221              25       0.08676478          683
  total_rec total_rec_yds total_yds_rec total_rec_tds total_tds_rec total_tar lg_rec off_tds fum_lost turnovers total_tackles solo_tackles joint_tackles tfl pds qb_hits num_krs kr_yds   kr_avg
1       363         4297      11.87352            24    0.06823812       562    694      36        9        31          915         785           130  92 103      111      27    540 13.45312
2       445         4541      10.31519            26    0.06202145       649    695      38       11        28         1024         701           323  60  57       57      27   1359 31.32813
3       363         3914      11.00789            19    0.05056675       616    649      26        6        29         1053         683           370  77 100       80      44   1163 22.91667
4       299         3373      11.56083            16    0.05551313       518    583      31       12        27         1171         794           377  98  93       97      23    469 16.04375
5       292         3385      11.76772            24    0.08404300       468    630      38        6        19          972         679           293  91  67      101      28    612 18.31250
6       373         4450      12.06318            32    0.08620875       570    693      45       10        23          966         741           225  64  63       44      70   1620 23.54308
  kr_lg kr_tds num_pr pr_yds    pr_avg pr_lg pr_tds fg_att fg_made    fg_pct fg_lg xp_made kick_points punts punt_yds punt_avg punt_lg tbs und_twenty
1   276      0     34    198  4.020833   114      0     36      30 0.6750000    519      37         127    78     3566 45.88423     871   6   35
2   287      0     30    250  8.031250   185      0     27      24 0.8385417    557      39         111    69     3166 43.98318     859   2   26
3   538      1     43    609 14.381250   369      1     41      38 0.8125000    578      26         140    90     4138 44.91763     875   9   27
4   272      0     39    243  6.075000   166      0     36      33 0.8697917    610      32         131    96     4124 42.89524     889   9   26
5   340      0     30    316 11.010417   217      0     27      24 0.7395833    573      42         114    70     3344 46.83720     912   5   25
6   568      0     18    256 11.645833   248      1     29      26 0.8229167    539      45         123    68     2763 38.08988     740   2   27
```

(D) SAS Code

```
options spool;

libname sasdat 'H:\Stat 330 SAS\sasdat';
data teams;
input Team $ Conf $ Div $;
datalines;
DAL NFC EAST
PHI NFC EAST
WAS NFC EAST
NYG NFC EAST
GBP NFC NORTH
DET NFC NORTH
CHI NFC NORTH
MIN NFC NORTH
NOS NFC SOUTH
CAR NFC SOUTH
ATL NFC SOUTH
TBB NFC SOUTH
SEA NFC WEST
SFO NFC WEST
STL NFC WEST
ARI NFC WEST
NEP AFC EAST
NYJ AFC EAST
MIA AFC EAST
BUF AFC EAST
CIN AFC NORTH
BAL AFC NORTH
CLE AFC NORTH
PIT AFC NORTH
IND AFC SOUTH
TEN AFC SOUTH
HOU AFC SOUTH
JAX AFC SOUTH
DEN AFC WEST
KCC AFC WEST
SDC AFC WEST
OAK AFC WEST
;
run;

%macro nfl(weeknum, gamenum, macro_team1, macro_team2, macro_pf1, macro_pf2, macro_aq1,
macro_aq2, macro_aq3, macro_aq4, macro_aot, macro_hq1, macro_hq2,
macro_hq3, macro_hq4, macro_hot,macro_apfirst, macro_arfirst, macro_apenaltyfdown,
macro_atdown_suc, macro_atdown_att, macro_afourthdown_suc, macro_afourthdown_att,
macro_atotalplays, macro_atotaldrives, macro_aredzoneconv, macro_aredzoneatt,
macro_anumpenalties, macro_apenaltyyards, macro_adsttds, macro_atopmin, macro_atopsec,
macro_hpfirst, macro_hrfirst, macro_hpenaltyfdown, macro_htdown_suc, macro_htdown_att,
macro_hfourthdown_suc, macro_hfourthdown_att, macro_htotalplays, macro_htotaldrives,
macro_hredzone_suc, macro_hredzoneatt, macro_hnumpenalties, macro_hpenaltyyards, macro_hdsttds,
macro_htopmin, macro_htopsec,macro_afqbcomp, macro_afqbatt, macro_afqbpassyds,
macro_afqbpasstds, macro_afqbints, macro_afqbsacks, macro_afqbsackyds, macro_atotalcomps,
macro_atotalatt, macro_atotalpassyds, macro_atotalpasstds, macro_atotalints, macro_atotalsacks,
macro_atotalsackyds, macro_afrcar, macro_afryds, macro_afrtds, macro_asrcar, macro_asryds,
macro_asrtds, macro_atotalcarries, macro_atotalrushyds, macro_atotalrushtds, macro_afwrrec,
macro_afwryds, macro_afwrtds, macro_afwrlg, macro_afwrtar, macro_aswrrec, macro_aswryds,
macro_aswrtds, macro_aswrlg, macro_aswrtar,
macro_atwrrec, macro_atwryds,macro_atwrtds, macro_atwrlg, macro_atwrtar, macro_atotalrec,
macro_atotalrecyds, macro_atotalrectds, macro_algrec, macro_atotaltar, macro_afumlost,
macro_hfqbcomp, macro_hfqbatt, macro_hfqbpassyds, macro_hfqbpasstds, macro_hfqbints,
macro_hfqbsacks, macro_hfqbsackyds, macro_htotalcomps, macro_htotalatt, macro_htotalpassyds,
macro_htotalpasstds, macro_htotalints, macro_htotalsacks,macro_htotalsackyds, macro_hfrcar,
macro_hfryds, macro_hfrtds, macro_hsrcar, macro_hsryds,
macro_hsrtds, macro_htotalcarries, macro_htotalrushyds, macro_htotalrushtds, macro_hfwrrec,
macro_hfwryds, macro_hfwrtds, macro_hfwrlg, macro_hfwrtar, macro_hswrrec, macro_hswryds,
macro_hswrtds, macro_hswrlg, macro_hswrtar, macro_htwrrec, macro_htwryds,macro_htwrtds,
macro_htwrlg, macro_htwrtar, macro_htotalrec, macro_htotalrecyds, macro_htotalrectds,
```

```
macro_hlgrec, macro_htotaltar, macro_hfumlost,macro_apicksixes, macro_atotaltackles,
macro_asolotackles, macro_atfl, macro_apds, macro_aqbhits, macro_anumkrs, macro_akryds,
macro_akrlg, macro_akrtds, macro_anumpr,macro_apryds, macro_aprlg, macro_aprtds, macro_afgmade,
macro_afgatt, macro_afglg, macro_axpmade, macro_apunts, macro_apuntyds, macro_atbs,
macro_aundtwenty, macro_apuntlg, macro_hpicksixes, macro_htotaltackles, macro_hsolotackles,
macro_htfl, macro_hpds, macro_hqbhits, macro_hnumkrs, macro_hkryds,  macro_hkrlg, macro_hkrtds,
macro_hnumpr,macro_hpryds, macro_hprlg, macro_hprtds, macro_hfgmade, macro_hfgatt, macro_hfglg,
macro_hxpmade,
macro_hpunts, macro_hpuntyds, macro_htbs, macro_hundtwenty, macro_hpuntlg);

libname sasdat 'H:\Stat 330 SAS\sasdat' ;
data new; set teams;
Week=&weeknum;
/* Win Loss PF PA calc*/
if Team=&macro_team1 then do;
Team1=&macro_team1;
PF = &macro_pf1;
PA = &macro_pf2;
end;
else if Team=&macro_team2 then do;
Team2=&macro_team2;
PF = &macro_pf2;
PA= &macro_pf1;
end;
spread=PF-PA;
run;


libname sasdat 'H:\Stat 330 SAS\sasdat';
data neww; set new;
if PF>PA then do;
Win=1;
Loss=0;
Tie=0;
end;
else if PF<PA then do;
Win=0;
Loss=1;
Tie=0;
end;
else do;
Win=0;
Loss=0;
Tie=1;
end;

Games=Win+Loss;
if Games NE 0 then do;
win_pct=Win/Games;
loss_pct=1-win_pct;
end;

if (Team1='' and Team2='') then delete;

/* Conf Game calc */

if Conf=lag(Conf) then sameconf='yes';

drop Team1 Team2;
run;

data test;
if eof=0 then set neww(firstobs=2 keep=sameconf
rename=(sameconf=sameconf2))end=eof;
else sameconf2=' ';
set neww;
run;

data newest; set test;
if sameconf2 NE ' ' then conf_game=sameconf2;
if sameconf NE ' ' then conf_game=sameconf;
```

```
if conf_game=' ' then conf_game='no';
drop sameconf sameconf2;
run;

 /* div calc */

 data div; set newest;
 if Div=lag(Div) then samediv='yes';
 run;

 data division;
 if eof=0 then set div(firstobs=2 keep=samediv
 rename=(samediv=samediv2))end=eof;
 else samediv2=' ';
 set div;
 run;

 data divv; set division;
 if samediv2 NE ' ' then div_game=samediv2;
 if samediv NE ' ' then div_game=samediv;
 if div_game=' ' then div_game='no';
 drop samediv samediv2;
 run;

/* conf win calc*/

 data confwin; set divv;
 if conf game='yes' then do;
        conf games=1;
        if Win=1 then do;
        conf_win=1;
        conf_loss=0;
        end;

        else do;
        conf_games=1;
        conf_win=0;
        conf_loss=1;
        end;

end;

if conf_games NE 0 then do;
conf_win_pct=conf_win/conf_games;
end;
conf_loss_pct=1-conf_win_pct;

run;

/* div win calc */

data divwin; set confwin;

if div game='yes' then do;
        div_games=1;
        if Win=1 then do;
        div_win=1;
        div_loss=0;
        end;

        else do;
        div_games=0;
        div_win=0;
        div_loss=1;
        end;

end;

if div_games NE 0 then do;
div_win_pct=div_win/div_games;
end;
```

```
div_loss_pct=1-div_win_pct;
run;

/* home away win loss calc */
        data homewin; set divwin;

        if Team=&macro_team2 then home='yes';
        else if Team=&macro_team1 then home='no';

        if home='no' then do;
        home_games=0;
        away_games=1;

                if Win=1 then do;
                away_win=1;
                away_loss=0;
                end;

                else do;
                away_win=0;
                away_loss=1;
                end;

        end;

        else if home='yes'  then do;
        home_games=1;
        away_games=0;

                if Win=1 then do;
                home_win=1;
                home_loss=0;
                end;

                else do;
                home_win=0;
                home_loss=1;
                end;


        end;

        if home_games NE 0 then do;
        home_win_pct=home_win/home_games;
        end;
        home_loss_pct=1-home_win_pct;
        if away_games NE 0 then do;
        away_win_pct=away_win/away_games;
        end;
        away_loss_pct=1-away_win_pct;


        run;

/*  END %nfl(away_team, home_team, PF_away, PF_home) */

data quarterlypoints; set homewin;

if home='no' then do;
q1_points=&macro_aq1;
q2_points=&macro_aq2;
q3_points=&macro_aq3;
q4_points=&macro_aq4;
ot_points=&macro_aot;
end;

else if home='yes' then do;
q1_points=&macro_hq1;
q2_points=&macro_hq2;
q3_points=&macro_hq3;
q4_points=&macro_hq4;
```

```
ot_points=&macro_hot;
end;

firsthalf=q1_points+q2_points;
secondhalf=q3_points+q4_points;
firstthree=firsthalf+q3_points;

run;

/*  END %nfl(macro_aq1, macro_aq2, macro_aq3, macro_aq4, macro_hq1, macro_hq2, macro_hq3,
macro_hq4) */

data overall_comp; set quarterlypoints;

if home='no' then do;

pfirstdowns=&macro_apfirst;
rfirstdowns=&macro_arfirst;
penalty_fdowns=&macro_apenaltyfdown;
thirddown_suc=&macro_atdown_suc;
thirddown_att=&macro_atdown_att;
fourthdown_suc=&macro_afourthdown_suc;
fourthdown_att=&macro_afourthdown_att;
total_plays=&macro_atotalplays;
total_drives=&macro_atotaldrives;
redzone_suc=&macro_aredzoneconv;
redzone_att=&macro_aredzoneatt;
num_penalties=&macro_anumpenalties;
penalty_yards=&macro_apenaltyyards;
dst_tds=&macro_adsttds;
mintop=&macro_atopmin;
sectop=&macro_atopsec;

end;

else if home='yes' then do;
pfirstdowns=&macro_hpfirst;
rfirstdowns=&macro_hrfirst;
penalty_fdowns=&macro_hpenaltyfdown;
thirddown_suc=&macro_htdown_suc;
thirddown_att=&macro_htdown_att;
fourthdown_suc=&macro_hfourthdown_suc;
fourthdown_att=&macro_hfourthdown_att;
total_plays=&macro_htotalplays;
total_drives=&macro_htotaldrives;
redzone_suc=&macro_hredzone_suc;
redzone_att=&macro_hredzoneatt;
num_penalties=&macro_hnumpenalties;
penalty_yards=&macro_hpenaltyyards;
dst_tds=&macro_hdsttds;
mintop=&macro_htopmin;
sectop=&macro_htopsec;
end;

total_first_downs=pfirstdowns+rfirstdowns+penalty_fdowns;
thirddown fail=thirddown att-thirddown_suc;
if thirddown_att NE 0 then do;
thirddown_convpct=thirddown_suc/thirddown_att;
end;
thirddown_failpct=1-thirddown_convpct;
fourthdown_fail=fourthdown_att-fourthdown_suc;
if fourthdown_att NE 0 then do;
fourthdown_convpct=fourthdown_suc/fourthdown_att;
end;
fourthdown_failpct=1-fourthdown_convpct;
redzone fail=redzone att-redzone_suc;
if redzone_att NE 0 then do;
redzone_convpct=redzone_suc/redzone_att;
end;
redzone_failpct=1-redzone_convpct;
if num_penalties NE 0 then do;
```

```
yards_per_penalty=penalty_yards/num_penalties;
end;

if total_drives NE 0 then do;
total_plays_drive=total_plays/total_drives;
end;

actualsectop=sectop/60;
top=mintop+actualsectop;
drop mintop sectop actualsectop;
run;



/*  END of %nfl(macro_apfirst, macro_arfirst, macro_apenaltyfdown, macro_atdown_suc,
macro_atdown_att, macro_afourthdown_suc, macro_afourthdown_att, macro_atotalplays,
macro_atotaldrives, macro_aredzone_suc, macro_aredzoneatt, macro_anumpenalties,
macro_apenaltyyards, macro_adsttds, macro_atop, macro_hpfirst, macro_hrfirst,
macro_hpenaltyfdown, macro_htdown_suc, macro_htdown_att, macro_hfourthdown_suc,
macro_hfourthdown_att, macro_htotalplays, macro_htotaldrives, macro_hredzone_suc,
macro_hredzoneatt, macro_hnumpenalties, macro_hpenaltyyards, macro_hdsttds, macro_htop);  */

data positions; set overall_comp;

if home='no' then do;

fqb_comp=&macro_afqbcomp;
fqb_att=&macro_afqbatt;
fqb_pass_yds=&macro_afqbpassyds;
fqb_pass_tds=&macro_afqbpasstds;
fqb_ints=&macro_afqbints;
fqb_sacks=&macro_afqbsacks;
fqb_sack_yds=&macro_afqbsackyds;
total_comps=&macro_atotalcomps;
total_att=&macro_atotalatt;
total_pass_yds=&macro_atotalpassyds;
total_pass_tds=&macro_atotalpasstds;
total_ints=&macro_atotalints;
total_sacks=&macro_atotalsacks;
total_sack_yds=&macro_atotalsackyds;
fr_car=&macro_afrcar;
fr_yds=&macro_afryds;
fr_tds=&macro_afrtds;
sr_car=&macro_asrcar;
sr_yds=&macro_asryds;
sr_tds=&macro_asrtds;
total_carries=&macro_atotalcarries;
total_rush_yds=&macro_atotalrushyds;
total_rush_tds=&macro_atotalrushtds;
fwr_rec=&macro_afwrrec;
fwr_yds=&macro_afwryds;
fwr_tds=&macro_afwrtds;
fwr_lg=&macro_afwrlg;
fwr_tar=&macro_afwrtar;
swr_rec=&macro_aswrrec;
swr_yds=&macro_aswryds;
swr_tds=&macro_aswrtds;
swr_lg=&macro_aswrlg;
swr_tar=&macro_aswrtar;
twr_rec=&macro_atwrrec;
twr_yds=&macro_atwryds;
twr_tds=&macro_atwrtds;
twr_lg=&macro_atwrlg;
twr_tar=&macro_atwrtar;
total_rec=&macro_atotalrec;
total_rec_yds=&macro_atotalrecyds;
total_rec_tds=&macro_atotalrectds;
lg_rec=&macro_algrec;
total_tar=&macro_atotaltar;
fum_lost=&macro_afumlost;
```

```
end;

else if home='yes' then do;

fqb_comp=&macro_hfqbcomp;
fqb_att=&macro_hfqbatt;
fqb_pass_yds=&macro_hfqbpassyds;
fqb_pass_tds=&macro_hfqbpasstds;
fqb_ints=&macro_hfqbints;
fqb_sacks=&macro_hfqbsacks;
fqb_sack_yds=&macro_hfqbsackyds;
total_comps=&macro_htotalcomps;
total_att=&macro_htotalatt;
total_pass_yds=&macro_htotalpassyds;
total_pass_tds=&macro_htotalpasstds;
total_ints=&macro_htotalints;
total_sacks=&macro_htotalsacks;
total_sack_yds=&macro_htotalsackyds;
fr_car=&macro_hfrcar;
fr_yds=&macro_hfryds;
fr_tds=&macro_hfrtds;
sr_car=&macro_hsrcar;
sr_yds=&macro_hsryds;
sr_tds=&macro_hsrtds;
total_carries=&macro_htotalcarries;
total_rush_yds=&macro_htotalrushyds;
total_rush_tds=&macro_htotalrushtds;
fwr_rec=&macro_hfwrrec;
fwr_yds=&macro_hfwryds;
fwr_tds=&macro_hfwrtds;
fwr_lg=&macro_hfwrlg;
fwr_tar=&macro_hfwrtar;
swr_rec=&macro_hswrrec;
swr_yds=&macro_hswryds;
swr_tds=&macro_hswrtds;
swr_lg=&macro_hswrlg;
swr_tar=&macro_hswrtar;
twr_rec=&macro_htwrrec;
twr_yds=&macro_htwryds;
twr_tds=&macro_htwrtds;
twr_lg=&macro_htwrlg;
twr_tar=&macro_htwrtar;
total_rec=&macro_htotalrec;
total_rec_yds=&macro_htotalrecyds;
total_rec_tds=&macro_htotalrectds;
lg_rec=&macro_hlgrec;
total_tar=&macro_htotaltar;
fum_lost=&macro_hfumlost;
end;

if fqb_att NE 0 then do;
fqb comp pct=fqb comp/fqb att;
fqb_incomp_pct=1-fqb_comp_pct;
end;

fqb_incomp=fqb_att-fqb_comp;
total_incomps=total_att-total_comps;

if fqb_comp NE 0 then do;
fqb_yds_comp=fqb_pass_yds/fqb_comp;
fqb_tds_comp=fqb_pass_tds/fqb_comp;
end;

if total_att NE 0 then do;
total comp pct=total comps/total att;
total_incomp_pct=1-total_comp_pct;
end;

total_passing_yds=total_pass_yds+total_sack_yds;
total_yds=total_passing_yds+total_rush_yds;
```

```
if total_plays NE 0 then do;
total_yds_play=total_yds/total_plays;
end;

if total_comps NE 0 then do;
total_yds_comp=total_passing_yds/total_comps;
total_tds_comp=total_pass_tds/total_comps;
end;

if total_carries NE 0 then do;
total_yds_car=total_rush_yds/total_carries;
end;

if fqb_att NE 0 then do;
a=5*((fqb_comp/fqb_att) - .3);
b=.25*((fqb_pass_yds/fqb_att) -3);
c=20*(fqb_pass_tds/fqb_att);
d=2.375-(fqb_ints/fqb_att)*25;

if a>2.375 then a=2.375;
if b>2.375 then b=2.375;
if c>2.375 then c=2.375;
if d>2.375 then d=2.375;

fqb_rating=100*((a+b+c+d)/6);

if total_drives NE 0 then do;
total_yds_drive=total_yds/total_drives;
end;

if total_plays NE 0 then do;
total_yds_play=total_yds/total_plays;
end;

if fr_car NE 0 then do;
fr_yds_car=fr_yds/fr_car;
fr_tds_car=fr_tds/fr_car;
end;

if sr_car NE 0 then do;
sr_yds_car=sr_yds/sr_car;
sr_tds_car=sr_tds/sr_car;
end;


toptwo_car=fr_car+sr_car;
toptwo_yds=fr_yds+sr_yds;

if toptwo_car NE 0 then do;
toptwo_yds_car=toptwo_yds/toptwo_car;
end;

toptwo_tds=fr_tds+sr_tds;

if toptwo_car NE 0 then do;
toptwo_tds_car=toptwo_tds/toptwo_car;
end;



if total_carries NE 0 then do;
total_yds_car=total_yds/total_carries;
total_tds_car=total_rush_tds/total_carries;
end;

if fwr_rec NE 0 then do;
fwr_yds_rec=fwr_yds/fwr_rec;
fwr_tds_rec=fwr_tds/fwr_rec;
end;

if fwr_tar NE 0 then do;
```

```
fwr_comp_pct=fwr_rec/fwr_tar;
end;

if swr_rec NE 0 then do;
swr_yds_rec=swr_yds/swr_rec;
swr_tds_rec=swr_tds/swr_rec;
end;

if swr_tar NE 0 then do;
swr_comp_pct=swr_rec/swr_tar;
end;

if twr_rec NE 0 then do;
twr_yds_rec=twr_yds/twr_rec;
twr_tds_rec=twr_tds/twr_rec;
end;

if twr_tar NE 0 then do;
twr_comp_pct=twr_rec/twr_tar;
end;

topthree_rec=fwr_rec+swr_rec+twr_rec;
topthree_rec_yds=fwr_yds+swr_yds+twr_yds;
topthree_rec_tds=fwr_tds+swr_tds+twr_tds;
topthree_tar=fwr_tar+swr_tar+twr_tar;
topthree_lg=max(fwr_lg,swr_lg,twr_lg);

topthree_comp_pct=topthree_rec/topthree_tar;

if topthree_rec NE 0 then do;
topthree_yds_rec=topthree_rec_yds/topthree_rec;
topthree_tds_rec=topthree_rec_tds/topthree_rec;
end;

if total_tar NE 0 then do;
total_comp_pct=total_rec/total_tar;
end;

if total_rec NE 0 then do;
total_tds_rec=total_rec_tds/total_rec;
end;

turnovers=fum_lost+total_ints;

if total_rec NE 0 then do;
total_yds_rec=total_rec_yds/total_rec;
end;

off_tds=total_pass_tds+total_rush_tds;

end;

drop a b c d;

run;

/* END OF %nfl(macro_afqbcomp, macro_afqbatt, macro_afqbpassyds, macro_afqbpasstds,
macro_afqbints, macro_afqbsacks, macro_afqbsackyds, macro_atotalcomps, macro_atotalatt,
macro_atotalpassyds, macro_atotalpasstds, macro_atotalints, macro_atotalsacks,
macro_atotalsackyds, macro_afrcar, macro_afryds, macro_afrtds, macro_asrcar, macro_asryds,
macro_asrtds, macro_atotalcarries, macro_atotalrushyds, macro_atotalrushtds, macro_afwrrec,
macro_afwryds, macro_afwrtds, macro_afwrlg, macro_afwrtar, macro_aswrrec, macro_aswryds,
macro_aswrtds, macro_aswrlg, macro_aswrtar, macro_atwrrec, macro_atwryds,macro_atwrtds,
macro_atwrlg, macro_atwrtar, macro_atotalrec, macro_atotalrecyds, macro_atotalrectds,
macro_algrec, macro_atotaltar, macro_afumlost, macro_hfqbcomp, macro_hfqbatt, macro_hfqbpassyds,
macro_hfqbpasstds, macro_hfqbints, macro_hfqbsacks, macro_hfqbsackyds, macro_htotalcomps,
macro_htotalatt, macro_htotalpassyds, macro_htotalpasstds, macro_htotalints, macro_htotalsacks,
macro_htotalsackyds, macro_hfrcar, macro_hfryds, macro_hfrtds, macro_hsrcar, macro_hsryds,
macro_hsrtds, macro_htotalcarries, macro_htotalrushyds, macro_htotalrushtds, macro_hfwrrec,
macro_hfwryds, macro_hfwrtds, macro_hfwrlg, macro_hfwrtar, macro_hswrrec, macro_hswryds,
macro_hswrtds, macro_hswrlg, macro_hswrtar, macro_htwrrec, macro_htwryds, macro_htwrtds,
```

```
macro_htwrlg, macro_htwrtar, macro_htotalrec, macro_htotalrecyds, macro_htotalrectds,
macro_hlgrec, macro_htotaltar, macro_hfumlost); */

data dst; set positions;

if home='no' then do;
picksixes=&macro_apicksixes;
total_tackles=&macro_atotaltackles;
solo_tackles=&macro_asolotackles;
/*tackle for loss*/
tfl=&macro_atfl;
/*pass deflections*/
pds=&macro_apds;
qb_hits=&macro_aqbhits;
num_krs=&macro_anumkrs;
kr_yds=&macro_akryds;
kr_tds=&macro_akrtds;
kr_lg=&macro_akrlg;
num_pr=&macro_anumpr;
pr_yds=&macro_apryds;
pr_lg=&macro_aprlg;
pr_tds=&macro_aprtds;
fg_att=&macro_afgatt;
fg_made=&macro_afgmade;
fg_lg=&macro_afglg;
xp_made=&macro_axpmade;
punts=&macro_apunts;
punt_yds=&macro_apuntyds;
/*touchbacks*/
tbs=&macro_atbs;
/*punt downed under 20 yards away from own endzone*/
und_twenty=&macro_aundtwenty;
punt_lg=&macro_apuntlg;
end;

else if home='yes' then do;
picksixes=&macro_hpicksixes;
total_tackles=&macro_htotaltackles;
solo_tackles=&macro_hsolotackles;
/*tackle for loss*/
tfl=&macro_htfl;
/*pass deflections*/
pds=&macro_hpds;
qb_hits=&macro_hqbhits;
num_krs=&macro_hnumkrs;
kr_yds=&macro_hkryds;
kr_tds=&macro_hkrtds;
kr_lg=&macro_hkrlg;
num_pr=&macro_hnumpr;
pr_yds=&macro_hpryds;
pr_lg=&macro_hprlg;
pr_tds=&macro_hprtds;
fg_att=&macro_hfgatt;
fg_made=&macro_hfgmade;
fg_lg=&macro_hfglg;
xp_made=&macro_hxpmade;
punts=&macro_hpunts;
punt_yds=&macro_hpuntyds;
/*touchbacks*/
tbs=&macro_htbs;
/*punt downed under 20 yards away from own endzone*/
und_twenty=&macro_hundtwenty;
punt_lg=&macro_hpuntlg;
end;

/*dst_td_fum includes blocked punts/kicks for tds*/
dst_td_fum=dst_tds-picksixes-kr_tds-pr_tds;
joint_tackles=total_tackles-solo_tackles;

if num_pr NE 0 then do;
pr_avg=pr_yds/num_pr;
```

```
end;

if fg_att NE 0 then do;
fg_pct=fg_made/fg_att;
end;

if punts NE 0 then do;
punt_avg=punt_yds/punts;
end;

if num_krs NE 0 then do;
kr_avg=kr_yds/num_krs;
end;

if 0<fg_lg<25 then longestfg_length='chip shot';
else if 25<=fg_lg<35 then longestfg_length='short';
else if 35<=fg_lg<45 then longestfg_length='medium';
else if fg_lg>=45 then longestfg_length='long';

kick_points=3*fg_made+xp_made;

drop Games home conf_game div_game;

run;

/* END OF %nfl(macro_apicksixes, macro_atotaltackles, macro_asolotackles, macro_atfl, macro_apds,
macro_aqbhits, macro_anumkrs, macro_akryds, macro_akrtds, macro_anumpr,macro_apryds, macro_aprlg,
macro_aprtds, macro_afgatt, macro_afgmade, macro_afglg, macro_axpmade, macro_apunts,
macro_apuntyds, macro_atbs, macro_aundtwenty, macro_apuntlg,
macro_hpicksixes, macro_htotaltackles, macro_htotaltackles, macro_hsolotackles, macro_htfl,
macro_hpds, macro_hqbhits, macro_hnumkrs, macro_hkryds, macro_hkrtds, macro_hnumpr,macro_hpryds,
macro_hprlg, macro_hprtds, macro_hfgatt, macro_hfgmade, macro_hfglg, macro_hxpmade, macro_hpunts,
macro_hpuntyds, macro_htbs, macro_hundtwenty, macro_hpuntlg) */


data week&weeknum._game&gamenum; set dst;
drop fqb_sacks total_pass_yds;
run;

data week&weeknum._game&gamenum;
retain Team Conf Div Week Win Loss Tie Win_pct Loss_pct PF PA spread home_win home_loss
home_games home_win_pct home_loss_pct away_win away_loss away_games away_win_pct away_loss_pct
div_win div_loss div_games div_win_pct div_loss_pct conf_win conf_loss conf_games conf_win_pct
conf_loss_pct q1_points q2_points q3_points q4_points ot_points firsthalf secondhalf firstthree
pfirstdowns rfirstdowns penalty_fdowns total_first_downs thirddown_suc thirddown_fail
thirddown_att thirddown_convpct thirddown_failpct fourthdown_suc fourthdown_fail fourthdown_att
fourthdown_convpct fourthdown_failpct total_yds total_plays total_drives total_plays_drive
total_yds_play total_yds_drive redzone_suc redzone_fail redzone_att redzone_convpct
redzone_failpct num_penalties penalty_yards yards_per_penalty dst_tds picksixes dst_td_fum top
fqb_comp fqb_incomp fqb_att fqb_comp_pct fqb_incomp_pct fqb_pass_yds fqb_yds_comp fqb_pass_tds
fqb_tds_comp fqb_ints fqb_rating fqb_sack_yds total_comps total_att
total_comp_pct total_incomps total_incomp_pct total_passing_yds total_yds_comp total_pass_tds
total_tds_comp total_ints total_sacks total_sack_yds fr_car fr_yds fr_yds_car fr_tds fr_tds_car
sr_car sr_yds sr_yds_car sr_tds sr_tds_car toptwo_car toptwo_yds toptwo_yds_car toptwo_tds
toptwo_tds_car total_carries total_rush_yds total_yds_car total_rush_tds total_tds_car fwr_rec
fwr_yds fwr_yds_rec fwr_tar fwr_comp_pct fwr_tds fwr_tds_rec fwr_lg swr_rec swr_yds swr_yds_rec
swr_tar swr_comp_pct swr_tds swr_tds_rec swr_lg twr_rec twr_yds twr_yds_rec twr_tar twr_comp_pct
twr_tds twr_tds_rec twr_lg topthree_rec topthree_rec_yds topthree_yds_rec topthree_tar
topthree_comp_pct topthree_rec_tds topthree_tds_rec topthree_lg total_rec total_rec_yds
total_yds_rec total_rec_tds total_tds_rec total_tar total_comp_pct lg_rec off_tds fum_lost
turnovers total_tackles solo_tackles joint_tackles tfl pds qb_hits num_krs kr_yds kr_avg kr_lg
kr_tds num_pr pr_yds pr_avg pr_lg pr_tds fg_att fg_made fg_pct fg_lg longestfg_length
xp_made kick_points punts punt_yds punt_avg punt_lg tbs und_twenty;
set week&weeknum._game&gamenum;
run;

proc print data=week&weeknum._game&gamenum;run;

%mend;
```

```
%nfl(1,1,'BAL','DEN',27,49,7,10,0,10,0,0,14,21,14,0,18,3,3,8,22,0,1,87,15,3,5,7,53,0,33,48,20,2,2
,8,15,0,0,68,16,2,2,8,61,0,26,12,34,62,362,2,2,4,27,34,62,335,2,2,4,27,12,36,1,9,22,0,21,58,1,4,9
2,0,34,8,7,87,0,31,12,4,65,1,23,6,34,362,2,34,61,0,27,42,462,7,0,3,17,27,42,445,7,0,3,17,9,28,0,8
,24,0,23,65,0,5,161,2,78,11,5,110,2,44,7,9,67,2,15,11,27,462,7,78,42,2,0,56,44,4,5,7,0,0,0,0,
1,13,13,0,2,2,30,3,9,456,0,2,61,0,66,53,10,11,9,0,0,0,0,6,63,27,0,0,0,0,7,7,319,1,5,59);

%nfl(1,2,'GBP','SFO',28,34,7,7,7,7,0,7,7,7,13,0,16,5,2,4,10,0,0,58,13,4,4,5,44,0,21,25,17,6,0,9,1
8,1,1,75,13,3,5,11,85,0,38,35,21,37,333,3,1,2,11,21,37,322,3,1,2,11,14,41,1,2,13,0,19,63,1,7,130,
1,37,10,7,108,1,38,12,5,56,1,13,8,21,333,3,38,36,1,27,39,412,3,0,2,8,27,39,40,3,0,2,8,21,44,1,6,2
4,0,34,90,1,13,208,1,43,17,6,98,2,37,9,3,36,0,16,6,27,412,3,43,39,0,0,76,61,8,4,3,3,40,17,
0,2,25,16,0,0,0,0,4,6,277,0,1,51,0,48,39,2,5,5,2,60,30,0,2,8,7,0,2,3,33,4,5,236,1,1,56);

%nfl(1,3,'NEP','BUF',23,21,10,7,0,6,0,0,14,7,0,0,18,7,1,11,20,0,1,89,15,2,5,4,36,0,37,43,6,7,2,4,
13,0,0,61,14,2,2,10,75,1,22,17,29,52,288,2,1,3,15,29,52,273,2,1,3,15,14,101,0,9,46,0,34,158,0,10,
104,0,24,14,7
,79,2,35,9,7,58,0,19,10,29,288,2,35,52,2,18,27,150,2,0,0,0,18,27,150,2,0,0,0,13,67,0,17,41,0,34,1
36,0,4,41,0,14,5,3,39,1,18,6,4,38,0,19,6,18,150,2,19,27,2,0,74,52,3,3,4,2,35,22,0,3,32,16,0,3,3,4
8,2,6,236,1,3,65,0,92,64,4,7,9,1,19,19,0,0,0,0,0,0,0,0,3,9,412,1,3,57);

%nfl(1,4,'CIN','CHI',21,24,7,7,7,0,0,7,3,7,7,0,12,5,1,7,11,0,0,55,11,2,2,8,84,0,28,30,12,4,1,6,14
,1,1,61,13,3,3,4,59,0,31,30,26,33,282,2,
2,1,5,26,33,277,2,2,1,5,14,25,1,4,22,0,21,63,1,9,162,2,45,13,5,47,0,17,5,5,3,0,12,5,26,282,2,45,3
3,1,21,33,242,2,1,0,0,21,33,242,2,1,0,0,19,50,1,3,16,0,28,81,1,8,104,1,38,10,3,49,1,30,6,5,42,0,1
8,8,21,242,2,38,32,0,0,54,44,3,5,4,0,0,0,0,1,13,13,0,0,0,0,3,4,193,0,0,53,0,59,31,1,5,2,1,31,31,0
,2,1,3,0,1,1,58,3,5,232,1,3,54);

%nfl(1,5,'MIA','CLE',23,10,3,3,7,10,0,0,7,3,0,0,15,1,2,8,16,0,0,65,14,1,2,10,77,0,32,47,15,2,3,1,
14,2,4,72,12,1,2,9,57,0,27,13,24,38,272,1,1,4,17,24,38,255,1,1,4,17,8,14,1,10,3,0,23,20,1,9,114,1
,34,14,7,77,0,24,10,5,54,0,20,6,24,272,1,34,37,0,26,53,289,1,3,6,45,26,53,244,1,3,6,45,13,47,0,0,
0,0,13,47,0,9,108,1,22,13,5,47,0,17,10,3,44,0,20,8,26,289,1,22,53,0,0,56,44,3,10,17,1,24,24,0,3,7
,5,0,3,3,49,2,5,270,0,2,66,0,60,44,8,5,9,4,103,33,0,2,31,31,0,1,1,39,1,5,225,0,2,52);

%nfl(1,6,'MIN','DET',24,34,7,7,10,0,0,3,10,14,7,0,11,3,2,2,10,1,2,53,14,2,2,5,52,0,23,41,16,10,2,
5,13,0,1,77,14,3,6,11,88,0,36,19,18,28,236,1,3,3,11,18,28,225,1,3,3,11,18,93,2,4,12,0,22,105,2,7,
140,0,47,8,3,33,0,20,7,2,27,0,21,4,18,236,1,47,28,1,28,43,357,2,1,0,0,28,43,357,2,1,0,0,21,90,0,6
,25,2,34,112,2,4,101,1,77,8,6,78,0,27,6,5,67,0,29,6,28,357,2,77,42,1,0,74,55,3,7,3,2,54,30,0,1,6,
6,0,1,1,52,3,5,211,0,1,54,0,50,33,7,6,6,0,0,0,0,5,37,11,0,2,2,42,4,4,142,0,1,55);

%nfl(1,7,'OAK','IND',17,21,0,7,3,7,0,7,7,0,7,0,10,9,1,7,13,1,1,63,8,2,3,8,51,0,32,47,9,7,2,6,10,0
,1,53,8,2,2,3,31,0,27,13,19,29,217,1,2,1,16,19,29,201,
1,2,1,16,13,112,0,17,48,1,33,171,1,5,70,0,18,8,5,43,1,21,7,1,41,0,41,1,19,217,1,41,29,0,18,23,178
,2,0,4,31,18,23,147,2,0,4,31,13,63,0,6,68,1,26,127,1,8,96,1,25,8,3,33,0,16,4,3,20,0,12,5,18,178,2
,25,23,0,0,57,33,5,1,8,2,47,27,0,1,5,5,0,1,2,38,2,2,10,1,0,53,0,72,36,2,4,3,0,0,0,0,1,23,23,0,0,0
,0,3,3,117,0,1,45);

%nfl(1,8,'ATL','NOS',17,23,10,0,7,0,0,0,13,7,3,0,14,3,1,3,11,0,1,55,11,2,4,2,19,0,24,49,17,1,0,6,
13,0,1,66,12,1,3,6,57,0,35,11,25,38,304,2,1,3,25,25,
38,279,2,1,3,25,11,77,0,1,12,0,14,88,0,4,93,0,50,6,7,76,1,22,9,5,45,0,17,8,25,304,2,50,36,1,26,35
,357,2,1,2,16,26,35,341,2,1,2,16,9,43,0,8,22,0,29,78,0,6,88,0,32,6,2,86,0,67,5,5,68,1,25,6,26,357
,2,67,35,0,0,69,49,7,4,3,0,0,0,0,2,21,13,0,1,1,23,2,6,281,1,2,56,0,51,33,4,3,6,1,23,23,0,4,7,5,0,
3,3,48,2,3,148,0,2,61);

%nfl(1,9,'TBB','NYJ',17,18,7,7,0,3,0,2,10,0,6,0,10,2,0,6,16,0,0,59,13,2,3,13,102,0,27,38,12,5,5,7
,18,0,0,73,13,1,2,6,45,0,32,22,15,31,210,1,1,3,25,15,31,185,1,1,3,25,24,65,1,1,0,0,25,65,1,7,154,
0,39,13,4,52,1,17,8,1,4,0,4,1,15,210,1,39,31,1,24,38,256,1,1,5,42,24,39,214,1,1,5,42,6,47,0,12,29
,0,29,90,0,7,79,1,25,8,3,45,0,26,4,6,39,0,10,9,24,256,1,26,38,1,0,65,49,7,5,9,3,92,40,0,3,35,28,0
,1,1,37,2,7,326,0,3,59,0,61,36,3,1,5,1,19,19,0,1,9,9,0,3,3,48,1,7,339,2,2,84);

%nfl(1,10,'TEN','PIT',16,9,0,7,3,6,0,2,0,0,7,0,6,10,1,6,15,1,1,63,10,1,4,6,60,0,34,1,13,0,1,4,13,
1,1,53,11,1,2,4,47,0,25,59,11,20,125,0,0,1,8,11,20,117,0,0,1,8,25,70,0,8,21,1,42,112,1,4,46,0,14,
7,3,40,0,25,4,1,15,0,15,2,11,125,0,25,20,0,21,33,191,1,1,5,28,21,33,163,1,1,5,28,6,19,0,7,8,0,15,
31,0,5,71,0,22,7,7,57,0,20,12,4,34,1,11,7,21,191,1,22,33,1,0,52,43,8,6,6,1,1,0,0,5,58,27,0,3,3,44
,1,5,208,0,4,55,0,79,50,4,2,3,4,78,25,0,1,1,1,0,0,0,1,7,309,0,1,51);

%nfl(1,11,'SEA','CAR',2,7,0,3,3,6,0,0,7,0,0,0,13,4,1,6,13,0,0,61,8,0,3,9,99,0,30,14,8,6,3,5,11,0,
0,50,9,1,1,4,46,0,29,46,25,33,320,1,0,2,20,25,33,300,1,0,2,20,17,43,0,3,17,0,26,70,0,7,91,0,25,8,
4,51,0,18,6,2,49,1,43,2,25,320,1,43,32,1,16,23,125,1,0,1,6,16,23,125,1,0,1,6,17,86,0,5,38,0,26,13
4,0,5,56,0,27,10,6,51,1,15,8,3,14,0,10,3,16,131,1,27,23,2,0,48,34,1,2,1,0,0,0,0,4,48,22,0,2,2,40,
0,4,198,0,1,69,0,60,42,2,2,1,0,0,0,0,2,10,10,0,0,0,0,1,5,239,0,2,57);
```

```
%nfl(1,12,'KCC','JAX',28,2,14,7,0,7,0,2,0,0,0,0,10,7,0,5,15,0,0,63,14,3,3,3,20,1,31,30,9,3,0,5,19
,0,1,70,15,0,1,5,30,0,28,30,21,34,173,2,0,1,2,21,34,171,2,0,1,2,16,77,1,4,25,0,27,121,1,4,44,0,26
,4,3,43,0,21,5,4,30,0,15,6,21,173,2,26,34,0,16,35,121,0,2,6,50,19,41,107,0,2,6,50,15,45,0,4,16,0,
23,71,0,3,40,0,24,11,3,31,0,16,5,4,22,0,8,5,19,157,0,24,41,0,1,48,46,8,7,10,0,0,0,0,7,80,36,0,0,0
,0,4,9,363,2,5,58,0,47,47,2,3,4,2,48,25,0,1,0,0,0,0,0,0,11,556,1,2,58);

%nfl(1,13,'ARI','STL',24,27,0,10,14,0,0,0,10,3,14,0,19,4,2,7,14,0,0,70,11,1,2,6,68,1,31,25,14,4,2
,4,11,0,0,62,11,2,4,7,59,0,28,35,26,40,627,2,1,4,23,26,40,304,2,1,4,23,16,60,0,10,26,0,26,86,0,8,
97,0,19,9,4,82,0,44,6,8,80,2,24,14,26,327,2,44,40,1,27,38,299,2,1,0,0,27,38,299,2,1,0,0,20,63,0,1
,4,0,24,67,0,7,141,2,47,10,6,41,0,14,7,5,33,0,15,6,27,299,2,47,38,1,1,56,56,3,6,5,2,32,18,0,1,1,1
,0,1,2,30,3,4,187,1,3,59,0,60,58,6,9,6,3,46,25,0,1,1,1,0,4,4,48,1,3,147,1,1,55);

%nfl(1,14,'NYG','DAL',31,36,3,7,7,14,0,3,10,14,9,0,18,3,0,6,11,0,0,59,14,3,5,6,52,0,22,50,17,3,2,
5,15,0,0,74,12,2,4,5,40,2,37,10,27,42,450,4,3,3,22,27,42,428,4,3,3,22,5,23,0,7,79,0,14,50,0,5,118
,3,70,8,5,114,0,57,8,5,101,0,26,6,27,450,4,70,41,3,36,49,263,2,1,2,19,36,49,244,2,1,2,19,20,86,0,
1,2,0,23,87,0,10,72,0,18,12,8,70,2,21,9,8,39,0,11,10,
36,263,2,23,49,0,0,73,55,2,5,6,1,26,26,0,5,20,14,0,1,1,20,4,3,164,1,1,60,1,53,39,3,6,5,0,0,0,0,2,
19,14,0,3,3,45,3,6,275,0,2,56);

%nfl(1,15,'PHI','WAS',33,27,12,14,7,0,0,7,0,7,13,0,11,14,1,7,15,1,1,77,14,1,2,8,65,0,32,39,19,6,0
,2,10,1,2,70,13,2,3,10,75,1,27,21,15,25,203,2,0,3,23,15,25,180,2,0,3,23,31,184,1,9,54,1,49,263,2,
7,104,1,26,9,2,56,1,28,3,2,14,0,8,6,15,203,2,28,25,2,30,49,329,2,2,3,21,30,49,308,2,2,3,21,12,45,
1,5,24,0,18,74,1,5,80,2,27,7,7,64,0,17,11,5,54,0,16,9,30,329,2,27,48,1,0,70,43,6,6,9,2,37,27,0,0,
0,0,0,1,1,48,4,6,254,1,4,61,0,89,54,6,3,7,3,56,23,0,2,14,9,0,0,1,0,3,3,126,0,1,47);

%nfl(1,16,'HOU','SDC',31,28,7,0,7,17,0,7,14,7,0,0,19,5,2,6,13,1,2,75,12,3,3,7,73,1,36,31,11,2,1,7
,14,1,1,51,11,4,4,7,55,0,23,29,34,45,346,3,1,2,17,34,45,329,3,1,2,17,18,57,0,9,55,0,28,120,0,12,1
46,0,27,16,5,67,2,28,7,5,66,0,30,6,34,346,3,30,44,0,14,29,195,4,1,2,12,14,29,183,4,1,2,12,13,33,0
,5,27,0,20,80,0,2,49,0,34,4,1,47,0,47,5,3,24,2,17,6,14,195,4,47,28,0,1,41,35,3,7,5,4,116,46,0,3,2
1,9,0,1,2,41,4,3,135,0,3,58,0,89,67,1,7,7,1,42,42,0,1,5,5,0,0,0,0,4,6,287,0,0,61);

data sasdat.week1; set week1_game1
week1_game2
week1_game3
week1_game4
week1_game5
week1_game6
week1_game7
week1_game8
week1_game9
week1_game10
week1_game11
week1_game12
week1_game13
week1_game14
week1_game15
week1_game16;
run;

/*  WEEK 2  */

%nfl(2,1,'NYJ','NEP',10,13,3,0,7,0,0,10,3,0,0,0,8,6,1,6,18,0,0,71,15,1,2,8,66,0,34,0,7,1,1,4,18,0
,0,64,16,0,3,3,30,0,26,0,15,35,214,0,3,4,25,15,35,189,0,3,4,25,12,52,0,13,48,1,32,129,1,4,86,0,37
,8,3,51,0,27,6,2,42,0,34,8,15,214,0,37,35,1,19,39,185,1,0,1,7,19,39,178,1,0,1,7,16,40,0,4,11,0,24
,54,0,13,78,0,10,18,3,56,1,39,10,2,47,0,38,7,19,185,1,39,39,0,0,61,33,4,3,1,0,0,0,0,2,7,4,0,1,1,3
7,1,9,401,0,1,57,0,58,34,7,7,9,1,25,25,0,6,72,17,0,
2,3,30,1,11,514,2,4,60);

%nfl(2,2,'STL','ATL',24,31,0,3,7,14,0,14,10,0,7,0,18,4,2,7,17,2,2,73,12,3,4,7,53,0,29,43,17,2,0,7
,13,0,0,61,11,2,3,7,53,1,30,17,32,55,352,3,1,0,0,32,55,352,3,1,0,0,10,35,0,3,25,0,18,69,0,5,105,0
,47,8,8,78,1,20,11,6,47,2,11,12,32,352,3,47,54,0,33,43,374,2,0,2,17,33,43,357,2,0,2,17,2,19,1,11,
17,0,16,36,1,11,182,1,81,14,4,43,0,20,5,4,41,0,22,4,33,374,2,81,42,0,0,51,51,6,4,8,1,25,25,0,4,6,
5,0,1,1,29,3,6,298,0,0,63,1,51,51,3,6,6,1,17,17,0,2,4,4,0,1,1,38,4,
6,318,0,2,63);

%nfl(2,3,'CAR','BUF',23,24,0,7,7,9,0,0,3,11,10,0,12,9,4,7,16,0,0,76,12,1,3,3,30,0,33,41,13,8,3,6,
14,0,0,73,12,2,3,7,55,0,26,19,21,38,229,2,1,6,46,21,38,183,2,1,6,46,22,85,0,6,25,0,32,125,0,7,84,
1,31,8,3,62,1,40,8,5,52,0,13,11,
21,229,2,40,38,0,27,39,296,1,1,1,9,27,39,287,1,1,1,9,16,103,0,12,30,1,33,149,1,8,111,1,45,10,4,68
,0,28,6,2,49,0,34,2,27,296,1,45,39,1,0,86,56,4,5,4,4,80,36,0,2,20,12,0,3,3,39,2,5,257,1,3,62,0,84
,59,8,7,9,0,0,0,0,1,19,19,0,3,4,55,1,3,134,0,1,55);
```

```
%nfl(2,4,'CLE','BAL',6,14,3,3,0,0,0,0,0,7,7,0,11,1,1,4,15,0,2,62,13,0,1,5,33,0,29,25,13,5,1,8,16,
0,0,71,13,2,3,3,41,0,30,35,21,33,227,0,0,5,39,22,37,194,0,0,5,39,18,58,0,2,7,0,20,65,0,5,95,0,53,
7,5,38,0,12,8,4,33,0,18,12,22,233,0,53,37,0,22,33,211,1,0,2,14,22,33,197,1,0,2,14,19,57,1,13,36,0
,36,99,1,7,85,0,27,13,4,45,1,18,6,4,36,0,16,5,22,211,1,27,33,1,0,74,42,4,4,3,2,44,26,0,4,19,18,0,
2,2,51,0,8,336,2,1,53,0,70,36,6,5,12,0,0,0,0,3,43,22,0,0,2,0,2,6,291,0,3,56);

%nfl(2,5,'DAL','KCC',16,17,10,0,3,3,0,7,0,7,3,0,15,3,2,3,11,0,0,61,12,1,2,5,27,0,31,47,12,6,1,4,1
3,0,0,65,11,2,2,10,45,0,28,13,30,42,298,1,0,3,17,30,42,281,1,0,3,17,12,25,0,1,12,0,16,37,0,9,141,
1,53,13,5,49,0,17,6,3,31,0,11,4,30,298,1,53,42,2,21,36,223,2,0,4,24,21,36,199,2,0,4,24,8,57,0,16,
55,0,25,114,0,4,56,1,27,8,8,48,1,18,10,2,38,0,31,4,21,223,2,31,34,0,0,58,52,6,3,5,1,35,35,0,1,22,
22,0,3,3,53,1,4,200,0,1,62,0,53,47,4,4,3,2,25,25,0,3,41,20,0,1,2,40,2,7,307,1,5,65);

%nfl(2,6,'DEN','NYG',41,23,0,10,14,17,0,3,6,7,7,0,18,5,0,8,15,0,0,72,15,2,3,13,132,1,28,02,15,3,1
0,1,11,0,1,69,14,1,3,4,16,0,31,58,30,43,307,2,0,0,0,30,43,307,2,0,0,0,16,93,2,12,14,0,29,107,2,9,
87,0,19,13,5,52,0,18,6,6,47,1,19,9,30,307,2,36,43,1,28,49,362,1,4,1,9,28,49,353,1,4,1,9,7,17,0,7,
4,1,19,23,1,8,118,0,51,11,4,83,0,34,7,6,74,0,27,10,28,362,1,51,49,0,0,74,53,7,11,7,2,34,22,0,4,12
1,81,1,2,2,47,5,5,210,0,2,53,0,83,57,2,2,2,5,121,30,0,2,13,7,0,3,3,41,2,5,231,0,1,50);

%nfl(2,7,'DET','ARI',21,25,0,14,7,0,0,0,10,6,9,0,11,4,1,3,11,0,1,57,12,1,1,8,10,1,28,41,13,7,4,1,
11,0,0,66,13,1,4,7,40,0,31,19,24,36,278,2,0,1,5,24,36,273,2,0,1,5,8,31,0,9,25,0,20,49,0,6,116,2,7
2,8,7,45,0,12,8,3,44,0,26,3,24,278,2,72,36,1,22,39,248,1,1,1,4,23,40,261,1,1,1,4,15,66,1,4,20,0,2
5,87,1,
2,42,1,36,2,3,40,0,17,4,3,36,0,19,8,23,265,1,36,39,0,1,49,45,4,7,6,1,23,23,0,3,2,8,0,0,2,0,3,5,26
1,0,0,58,0,47,45,6,4,2,0,0,0,0,3,10,5,0,4,4,47,1,5,214,0,4,52);

%nfl(2,8,'JAX','OAK',9,19,0,3,0,6,0,7,3,3,6,0,12,3,0,7,17,1,1,62,11,1,2,10,70,0,28,12,6,7,3,4,14,
0,0,61,12,1,5,5,30,0,31,48,25,38,241,1,0,5,27,25,38,214,1,0,5,27,10,27,0,2,9,0,19,34,0,8,93,0,22,
14,5,64,0,30,7,3,34,1,17,4,25,241,1,30,37,0,15,24,126,0,0,3,12,15,24,114,0,0,3,12,19,129,0,9,50,0
,34,226,1,3,42,0,17,4,3,32,0,11,3,4,28,0,12,4,15,126,0,17,21,1,0,67,47,6,2,2,4,79,32,0,1,5,5,0,1,
1,27,0,8,349,0,3,57,0,56,48,8,6,7,1,26,26,0,4,33,30,0,4,5,46,1,4,192,1,1,58);

%nfl(2,9,'MIA','IND',24,20,14,3,7,0,0,3,14,3,0,0,14,7,0,6,14,0,1,66,13,3,3,0,0,0,29,26,14,9,0,7,1
5,0,1,72,11,2,4,3,13,0,30,34,23,34,319,1,0,5,22,23,34,297,1,0,5,22,14,49,1,8,30,0,27,10,2,9,115,1
,34,11,5,109,0,67,7,5,68,0,24,8,23,319,1,67,32,1,25,43,321,1,1,3,6,25,43,315,1,1,3,6,15,65,1,4,38
,0,26,133,1,6,124,0,47,12,4,69,1,40,8,5,46,0,18,8,25,321,1,47,43,0,0,70,42,3,8,10,2,73,38,0,0,0,0
,0,1,1,54,3,5,208,0,3,53,0,68,38,4,6,4,1,28,28,0,2,16,9,0,2,3,38,2,4,206,2,1,60);

%nfl(2,10,'MIN','CHI',30,31,7,14,3,6,0,14,10,0,7,0,9,8,2,7,16,2,2,64,10,0,3,3,25,2,29,26,15,8,1,7
,12,0,0,66,13,2,4,4,35,1,30,34,16,30,227,1,1,1,0,16,30,227,1,1,1,0,26,100,0,6,18,0,33,123,0,5,84,
0,22,6,2,49,0,37,5,3,42,1,20,6,16,227,1,37,28,2,27,38,292,3,2,1,8,27,38,284,3,2,1,8,20,88,0,2,30,
0,27,127,0,7,113,1,34,10,7,76,2,23,9,10,73,0,13,10,27,292,3,34,37,2,0,63,55,5,4,3,4,150,105,1,0,0
,0,0,3,3,28,3,3,170,1,2,65,1,58,48,2,7,2,6,263,80,0,0,0,0,0,1,1,20,4,3,111,0,1,48);

%nfl(2,11,'NOS','TBB',16,14,10,0,3,3,0,7,0,0,7,0,13,4,4,5,14,0,1,70,13,0,4,5,35,0,32,36,6,7,1,5,1
3,0,0,56,11,1,1,10,118,1,27,24,26,46,322,1,2,4,26,26,46,296,1,2,4,26,5,29,0,7,26,0,20,75,0,10,179
,1,56,16,4,63,0,31,7,6,36,0,8,8,26,322,1,56,44,0,9,22,125,1,1,1,12,9,22,113,1,1,1,12,29,144,0,3,1
6,0,33,160,0,5,77,0,22,11,1,34,0,34,1,2,9,0,6,6,9,125,1,34,22,1,0,55,43,2,3,1,1,23,23,0,1,-
2,0,0,3,4,44,1,4,175,0,4,47,1,69,52,4,11,6,1,33,33,0,2,0,2,0,0,1,0,2,
6,243,0,2,47);

%nfl(2,12,'PIT','CIN',10,20,3,7,0,0,0,7,3,7,3,0,11,2,1,3,12,0,0,55,12,1,1,3,29,0,24,26,12,8,2,7,1
7,0,1,79,12,1,2,9,84,0,35,34,20,37,251,1,1,2,17,20,37,234,1,1,2,17,10,37,0,1,6,0,16,44,0,5,78,0,4
3,10,3,59,0,31,9,6,57,0,18,9,20,251,1,43,36,1,25,45,280,1,0,0,0,25,45,280,1,0,0,0,22,75,0,8,38,1,
34,127,1,6,66,0,26,9,3,66,0,61,5,6,41,0,10,14,25,280,1,61,44,0,0,80,49,2,4,6,2,54,34,0,2,37,40,0,
1,1,44,1,7,326,0,0,52,0,50,32,4,4,7,1,17,17,0,5,27,14,0,2,2,41,2,7,326,1,3,61);

%nfl(2,13,'SDC','PHI',33,30,3,10,7,13,0,3,7,10,10,0,22,7,4,10,15,0,0,79,11,2,4,4,32,0,40,17,15,7,
0,5,11,0,0,58,11,2,4,9,77,0,19,43,36,47,419,3,0,1,6,36,47,413,3,0,1,6,16,73,0,9,27,0,31,126,0,8,1
24,0,24,10,5,102,0,31,6,7,90,3,24,8,
36,419,3,31,45,2,23,36,428,2,0,2,17,23,37,411,2,0,2,17,11,53,0,5,34,1,19,100,1,9,193,1,61,15,5,11
4,0,70,6,2,58,0,31,2,23,428,2,70,36,0,
0,44,42,1,1,5,4,93,28,0,2,5,8,0,4,4,49,3,1,40,0,0,40,0,75,59,2,2,2,8,186,33,0,0,0,0,0,3,4,48,3,3,
134,0,1,51);

%nfl(2,14,'SFO','SEA',3,29,0,0,3,0,0,0,5,7,17,0,6,5,1,3,12,0,1,51,11,0,2,12,121,0,23,17,5,10,4,5,
16,1,2,70,14,3,6,10,84,0,36,43,13,28,127,0,3,3,20,13,28,107,0,3,3,20,9,87,0,9,16,0,20,100,0,4,39,
0,14,6,2,22,0,17,5,3,20,0,8,5,13,127,0,19,26,2,8,19,142,1,1,4,24,8,19,118,1,1,4,24,28,98,2,10,33,
0,47,172,2,1,51,0,51,1,3,37,1,35,3,2,22,0,15,4,8,142,1,51,17,0,0,81,43,9,4,7,2,52,29,0,1,0,0,0,1,
1,21,0,4,196,1,0,60,0,47,25,3,8,5,1,24,24,0,2,31,33,0,2,2,37,3,5,170,0,2,58);
```

```
%nfl(2,15,'TEN','HOU',24,30,7,3,0,14,0,7,0,7,10,6,6,6,2,4,16,0,1,67,15,2,2,9,70,1,31,14,15,9,1,6,
17,0,0,78,16,4,4,5,40,0,33,14,17,30,148,2,0,4,19,17,30,129,2,0,4,19,25,96,0,6,13,0,33,119,0,7,54,
1,14,11,3,50,0,31,5,4,28,0,9,9,17,148,2,31,30,0,26,48,298,3,2,2,18,26,48,280,3,2,2,18,9,93,0,19,7
9,1,28,172,1,7,117,1,28,13,8,76,0,21,13,2,37,0,32,2,26,298,3,32,47,0,1,66,59,4,8,8,0,0,0,0,4,18,8
,0,1,2,47,3,8,382,0,1,54,0,60,54,9,6,8,4,104,34,0,5,9,4,0,0,3,0,2,7,338,1,5,61);

%nfl(2,16,'WAS','GBP',20,38,0,0,7,13,0,10,14,14,0,0,15,3,0,3,11,1,2,58,12,3,3,7,78,0,27,31,18,10,
0,4,10,1,1,70,11,3,6,4,40,0,32,29,26,40,320,3,1,1,6,26,40,320,3,1,1,6,13,107,0,4,1,0,17,108,0,8,1
43,1,44,13,3,41,1,19,5,2,39,0,21,6,26,326,3,44,40,0,34,42,480,4,0,4,39,34,42,441,4,0,4,39,20,132,
1,1,10,0,24,139,1,11,178,0,57,12,9,128,1,35,10,3,66,2,37,4,34,480,4,57,41,1,0,66,53,5,0,6,3,59,28
,0,2,9,6,0,0,1,0,2,5,184,0,3,48,0,59,40,4,7,3,2,24,14,0,1,11,11,0,1,1,28,5,3,121,0,1,51);

data sasdat.week2; set week2_game1
week2_game2
week2_game3
week2_game4
week2_game5
week2_game6
week2_game7
week2_game8
week2_game9
week2_game10
week2_game11
week2_game12
week2_game13
week2_game14
week2_game15
week2_game16;
run;

/*  WEEK 3  */


%nfl(3,1,'KCC','PHI',26,16,10,6,0,10,0,6,0,3,7,0,12,7,0,6,19,0,2,77,13,1,6,9,65,1,39,7,11,8,2,3,1
0,0,1,63,13,0,1,6,45,0,20,53,22,35,273,0,0,5,25,22,35,248,0,0,5,25,20,92,1,11,32,0,38,146,1,7,141
,0,51,7,7,80,0,21,8,4,31,0,9,4,22,273,0,51,33,0,13,30,201,1,2,6,34,13,30,167,1,2,6,34,20,158,1,4,
99,0,27,264,1,5,87,1,31,8,3,63,0,40,7,2,29,0,16,7,13,201,1,40,29,3,1,47,42,5,11,8,3,96,57,0,2,1,7
,0,4,5,38,2,5,218,0,3,53,0,69,65,7,5,6,3,78,27,0,3,14,8,0,1,2,29,1,4,148,0,2,41);

%nfl(3,2,'IND','SFO',27,7,7,3,3,14,0,7,0,0,0,0,9,9,5,5,12,0,0,67,11,3,4,1,10,0,36,25,8,6,0,3,12,1
,1,53,11,1,1,6,48,0,23,35,17,26,159,0,0,1,7,17,26,152,0,0,1,7,19,95,1,13,35,1,40,184,3,5,59,0,19,
5,4,58,0,25,6,3,16,0,7,4,17,159,0,25,26,0,13,27,150,0,1,3,11,13,27,139,0,1,3,11,11,82,0,7,20,0,23
,115,1,5,67,0,24,8,1,30,0,30,2,2,21,0,11,4,13,150,0,30,27,1,0,48,40,4,6,3,0,0,0,0,2,16,12,0,2,3,4
3,9,4,192,0,3,52,0,63,57,3,3,7,3,36,20,0,1,14,14,0,0,0,0,1,7,305,1,2,62);

%nfl(3,3,'GBP','CIN',30,34,0,16,14,0,0,14,0,7,13,0,12,11,4,4,13,0,2,77,13,2,4,4,55,1,31,51,12,5,2
,4,11,0,0,56,13,3,3,5,43,1,28,9,26,43,244,1,2,4,27,26,43,217,1,2,4,27,13,103,1,14,55,0,30,182,1,8
,93,0,30,9,5,54,0,26,11,4,34,1,13,8,26,244,1,30,42,2,20,28,235,2,1,4,20,20,28,215,2,1,4,20,10,50,
1,10,29,1,24,82,2,4,68,0,32,5,4,49,0,31,4,4,46,1,20,8,20,235,2,32,28,3,0,58,44,5,3,5,2,21,21,0,0,
0,0,0,3,3,41,3,3,130,0,3,55,0,66,57,5,7,8,4,111,32,0,0,0,0,0,1,0,4,3,131,0,1,55);

%nfl(3,4,'STL','DAL',7,31,0,0,7,0,0,10,7,7,7,0,11,3,3,1,13,3,6,67,11,1,1,5,41,0,26,32,12,8,1,5,11
,0,0,59,10,3,5,6,72,0,33,28,29,48,420,1,0,6,43,29,49,197,1,0,6,43,6,20,0,4,16,0,12,35,0,2,54,0,29
,8,5,44,0,19,7,7,43,0,14,7,29,240,1,29,48,1,17,24,210,3,0,1,7,17,24,203,3,0,1,7,26,175,1,5,19,0,3
4,193,1,5,67,0,26,6,4,38,1,16,6,3,28,0,17,3,17,210,3,24,24,1,0,54,46,3,1,1,2,46,25,0,2,16,10,0,0,
0,0,1,5,238,0,0,57,0,55,44,7,5,8,0,0,0,0,4,16,12,0,1,2,19,4,4,195,1,2,55);

%nfl(3,5,'SDC','TEN',17,20,7,3,7,0,0,0,10,0,10,0,10,5,4,3,9,0,0,53,10,2,3,5,45,0,28,22,14,9,0,6,1
4,1,2,68,9,1,3,11,116,0,31,38,20,24,184,1,0,2,9,20,24,175,1,0,2,9,16,58,0,5,31,0,27,102,1,7,55,0,
13,8,5,55,1,17,7,2,48,0,34,2,20,184,1,34,24,1,23,37,299,1,0,2,17,23,37,282,1,0,2,17,19,90,0,5,68,
1,29,170,1,8,131,0,35,10,6,71,0,19,6,5,49,0,17,8,23,299,1,35,36,0,0,69,47,4,5,2,1,21,21,0,1,7,7,0
,1,2,44,2,5,212,0,3,60,0,50,42,3,3,2,4,114,32,0,2,6,5,0,2,3,37,2,3,140,0,2,63);

%nfl(3,6,'CLE','MIN',31,27,7,17,0,7,0,7,10,7,3,0,18,4,1,6,15,2,3,75,14,3,3,5,47,0,28,52,11,9,1,8,
17,0,0,79,15,3,5,4,35,0,31,8,30,54,321,3,3,3,26,31,55,306,4,3,3,26,1,34,0,2,23,0,17,103,0,10,146,
1,47,19,7,67,0,15,10,6,66,3,19,11,31,332,4,47,54,1,25,42,228,0,1,6,33,25,42,195,0,1,6,33,25,88,1,
5,46,2,31,134,3,2,49,0,37,4,3,43,0,27,6,3,35,0,20,4,25,228,0,37,42,2,0,73,49,5,4,8,1,26,26,0,3,20
,28,0,1,1,38,4,5,234,0,2,56,0,55,49,8,6,7,3,78,30,0,2,2,2,0,2,2,43,3,7,325,0,1,57);

%nfl(3,7,'TBB','NEP',3,23,3,0,0,0,0,0,17,3,3,0,14,3,1,5,14,0,4,66,10,0,2,4,48,0,26,59,12,7,2,6,15
,1,2,72,12,2,5,6,50,0,33,1,19,41,236,0,1,3,10,19,41,226,0,1,3,10,20,88,0,1,5,0,22,97,0,5,65,0,28,
```

```
9,3,55,0,30,5,2,35,0,20,6,19,236,0,30,38,0,25,36,225,2,1,3,23,25,36,202,2,1,3,23,14,65,0,3,51,0,3
3,156,0,7,52,0,15,10,5,49,0,17,6,7,44,0,12,7,25,225,2,20,36,0,0,70,46,4,1,6,0,0,0,0,1,12,12,0,1,2
,30,0,3,149,0,0,57,0,57,29,1,4,8,1,25,25,0,2,29,16,0,3,3,53,2,3,128,0,1,47);

%nfl(3,8,'ARI','NOS',7,31,7,0,0,0,0,7,7,3,14,0,9,6,1,5,13,0,0,55,11,1,2,3,18,0,24,29,17,9,1,7,13,
0,0,74,12,3,5,4,30,0,35,31,18,35,187,0,2,4,26,18,35,161,0,2,4,26,9,29,0,3,27,1,16,86,1,5,64,0,26,
6,4,49,0,20,6,3,36,0,17,6,18,187,0,26,32,0,29,46,342,3,1,4,23,29,46,319,3,1,4,23,4,38,0,11,28,0,2
4,104,1,9,134,2,29,15,5,71,0,24,8,6,39,0,16,6,29,342,3,29,45,0,0,58,52,7,6,5,3,87,46,0,2,15,8,0,0
,0,0,1,8,326,1,4,60,0,48,38,5,5,9,0,0,0,0,3,53,28,0,1,1,31,4,4,198,0,0,58);

%nfl(3,9,'DET','WAS',27,20,7,10,0,10,0,7,7,3,3,0,18,4,2,4,13,1,1,66,12,3,5,8,71,0,28,48,21,2,4,6,
13,0,0,74,12,0,2,6,45,1,31,12,25,42,385,2,1,1,7,25,42,378,2,1,1,7,20,63,1,1,2,0,23,63,1,6,116,0,4
7,9,7,115,1,23,13,4,69,0,37,5,25,385,2,47,42,0,32,50,326,0,1,2,26,32,50,300,0,1,2,26,15,73,1,6,37
,0,22,120,1,7,77,0,18,9,8,73,0,27,13,4,51,0,19,6,32,326,0,27,50,1,0,78,46,2,7,8,1,15,15,0,2,9,9,0
,2,2,32,3,6,315,3,0,72,1,71,35,5,6,10,4,88,26,0,2,11,7,0,2,2,43,2,5,231,0,3,63);

%nfl(3,10,'NYG','CAR',0,38,0,0,0,0,0,7,10,14,7,0,5,4,1,3,12,0,1,50,11,0,1,6,45,0,23,13,11,15,1,8,
14,1,2,74,11,3,3,4,32,0,36,47,12,23,119,0,1,7,45,14,27,90,0,2,7,45,11,39,0,1,14,0,16,60,0,2,40,0,
24,4,3,33,0,20,6,3,25,0,11,8,14,135,0,24,27,1,15,27,223,3,1,1,15,15,27,208,3,1,1,15,23,120,0,7,45
,1,46,194,2,3,71,1,47,4,4,54,0,24,8,3,56,2,20,5,15,223,3,47,27,1,0,68,44,7,6,1,1,24,24,0,1,0,0,0,
0,1,0,0,6,245,0,2,56,0,53,29,8,3,10,0,0,0,0,2,12,12,0,1,1,53,5,2,97,1,0,49);

%nfl(3,11,'HOU','BAL',9,30,3,6,0,0,0,0,17,7,6,0,11,5,2,3,12,0,1,61,12,0,2,14,113,0,30,36,7,5,4,8,
16,0,0,57,9,1,2,10,87,2,29,24,25,35,194,0,1,3,24,25,35,170,0,1,3,24,12,54,0,9,36,0,23,94,0,6,60,0
,18,7,5,36,0,12,6,2,35,0,18,3,25,194,0,18,35,0,16,24,171,0,0,2,10,16,24,161,0,0,2,10,24,65,1,3,8,
0,31,75,1,5,92,0,48,9,4,46,0,21,7,2,11,0,7,2,16,171,0,48,24,0,0,64,40,6,1,3,2,55,29,0,2,18,11,0,3
,3,47,0,5,252,0,3,59,1,65,45,9,4,8,2,53,31,0,2,93,82,1,3,3,45,3,4,194,0,0,56);

%nfl(3,12,'ATL','MIA',23,27,7,6,7,3,0,0,10,10,7,0,14,9,1,5,11,0,0,68,9,2,5,7,59,0,37,9,13,3,0,7,1
2,0,0,55,11,3,3,2,13,0,22,51,23,38,231,2,1,0,0,23,38,231,2,1,0,0,18,86,0,11,53,0,30,146,0,9,115,0
,28,13,4,58,1,34,5,4,24,0,11,5,23,231,2,34,37,1,24,35,236,2,1,5,41,24,35,195,2,1,5,41,8,62,0,5,21
,1,15,90,1,4,56,1,20,6,6,49,0,19,8,4,42,0,14,4,24,236,2,21,35,1,0,44,38,3,5,8,0,0,0,0,3,4,7,0,3,4
,52,2,2,66,0,0,36,0,56,54,2,3,5,2,48,27,0,0,0,0,0,2,2,50,3,3,159,0,1,56);

%nfl(3,13,'BUF','NYJ',20,27,0,6,6,8,0,7,10,3,7,0,6,4,8,4,18,0,2,75,17,0,3,7,87,0,25,47,11,6,3,5,1
4,0,1,70,15,1,2,20,168,0,34,13,19,42,243,1,0,8,35,19,42,208,1,0,8,35,7,72,0,6,40,0,25,120,0,6,86,
0,26,13,5,79,1,33,6,4,37,0,17,5,19,243,1,33,41,0,16,29,331,2,2,0,0,16,29,331,2,2,0,0,27,149,0,5,1
4,0,41,182,1,5,154,1,69,10,3,108,1,51,6,3,26,0,18,3,16,331,2,69,29,0,0,73,43,2,3,2,1,18,18,0,2,4,
3,0,4,4,43,0,7,357,3,3,66,0,63,43,12,1,16,3,53,18,0,3,18,12,0,2,2,47,3,7,294,0,2,44);

%nfl(3,14,'JAX','SEA',17,45,0,0,10,7,0,7,17,14,7,0,10,6,1,4,14,1,1,66,14,2,5,4,45,0,27,25,16,10,2
,4,10,0,0,67,14,4,5,4,24,0,32,35,18,38,235,0,2,3,21,18,38,214,0,2,3,21,19,43,1,2,5,1,24,51,2,8,14
3,0,59,15,5,42,0,13,9,2,25,0,20,3,18,235,0,59,36,1,14,21,202,4,1,2,8,21,29,323,5,1,2,8,17,69,0,9,
37,0,36,156,1,5,88,0,30,8,5,79,2,23,7,5,76,0,35,5,21,331,5,35,29,1,0,81,38,4,4,6,2,54,27,0,2,-
3,0,0,1,1,33,2,7,299,0,2,48,0,64,32,7,6,8,2,45,23,0,4,33,13,0,1,1,21,6,4,140,0,1,54);

%nfl(3,15,'CHI','PIT',40,23,17,7,3,13,0,0,10,10,3,0,7,6,2,5,15,1,1,60,14,3,4,3,25,2,31,36,15,5,1,
3,11,0,1,65,13,0,2,6,59,0,28,24,20,30,159,1,0,2,8,20,30,151,1,0,2,8,16,87,1,4,11,0,28,107,2,5,52,
0,41,8,7,51,0,9,8,4,24,0,11,4,20,159,1,41,30,0,26,41,406,2,2,3,27,26,41,379,2,2,3,27,12,39,0,7,34
,0,21,80,0,9,196,2,45,13,3,52,0,26,4,2,51,0,32,3,26,406,2,45,41,3,1,61,46,5,6,4,5,73,21,0,0,0,0,0
,2,2,47,4,6,282,0,2,59,0,63,52,4,4,5,2,48,25,0,2,4,4,0,3,3,44,2,2,59,0,0,38);

%nfl(3,16,'OAK','DEN',21,37,0,7,7,7,0,10,17,3,7,0,11,2,0,5,12,0,1,51,11,2,3,8,77,0,24,36,20,9,2,5
,9,0,0,73,11,4,6,5,40,0,35,24,19,28,281,1,0,3,23,21,31,293,2,0,3,23,4,36,0,12,9,1,17,49,1,6,124,1
,73,11,3,51,0,29,4,4,45,1,19,5,21,316,2,73,31,0,32,37,374,3,0,1,2,32,37,372,3,0,1,2,9,66,1,11,61,
0,35,164,1,8,133,1,61,8,10,94,0,22,11,7,84,1,32,8,32,374,3,61,37,2,0,69,63,2,2,2,2,45,28,0,0,0,0,
0,0,0,0,3,6,315,1,0,66,0,49,32,4,2,6,1,8,8,0,3,34,20,0,3,3,53,4,1,37,0,1,37);

data sasdat.week3; set week3_game1
week3_game2
week3_game3
week3_game4
week3_game5
week3_game6
week3_game7
week3_game8
week3_game9
week3_game10
week3_game11
week3_game12
week3_game13
```

```
week3_game14
week3_game15
week3_game16;
run;

/*  WEEK 4  */

%nfl(4,1,'SFO','STL',35,11,0,14,7,14,0,3,0,0,8,0,8,8,3,6,15,1,1,65,16,3,3,10,85,0,31,45,12,0,2,3,
17,0,0,65,16,1,1,8,82,0,28,15,15,23,167,2,0,2,16,15,23,151,2,0,2,16,20,153,1,11,49,1,40,219,3,5,9
0,1,42,7,3,22,0,11,3,2,19,0,15,2,15,167,2,42,23,2,19,41,202,1,1,5,32,19,41,170,1,1,5,32,12,16,0,2
,6,0,19,18,0,
5,59,0,27,9,4,49,0,20,8,4,45,0,18,9,19,202,1,27,41,1,0,58,46,6,10,8,0,0,0,0,1,0,0,0,0,2,0,5,7,383
,0,2,60,0,61,43,4,3,4,3,74,32,0,6,19,14,0,1,1,40,0,11,490,1,6,60);

%nfl(4,2,'BAL','BUF',20,23,0,7,7,6,0,6,14,3,0,0,13,0,2,3,16,1,1,63,17,1,4,8,59,0,23,34,7,10,2,5,1
8,0,0,79,16,1,4,11,99,0,36,26,25,50,347,2,5,4,26,25,50,321,2,5,4,26,5,17,0,4,7,0,9,14,0,5,166,1,7
4,12,4,50,0,33,4,4,47,0,24,9,25,347,2,74,49,0,10,22,167,1,2,2,20,10,22,147,1,2,2,20,16,87,1,23,77
,0,55,203,1,4,80,1,42,8,2,32,0,26,3,2,28,0,14,3,10,167,1,42,22,1,0,107,70,5,3,5,3,73,34,0,4,31,17
,0,2,2,35,2,7,331,0,2,53,0,62,44,4,16,12,0,0,0,0,4,34,11,0,3,3,27,2,8,346,1,3,59);

%nfl(4,3,'CIN','CLE',6,17,0,3,3,0,0,7,0,3,7,0,10,3,3,4,14,1,3,64,10,0,2,3,25,0,28,51,14,4,0,9,18,
0,0,71,11,2,3,5,80,0,31,9,23,42,206,0,1,2,3,23,42,203,0,1,2,3,10,37,0,6,13,0,20,63,0,3,53,0,26,5,
7,51,0,16,15,3,39,0,29,5,23,206,0,29,42,1,25,38,269,2,0,3,22,25,38,247,2,0,3,22,15,46,0,5,27,0,30
,89,0,10,91,1,31,12,4,71,0,33,9,1,39,0,39,1,25,269,2,39,38,0,0,77,35,5,1,6,3,60,22,0,2,15,10,0,2,
2,43,0,4,155,0,3,43,0,59,41,2,10,2,2,60,30,0,1,7,7,0,1,3,51,2,5,214,0,3,59);

%nfl(4,4,'CHI','DET',32,40,3,10,3,16,0,3,27,7,3,0,13,4,1,1,13,2,2,66,16,2,5,4,30,0,28,11,13,10,0,
2,10,0,0,66,14,2,5,3,25,1,31,49,27,47,317,2,3,3,31,27,47,286,2,3,3,31,14,95,1,1,27,0,16,131,1,5,1
07,1,44,11,8,90,0,30,12,7,79,0,24,14,27,317,2,44,47,1,23,35,242,1,1,1,14,23,35,228,1,1,1,14,18,13
9,1,7,12,0,30,159,2,3,58,0,24,4,7,54,0,11,7,4,44,1,19,10,23,242,1,24,35,2,0,70,51,3,3,1,6,147,32,
0,2,17,11,0,3,3,34,1,5,201,0,1,52,0,64,47,4,11,6,3,63,22,0,1,57,57,0,4,4,43,4,3,150,1,1,57);

%nfl(4,5,'NYG','KCC',7,31,0,7,0,0,0,0,10,7,14,0,8,3,0,1,14,1,2,61,14,0,0,7,65,0,24,4,15,4,2,9,16,
0,0,70,15,2,2,7,62,1,35,56,18,37,217,1,1,3,17,18,37,200,1,1,3,17,13,55,0,5,25,0,21,98,0,10,164,1,
69,16,3,33,0,16,9,2,8,0,6,3,18,217,1,69,37,2,21,41,288,3,2,1,0,24,41,288,3,2,1,0,18,65,0,7,37,0,2
8,102,0,5,64,1,23,5,5,62,1,31,11,4,58,1,34,7,24,288,3,34,41,1,0,54,50,2,5,3,3,74,31,0,4,35,13,0,0
,1,0,1,8,399,2,1,59,0,50,48,4,8,6,1,22,22,0,4,113,89,1,1,1,51,4,5,223,0,2,56);

%nfl(4,6,'PIT','MIN',27,34,7,3,7,10,0,10,10,14,0,0,21,5,3,8,15,0,0,77,12,3,6,4,50,0,36,27,7,7,2,4
,11,0,0,51,12,2,3,5,89,0,23,33,36,51,383,1,1,5,26,36,51,357,1,1,5,26,16,57,2,1,10,0,21,77,2,5,103
,1,36,6,12,88,0,15,13,6,70,0,28,8,36,383,1,36,47,1,16,25,248,2,0,1,0,16,25,248,2,0,1,0,23,140,2,2
,5,0,25,145,2,7,124,0,51,11,3,92,2,70,4,1,9,0,9,2,16,248,2,70,25,0,0,49,44,1,4,0,4,92,33,0,1,3,3,
0,2,2,28,3,4,143,0,1,42,0,66,62,4,5,5,5,144,42,0,1,0,0,0,2,3,54,4,4,167,0,0,57);

%nfl(4,7,'ARI','TBB',13,10,0,0,0,13,0,7,3,0,0,0,11,4,2,1,10,0,0,59,14,1,3,10,90,0,25,55,13,4,3,7,
18,1,1,76,14,1,1,8,73,0,34,5,21,38,248,1,2,1,8,21,38,240,1,2,1,8,4,29,0,12,21,0,20,56,0,5,87,0,27
,10,6,68,1,21,9,1,23,0,23,2,21,248,1,27,37,1,24,43,193,1,2,2,20,24,43,173,1,2,2,20,27,45,0,1,22,0
,31,80,0,5,41,0,15,6,4,38,1,14,6,5,30,0,12,9,24,193,1,20,42,1,0,68,61,11,4,8,0,0,0,0,1,5,5,0,2,2,
42,1,7,320,0,3,59,0,52,43,4,7,3,3,69,29,0,2,22,12,0,1,1,50,1,8,322,2,2,52);

%nfl(4,8,'IND','JAX',37,3,0,20,14,3,0,3,0,0,0,0,16,8,2,6,13,0,0,70,11,2,5,7,58,1,36,38,10,0,4,2,1
1,0,1,54,12,0,1,9,65,0,23,22,21,35,257,2,1,2,14,23,38,280,2,1,2,14,3,65,0,20,60,1,30,157,1,5,100,
1,31,11,5,77,1,31,7,4,45,0,18,8,23,294,2,31,38,0,17,32,179,0,3,4,14,17,32,165,0,3,4,14,13,23,0,2,
10,0,18,40,0,7,61,0,15,12,4,59,0,27,8,2,39,0,31,3,17,179,0,31,31,0,1,45,43,5,6,9,2,45,26,0,5,19,9
,0,3,3,46,4,3,138,1,0,60,0,61,55,4,6,10,4,87,27,0,1,10,10,0,1,1,53,0,6,290,0,1,61);

%nfl(4,9,'SEA','HOU',23,20,3,0,3,14,3,0,20,0,0,0,6,6,3,3,14,1,1,58,13,1,1,9,62,1,31,48,20,7,2,6,1
7,0,0,88,15,1,3,6,86,0,39,53,12,23,123,0,1,5,32,12,23,91,0,1,5,32,17,98,1,10,77,0,30,179,1,3,45,0
,24,3,3,39,0,24,4,3,17,0,10,5,12,123,0,24,23,1,31,49,355,2,2,4,30,31,49,325,2,2,4,30,27,102,0,7,4
4,0,35,151,0,9,110,0,17,12,6,72,0,21,11,6,69,1,31,8,31,355,2,31,49,1,1,77,66,6,9,12,3,55,30,0,
4,60,32,0,3,3,48,2,6,278,1,4,60,0,68,48,5,3,10,2,52,28,0,1,1,1,0,2,2,42,2,7,317,1,2,61);

%nfl(4,10,'NYJ','TEN',13,38,0,6,0,7,0,10,14,0,14,0,11,5,0,4,13,0,1,62,13,0,0,10,66,0,29,22,11,4,2
,10,18,0,0,65,14,3,4,4,30,1,30,38,23,34,289,1,2,5,50,23,34,239,1,2,5,50,14,66,0,4,17,0,23,91,0,6,
73,0,25,9,4,65,0,23,5,3,42,0,36,5,23,289,1,36,34,2,18,24,149,3,0,2,13,21,32,244,4,0,2,13,11,42,0,
15,21,0,31,78,0,4,105,2,77,8,5,56,0,25,9,5,53,0,25,7,21,257,4,77,32,0,0,56,50,6,1,3,3,46,28,0,2,7
,5,0,2,2,47,1,5,245,0,1,56,0,69,41,5,3,11,0,0,0,0,2,36,35,0,1,1,26,5,7,293,0,4,54);

%nfl(4,11,'PHI','DEN',20,52,3,10,0,7,0,14,7,21,10,0,12,9,0,8,16,0,0,69,11,2,5,8,62,0,26,38,19,11,
5,5,8,0,0,71,10,5,5,2,25,2,33,22,14,27,248,0,0,3,13,17,31,284,1,0,3,13,16,73,0,8,41,0,35,166,1,3,
57,0,27,6,2,43,1,37,2,2,41,0,35,3,17,297,1,38,31,0,28,34,327,4,0,1,6,30,37,331,4,0,1,6,12,78,1,11
```

```
,36,0,33,141,1,5,88,0,52,7,9,86,2,15,10,7,76,2,33,9,30,337,4,52,37,0,0,68,53,3,1,2,1,26,26,0,1,21
,21,0,2,3,35,2,4,191,2,0,54,0,58,49,5,1,6,1,105,105,1,2,0,0,0,1,1,53,7,2,92,0,1,60);

%nfl(4,12,'WAS','OAK',24,14,0,10,7,7,0,14,0,0,0,0,10,5,0,5,16,0,1,64,13,2,3,3,29,1,27,38,11,3,0,5
,17,1,2,65,14,1,2,4,25,1,32,22,18,31,227,1,0,1,10,18,31,217,1,0,1,10,16,71,0,13,41,1,32,122,1,6,5
9,1,16,7,4,49,0,17,7,2,46,0,33,2,18,227,1,33,29,1,21,32,227,1,1,7,33,21,32,194,1,1,7,33,14,45,0,5
,29,0,26,104,0,8,71,0,17,8,4,66,0,34,6,2,44,1,26,6,21,227,1,34,32,2,1,73,52,7,3,7,0,0,0,0,2,11,11
,0,1,1,25,3,7,280,0,2,51,0,67,44,5,0,5,2,49,25,0,3,24,9,0,0,1,0,2,7,314,1,3,48);

%nfl(4,13,'DAL','SDC',21,30,0,21,0,0,0,7,6,7,10,0,15,3,3,3,9,0,0,56,10,1,2,5,33,1,25,57,20,5,2,5,
12,0,0,70,12,1,3,7,85,0,34,3,27,37,246,2,0,3,19,27,37,227,2,0,3,19,14,70,0,1,15,0,16,92,0,6,81,2,
34,9,7,71,0,14,8,5,43,0,11,10,27,246,2,34,37,1,35,42,401,3,1,1,7,35,42,394,3,1,1,7,19,62,0,5,32,0
,27,112,0,10,136,1,56,10,5,80,0,31,6,5,54,2,26,7,35,401,3,56,40,0,1,78,61,3,5,1,3,85,33,0,1,38,38
,0,0,1,0,3,5,203,1,0,51,0,61,47,5,5,3,1,18,18,0,1,12,12,0,3,3,42,3,4,159,0,3,51);

%nfl(4,14,'NEP','ATL',30,23,0,10,3,17,0,3,7,0,13,0,14,5,2,7,13,0,1,62,11,2,3,9,93,0,30,39,20,3,3,
6,14,0,2,71,11,1,6,6,55,0,29,21,20,31,316,2,0,0,0,20,31,316,2,0,0,0,9,64,1,11,53,0,31,132,1,6,127
,1,49,11,7,118,0,44,9,2,26,0,24,2,20,316,2,49,31,0,34,54,421,2,1,2,22,34,54,399,2,1,2,22,7,32,0,8
,26,1,15,58,1,12,149,2,25,14,6,108,0,49,13,5,68,0,40,6,34,421,2,49,53,0,0,63,37,2,4,5,0,0,0,0,0,0
,0,0,3,3,49,3,2,110,1,0,56,0,58,32,3,2,2,1,29,29,0,1,6,6,0,3,3,45,2,3,137,0,2,60);

%nfl(4,15,'MIA','NOS',17,38,3,7,0,7,0,7,14,14,3,0,13,5,1,3,9,0,0,58,12,2,3,5,25,0,26,11,18,4,1,6,
13,0,0,65,12,3,4,6,45,0,33,49,22,35,249,1,3,4,33,22,35,216,1,3,4,33,11,62,1,4,48,0,19,115,1,6,71,
0,28,8,1,50,0,50,2,6,42,1,14,6,22,249,1,50,34,1,30,39,413,4,0,2,16,30,39,397,4,0,2,16,12,37,0,4,2
8,1,24,68,1,7,114,1,48,8,4,100,2,43,4,7,96,0,21,8,30,413,4,48,38,1,0,65,49,7,3,3,3,68,28,0,1,5,5,
0,1,1,34,2,4,208,1,0,57,0,56,36,6,7,10,2,36,24,0,3,44,18,0,1,2,29,5,3,142,0,1,49);


data sasdat.week4; set week4_game1
week4_game2
week4_game3
week4_game4
week4_game5
week4_game6
week4_game7
week4_game8
week4_game9
week4_game10
week4_game11
week4_game12
week4_game13
week4_game14
week4_game15;
run;

/*   WEEK 5 */

%nfl(5,1,'BUF','CLE',24,37,10,0,14,0,0,0,17,7,13,0,10,8,2,5,16,1,2,75,14,2,2,7,56,0,27,37,11,6,2,
7,17,0,0,65,14,1,3,6,66,2,32,23,11,20,129,0,0,2,10,19,40,188,0,1,4,21,8,66,1,17,53,2,31,155,3,5,6
4,0,24,13,4,49,0,20,6,4,40,0,13,6,19,209,0,24,40,0,13,24,197,1,0,5,23,15,28,199,1,0,5,23,26,72,1,
1,11,0,32,91,1,4,86,1,37,6,3,71,0,47,5,3,36,0,19,5,15,222,1,47,28,0,0,78,36,5,1,7,2,37,19,0,2,34,
25,0,1,1,52,3,8,364,0,0,58,1,69,41,4,7,12,3,44,18,0,7,179,79,1,3,3,44,4,6,276,0,3,50);

%nfl(5,2,'HOU','SFO',3,34,0,0,3,0,0,14,7,3,10,0,9,7,1,6,16,2,3,71,12,0,1,7,52,0,33,52,5,11,1,4,11
,0,1,52,10,2,5,3,17,1,26,8,19,35,173,0,3,1,6,22,40,182,0,3,1,6,21,98,0,7,28,0,30,131,0,6,60,0,19,
9,3,39,0,19,10,2,23,0,18,4,22,188,0,19,39,1,6,15,113,1,0,1,6,6,15,107,1,0,1,6,17,81,1,4,31,0,36,1
77,2,3,88,1,64,6,2,21,0,12,6,1,4,0,4,1,6,113,1,64,15,0,0,53,43,6,4,5,6,140,49,0,3,20,9,0,1,2,41,0
,3,151,0,1,60,1,72,61,5,7,4,1,29,29,0,2,28,22,0,2,2,38,4,4,195,0,1,60);

%nfl(5,3,'NOS','CHI',26,18,6,14,3,3,0,0,7,3,8,0,11,5,1,6,16,1,1,65,10,1,3,2,10,0,36,0,16,4,0,4,10
,0,1,54,11,2,3,6,43,0,24,0,29,35,288,2,0,1,5,29,35,288,2,0,1,5,19,36,0,3,11,0,29,64,0,10,135,0,38
,11,9,55,2,25,9,1,35,0,35,1,29,293,2,38,35,0,24,33,358,2,0,3,18,24,33,340,2,0,3,18,12,55,0,4,27,0
,18,94,0,10,218,1,58,13,5,56,0,18,5,4,40,0,15,6,24,358,2,58,33,1,0,46,44,4,3,6,2,38,19,0,1,2,2,0,
4,4,48,2,4,195,1,1,56,0,70,54,8,1,4,2,49,26,0,1,17,17,0,1,1,27,1,4,181,0,1,54);

%nfl(5,4,'NEP','CIN',6,13,0,3,0,3,0,0,3,3,7,0,9,3,3,1,12,0,0,60,12,0,1,0,0,0,25,44,13,8,0,6,15,1,
1,70,13,1,2,7,59,0,34,16,18,38,197,0,1,4,31,18,38,166,0,1,4,31,12,51,0,5,24,0,18,82,0,4,55,0,21,9
,2,49,0,53,4,6,40,0,14,8,18,197,0,53,35,1,20,27,212,0,1,4,33,20,27,179,0,1,4,33,19,67,1,13,62,0,3
9,162,1,5,61,0,18,8,5,53,0,22,7,2,39,0,28,2,20,212,0,28,27,1,0,81,50,4,3,6,4,93,27,0,4,43,24,0,2,
2,42,0,8,353,0,5,53,0,61,41,5,5,8,1,29,29,0,3,17,10,0,2,2,50,1,6,275,0,2,57);
```

```
%nfl(5,5,'DET','GBP',9,22,0,3,0,6,0,3,3,10,6,0,12,5,2,7,15,0,1,64,10,1,1,7,50,0,27,41,11,3,2,7,16
,0,0,64,10,0,2,10,72,0,32,19,25,40,262,1,0,5,40,25,40,222,1,0,5,40,16,44,0,5,21,0,19,64,0,4,59,0,
25,5,4,55,0,19,7,4,30,0,16,4,25,262,1,25,40,0,20,30,274,1,0,1,5,20,30,269,1,0,1,5,23,99,0,2,72,0,
33,180,0,4,127,1,83,6,5,82,0,61,7,4,35,0,22,8,20,274,1,83,29,0,0,67,51,5,1,2,2,40,23,0,0,0,0,0,1,
1,53,0,6,311,2,2,58,0,59,46,7,3,5,0,0,0,0,4,14,7,0,5,5,52,1,3,141,2,1,60);

%nfl(5,6,'KCC','TEN',26,17,7,6,0,13,0,0,0,10,7,0,10,7,3,1,12,0,0,67,13,1,4,9,61,1,31,17,12,4,3,4,
14,2,3,66,14,1,4,6,35,0,28,43,20,39,245,0,1,2,12,20,39,233,0,1,2,12,22,108,1,3,10,0,26,120,1,3,91
,0,44,4,4,54,0,25,6,5,37,0,11,9,20,245,0,44,39,1,21,41,247,1,2,3,13,21,41,234,1,2,3,13,6,50,1,6,3
8,0,22,105,1,6,74,0,24,8,4,63,1,49,5,4,43,0,15,6,21,247,1,49,41,1,0,57,43,3,9,2,1,36,36,0,5,39,20
,0,4,4,48,2,6,225,0,0,54,0,66,42,3,8,6,2,48,26,0,4,18,13,0,1,2,22,2,6,272,0,2,56);

%nfl(5,7,'SEA','IND',28,34,12,7,9,0,0,7,10,6,11,0,10,11,0,2,12,1,3,67,11,1,2,7,85,0,31,22,12,6,2,
7,12,0,0,60,10,1,1,3,35,1,26,38,15,31,210,2,1,2,5,15,31,205,2,1,2,5,17,102,0,16,102,0,34,218,0,5,
80,0,27,9,5,61,1,27,11,2,28,0,17,4,15,210,2,28,31,1,16,29,229,2,0,2,21,16,29,208,2,0,2,21,18,56,0
,6,37,1,29,109,1,5,140,2,73,6,6,65,0,19,9,2,15,0,11,3,16,229,2,73,29,2,0,61,31,1,1,5,2,39,21,0,1,
14,14,0,4,5,46,2,2,77,0,1,45,0,68,36,3,7,3,4,107,28,0,0,0,0,0,2,2,49,2,2,93,0,0,59);

%nfl(5,8,'JAX','STL',20,34,10,0,3,7,0,7,17,0,10,0,11,5,0,3,12,0,2,59,14,1,3,4,45,0,24,41,12,7,3,8
,19,0,0,72,13,2,5,6,53,1,35,19,9,19,181,1,2,2,3,16,32,267,2,2,2,3,17,70,0,3,16,0,25,96,0,5,136,1,
67,9,5,74,1,28,11,3,39,0,21,5,16,270,2,67,32,1,19,34,222,3,0,2,14,19,34,208,3,0,2,14,14,78,0,13,4
8,0,36,143,0,4,49,2,31,5,2,45,0,28,2,4,37,1,16,6,19,222,3,31,34,0,0,60,58,3,9,2,2,64,37,0,4,5,4,0
,2,2,48,2,5,241,0,1,54,1,52,45,5,7,3,2,52,32,0,4,15,11,0,2,2,37,4,7,286,0,2,56);

%nfl(5,9,'BAL','MIA',26,23,3,3,10,10,0,3,10,0,10,0,12,6,2,6,16,0,0,74,15,2,3,6,61,0,36,16,9,0,1,3
,16,1,1,57,13,1,3,4,65,1,23,44,19,32,269,0,1,2,18,19,32,251,0,1,2,18,27,74,2,11,46,0,40,133,2,6,1
21,0,41,9,3,58,0,40,5,2,51,0,43,2,19,269,0,43,32,1,21,40,307,1,0,6,35,21,40,272,1,0,6,35,7,15,0,2
,6,0,11,22,0,7,105,0,49,16,4,74,0,46,5,4,60,0,30,7,21,307,1,49,38,0,0,41,39,9,7,6,4,128,47,0,4,50
,16,0,4,4,50,2,5,171,0,2,53,1,67,65,6,5,6,2,49,31,0,1,11,11,0,3,4,48,2,8,420,0,3,62);

%nfl(5,10,'PHI','NYG',36,21,3,16,3,14,0,7,0,14,0,0,12,10,6,9,19,0,0,77,16,2,5,8,88,0,32,7,17,3,1,
5,13,0,0,70,14,2,2,12,136,0,27,53,16,25,197,2,0,1,3,22,39,299,2,0,1,3,7,79,0,20,46,1,37,140,1,7,1
32,1,56,12,3,47,1,25,3,6,46,0,12,8,22,302,2,56,36,0,24,52,334,2,3,1,4,24,52,330,2,3,1,4,11,37,0,6
,16,1,17,53,1,9,142,0,49,12,6,96,2,26,13,5,48,0,14,12,24,334,2,49,49,1,0,57,42,4,11,3,0,0,0,0,3,2
4,18,0,5,5,41,3,6,287,1,2,54,0,74,59,9,5,9,3,57,22,0,1,8,8,0,0,0,0,3,7,338,1,1,58);

%nfl(5,11,'CAR','ARI',6,22,3,3,0,0,0,0,3,9,10,0,15,5,1,5,12,0,1,66,13,0,3,9,79,0,31,4,9,6,4,4,12,
0,0,58,12,2,3,3,30,0,28,56,21,39,308,0,3,7,50,21,39,258,0,3,7,50,12,39,0,4,31,0,20,95,0,5,79,0,25
,6,4,78,0,32,5,4,60,0,19,10,21,308,0,32,38,1,19,28,175,1,3,2,15,19,28,160,1,3,2,15,2,52,0,17,43,0
,28,90,1,5,61,0,22,7,3,43,0,19,6,4,31,0,15,4,19,175,1,22,27,0,0,55,45,3,4,6,2,63,38,0,1,6,6,0,2,2
,51,0,4,195,1,1,63,0,52,46,8,8,11,1,18,18,0,2,20,10,0,2,2,50,2,4,199,0,2,56);

%nfl(5,12,'DEN','DAL',51,48,7,21,10,13,0,14,6,13,15,0,20,9,5,9,13,0,0,73,13,6,7,5,55,0,32,34,20,3
,1,4,6,0,0,54,12,5,6,9,81,0,27,26,33,42,414,4,1,0,0,33,42,414,4,1,0,0,19,93,1,7,17,0,31,103,2,9,1
22,2,29,12,5,87,1,57,8,5,57,0,19,5,33,414,4,57,41,1,25,36,506,5,1,4,36,25,36,470,5,1,4,36,12,43,1
,1,7,0,14,52,1,4,151,1,82,4,6,141,2,79,10,7,121,1,27,10,25,506,5,82,35,1,0,46,39,6,3,6,4,93,40,0,
1,9,9,0,3,3,50,6,0,0,0,0,0,0,72,55,4,2,0,5,123,28,0,0,0,0,0,2,2,48,4,1,51,0,0,51);

%nfl(5,13,'SDC','OAK',17,27,0,0,3,14,0,14,3,7,3,0,21,3,3,4,11,0,1,69,11,2,5,5,30,0,30,55,11,5,1,4
,12,0,0,55,10,1,1,8,85,1,29,5,36,48,411,2,3,2,20,36,48,391,2,3,2,20,9,17,0,7,11,0,19,36,0,7,117,0
,51,8,6,115,1,30,9,7,74,0,20,10,
36,411,2,51,48,2,18,23,221,2,0,4,26,18,23,195,2,0,4,26,10,41,0,7,32,0,28,104,0,5,84,1,35,8,3,56,1
,44,3,3,25,0,9,3,18,221,2,44,23,0,0,68,45,4,1,3,2,46,24,0,2,21,21,0,1,2,35,2,2,77,0,2,49,0,76,50,
4,6,2,4,92,30,0,0,0,0,0,2,2,50,3,6,297,1,1,64);

%nfl(5,14,'NYJ','ATL',30,28,3,14,3,10,0,0,7,7,14,0,10,5,0,6,11,0,0,46,10,3,5,6,24,0,24,33,20,3,3,
6,12,1,2,70,9,4,5,4,46,0,35,27,16,20,199,3,0,4,29,16,20,170,3,0,4,29,12,38,0,3,32,0,22,118,0,3,79
,1,47,4,5,68,1,21,6,2,21,0,12,2,16,199,3,47,20,0,36,45,319,2,0,2,12,37,46,299,2,0,2,12,14,43,2,7,
13,0,22,64,2,8,99,0,46,11,10,97,0,15,14,4,45,0,18,4,37,311,2,46,46,1,0,72,48,8,3,4,2,54,36,0,2,29
,24,0,3,3,43,3,3,140,0,1,48,0,55,29,4,2,3,1,23,23,0,2,22,15,0,0,0,0,4,3,99,0,0,55);

data sasdat.week5; set week5_game1
week5_game2
week5_game3
week5_game4
week5_game5
week5_game6
week5_game7
week5_game8
week5_game9
week5_game10
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week5_game11
week5_game12
week5_game13
week5_game14;
run;


/*  WEEK 6  */

%nfl(6,1,'NYG','CHI',21,27,7,7,7,0,0,7,17,3,0,0,12,8,1,7,11,0,0,53,9,2,2,4,31,0,27,5,17,7,2,5,11,
0,1,65,10,2,3,5,51,0,32,55,14,26,239,1,3,1,7,14,26,232,1,3,1,7,22,106,2,4,17,0,26,123,2,3,75,1,37
,5,4,70,0,31,8,4,68,0,23,5,14,239,1,37,26,0,24,36,262,2,0,0,0,24,36,262,2,0,0,0,19,67,0,3,20,0,29
,110,0,9,87,2,20,11,6,68,0,16,7,6,44,0,13,6,24,262,2,30,35,0,0,60,54,2,2,2,3,72,46,0,0,0,0,0,0,0,
0,3,3,139,1,0,51,1,42,40,4,6,1,3,73,28,0,1,0,0,0,2,2,52,3,3,110,0,3,38);

%nfl(6,2,'ARI','SFO',20,32,7,7,6,0,0,6,16,0,10,0,10,6,0,5,13,0,1,63,15,2,2,6,38,0,25,41,9,9,2,4,1
4,1,1,69,15,1,4,4,35,0,34,19,25,41,298,2,2,1,4,25,41,294,2,2,1,4,7,56,1,10,40,0,21,109,1,6,117,1,
75,12,1,53,0,53,3,5,44,1,19,6,
25,298,2,75,40,2,16,29,252,2,1,2,14,16,29,238,2,1,2,14,25,101,0,4,18,0,38,149,1,8,180,2,61,11,3,2
8,0,15,8,1,14,0,14,2,16,252,2,61,29,1,0,66,56,5,10,4,2,42,23,0,3,18,18,0,0,0,0,2,5,218,0,2,51,0,5
7,45,1,5,5,5,87,35,0,1,7,7,0,3,3,44,3,6,288,1,3,58);

%nfl(6,3,'CIN','BUF',27,24,10,7,7,0,3,7,3,0,14,0,14,9,3,7,18,1,1,84,13,2,3,8,78,0,42,52,9,8,3,8,1
7,1,2,69,12,1,2,4,27,0,25,24,26,40,337,3,1,3,19,26,40,318,3,1,3,19,18,86,0,1,34,0,41,135,0,6,103,
1,54,11,6,72,1,23,7,3,71,1,42,5,26,337,3,54,39,0,19,32,216,2,0,5,24,19,32,192,2,0,5,24,10,55,0,10
,35,0,32,130,1,4,74,0,47,6,2,51,1,40,3,2,47,1,25,4,19,216,2,47,32,1,0,89,56,8,5,11,4,103,28,0,3,3
4,29,0,2,3,46,3,5,206,0,3,50,0,114,69,8,5,5,5,101,26,0,2,10,7,0,1,1,51,3,5,244,0,2,57);

%nfl(6,4,'DET','CLE',31,17,7,0,7,17,0,0,17,0,0,0,15,6,3,8,14,0,0,72,12,3,3,8,65,0,33,29,14,8,1,5,
14,1,1,66,12,2,3,9,87,0,26,31,25,43,248,4,1,1,0,25,43,248,4,1,1,0,17,78,0,7,25,0,28,118,0,8,83,0,
24,13,5,57,1,18,6,4,36,0,12,4,25,248,4,24,43,0,26,43,292,2,3,2,23,26,43,269,2,2,2,23,1,45,0,10,37
,0,21,126,0,7,126,0,36,9,5,64,0,33,6,7,61,1,15,12,26,292,2,36,41,0,0,63,39,1,4,6,0,0,0,0,5,22,11,
0,1,1,51,4,5,229,0,3,52,0,68,42,2,7,2,1,21,21,0,3,-10,2,0,1,1,40,2,6,284,0,0,52);

%nfl(6,5,'OAK','KCC',7,24,0,7,0,0,0,0,7,7,10,0,13,5,0,4,15,1,1,71,14,0,0,11,68,0,34,0,7,7,2,4,14,
0,0,61,13,2,4,4,20,1,26,0,18,34,216,1,3,9,63,18,34,153,1,3,9,63,7,56,0,16,52,0,28,121,0,5,82,1,39
,10,3,46,0,18,7,3,31,0,16,3,18,216,1,39,34,0,14,31,128,0,0,3,23,14,31,105,0,0,3,23,22,78,2,4,29,0
,27,111,2,5,50,0,24,9,3,46,0,18,4,1,10,0,10,5,14,128,0,24,29,1,0,49,49,4,1,9,1,18,18,0,3,34,22,0,
0,1,0,1,8,414,1,1,64,1,58,54,9,10,13,0,0,0,0,6,32,11,0,1,1,33,3,8,392,1,4,60);

%nfl(6,6,'CAR','MIN',35,10,7,7,14,7,0,0,3,0,7,0,11,9,2,7,12,2,2,66,10,4,4,6,40,0,36,27,14,2,1,6,1
4,1,2,60,9,0,1,5,55,0,23,33,20,26,242,3,0,1,6,20,26,236,3,0,1,6,17,64,0,9,30,1,39,131,2,4,107,1,7
9,4,5,53,0,18,5,2,22,0,17,3,20,242,3,79,26,0,32,44,241,1,2,3,26,32,44,215,1,2,3,26,10,62,0,2,7,0,
13,75,0,9,97,1,23,11,6,34,0,20,10,4,30,0,15,7,32,241,1,23,44,0,0,51,41,5,4,6,2,31,16,0,3,22,11,0,
0,0,0,5,3,99,0,3,34,0,62,49,5,3,2,0,0,0,0,0,0,0,0,1,1,22,1,4,199,0,1,60);

%nfl(6,7,'PIT','NYJ',19,6,0,9,7,3,0,3,3,0,0,0,11,3,2,6,13,0,0,61,11,0,2,7,49,0,35,49,14,4,0,3,11,
0,0,57,13,0,2,5,60,0,24,11,23,30,264,1,0,3,17,24,31,255,1,0,4,24,16,34,0,5,18,0,26,73,0,9,86,0,16
,11,6,84,0,31,7,3,70,1,55,6,24,279,1,55,31,0,19,34,201,0,2,3,17,19,34,184,0,2,3,17,9,30,0,4,29,0,
20,83,0,4,59,0,29,5,3,46,0,20,8,5,36,0,11,7,19,201,0,29,34,0,0,60,37,5,3,6,2,28,23,0,2,11,11,0,4,
4,48,1,6,273,0,0,53,0,70,48,6,1,8,3,71,33,0,4,45,13,0,2,2,39,0,7,312,1,2,53);

%nfl(6,8,'PHI','TBB',31,20,7,7,7,10,0,3,14,0,3,0,12,8,1,7,14,0,0,65,13,2,3,3,31,0,26,14,15,3,1,6,
12,1,2,66,11,1,2,8,72,0,33,46,22,31,296,3,0,1,9,22,31,287,3,0,1,9,25,116,0,5,20,0,33,138,1,4,120,
1,47,6,6,64,2,36,6,2,55,0,44,2,22,296,3,47,31,1,26,43,273,2,1,2,16,26,43,257,2,1,2,16,16,67,0,3,2
0,0,21,94,0,9,114,2,24,14,7,91,0,36,9,3,28,0,14,4,26,273,2,36,39,0,0,59,52,3,7,3,2,45,23,0,2,15,8
,0,1,1,24,4,5,249,0,3,58,0,63,56,4,1,6,2,54,30,0,2,45,40,0,2,2,38,2,5,230,0,0,52);

%nfl(6,9,'GBP','BAL',19,17,3,3,10,3,0,0,0,3,14,0,9,6,0,6,17,0,0,65,15,0,4,8,55,0,31,22,11,2,2,2,1
4,1,2,61,13,2,4,6,40,0,28,38,17,32,315,1,1,3,17,17,32,298,1,1,3,17,23,120,0,5,21,0,30,140,0,4,116
,1,64,10,3,75,0,52,7,4,53,0,18,4,17,315,1,64,32,1,10,34,342,2,0,5,29,20,34,313,2,0,5,29,14,34,0,6
,9,0,22,47,0,4,99,0,63,6,4,81,1,45,6,3,71,0,59,7,20,342,2,63,36,1,0,66,40,10,4,3,1,19,19,0,6,68,2
3,0,4,5,50,1,6,329,2,0,61,0,76,34,6,5,3,4,102,35,0,2,38,38,0,1,1,23,2,9,375,1,2,61);

%nfl(6,10,'STL','HOU',38,13,7,10,21,0,0,0,6,0,7,0,9,4,2,3,7,0,0,11,8,3,3,9,74,2,24,50,13,9,5,6,14
,2,3,73,10,1,6,7,95,0,35,10,12,16,117,3,0,0,0,13,16,117,3,0,0,0,18,79,0,3,11,0,25,99,0,2,45,0,34,
2,2,20,0,13,4,1,18,0,18,1,12,117,3,34,16,0,15,21,186,0,0,3,10,27,38,267,0,2,5,17,20,141,0,10,12,1
,30,153,1,7,88,0,19,8,4,57,0,41,7,3,47,0,22,5,27,284,0,41,38,2,1,82,61,6,4,7,3,64,30,0,0,0,0,0,1,
1,42,5,3,135,0,1,47,0,52,36,2,0,3,4,97,39,0,2,6,4,0,2,2,35,7,2,78,1,0,44);
```

```
%nfl(6,11,'JAX','DEN',19,35,0,12,7,0,0,14,0,14,7,0,15,4,1,5,14,0,3,71,11,1,3,7,62,1,31,15,14,8,4,
7,13,1,1,71,13,4,5,4,31,0,28,45,27,42,303,0,2,2,12,27,42,291,0,2,2,12,20,71,1,1,2,0,27,71,1,14,19
0,0,23,20,4,49,0,19,5,2,29,0,23,3,27,303,0,23,42,0,28,42,295,2,1,0,0,28,42,295,2,1,0,0,15,42,3,1,
35,0,29,112,3,3,78,0,42,5,6,63,1,26,8,7,62,0,28,10,28,295,2,42,42,2,1,55,47,3,4,1,0,0,0,0,2,2,5,0
,2,2,50,1,3,135,0,2,48,0,68,53,8,13,4,0,0,0,0,1,1,1,0,0,0,0,5,3,129,0,0,48);

%nfl(6,12,'TEN','SEA',13,20,3,7,0,3,0,0,7,3,10,0,8,3,2,4,12,1,2,52,10,0,1,7,44,1,26,38,10,11,3,5,
13,1,1,66,10,2,5,6,65,0,33,22,17,29,171,0,2,3,14,17,29,157,0,2,3,14,12,33,0,6,33,0,20,66,0,5,69,0
,32,8,4,29,0,11,5,2,22,0,17,5,17,171,0,32,28,0,23,31,257,0,0,2,4,23,34,253,0,0,2,4,21,77,2,10,61,
0,33,151,2,4,78,0,55,5,4,48,0,28,4,2,35,0,24,4,23,257,0,55,30,2,0,77,42,4,3,4,4,121,40,0,0,0,0,0,
2,2,38,1,4,140,0,1,46,0,55,28,5,6,6,3,95,40,0,2,15,11,0,2,2,31,2,3,146,2,1,61);

%nfl(6,13,'NOS','NEP',27,30,7,0,10,10,0,3,14,3,10,0,13,7,0,5,14,0,0,63,12,2,3,7,56,0,28,9,15,8,3,
5,15,1,3,83,14,3,5,4,33,0,31,51,17,36,236,2,1,1,6,17,36,230,2,1,1,6,7,53,1,11,51,0,26,131,1,3,64,
1,34,3,3,61,0,32,4,6,58,0,19,12,17,236,2,34,36,1,25,43,269,1,1,5,34,25,43,235,1,1,5,34,20,96,2,5,
19,0,35,141,2,6,63,0,20,10,5,57,0,23,11,4,57,0,19,4,25,269,1,23,42,0,0,84,46,7,3,7,3,53,21,0,3,20
,9,0,2,2,39,3,6,268,0,2,54,0,61,27,3,4,3,2,51,29,0,3,9,12,0,3,3,54,3,4,210,0,1,56);

%nfl(6,14,'WAS','DAL',16,31,3,3,10,0,0,7,7,7,10,0,10,11,4,8,16,0,1,75,13,0,3,12,104,0,34,32,8,7,3
,5,12,0,0,50,11,2,4,7,80,1,25,28,19,39,246,0,1,3,29,19,39,217,0,1,3,29,16,81,1,9,77,0,33,216,1,6,
69,0,25,15,4,58,0,29,6,2,42,0,26,3,19,246,0,29,38,1,18,30,170,1,1,1,5,18,30,165,1,1,1,5,7,29,1,11
,17,1,19,48,2,4,44,0,14,5,5,36,0,17,8,3,27,0,14,5,18,170,1,17,29,0,0,43,35,3,3,4,2,29,20,0,5,17,9
,0,3,4,33,1,3,141,0,0,59,0,74,57,4,10,5,2,113,90,0,2,109,86,1,1,1,30,4,5,226,0,2,52);

%nfl(6,15,'IND','SDC',9,19,3,3,0,3,0,0,10,3,6,0,9,3,0,2,10,0,0,48,10,0,1,5,28,0,21,29,13,8,3,7,14
,0,0,72,9,0,3,5,25,0,38,31,18,30,202,0,1,1,9,18,30,193,0,1,1,9,10,40,0,4,19,0,17,74,0,5,88,0,35,8
,5,43,0,11,8,2,19,0,14,2,18,202,0,35,29,0,22,33,237,1,0,2,10,22,33,237,1,0,2,10,22,102,0,9,36,0,3
7,147,0,9,107,1,22,12,5,47,0,13,5,2,31,0,16,4,22,237,1,25,32,0,0,76,61,6,1,4,5,124,31,0,2,10,5,0,
3,3,51,0,5,203,0,2,52,0,51,43,1,2,4,1,24,24,0,0,0,0,0,4,4,50,1,3,145,0,2,49);*/;

data sasdat.week6; set week6_game1
week6_game2
week6_game3
week6_game4
week6_game5
week6_game6
week6_game7
week6_game8
week6_game9
week6_game10
week6_game11
week6_game12
week6_game13
week6_game14
week6_game15;
run;

/*  WEEK 7 */

%nfl(7,1,'SFO','TEN',31,17,3,14,7,7,0,0,0,0,17,0,8,9,2,8,16,0,0,64,11,2,2,5,42,1,35,46,12,2,1,5,1
4,0,0,57,11,1,2,10,100,0,24,14,15,21,199,0,0,2,3,13,21,196,0,0,2,3,47,70,2,11,68,2,41,153,3,5,74,
0,25,6,4,62,0,24,8,2,34,0,29,3,13,199,0,29,21,0,25,41,326,2,1,3,28,25,41,298,2,1,3,28,9,39,0,3,29
,0,13,70,0,9,98,0,21,12,4,71,1,66,4,3,62,0,42,10,25,326,2,66,41,1,0,45,37,4,4,5,1,21,21,0,2,0,0,0
,1,1,44,4,6,280,1,3,58,0,59,45,4,2,2,4,73,39,0,2,-1,0,0,1,1,31,2,6,263,0,3,55);

%nfl(7,2,'TBB','ATL',23,31,0,10,7,6,0,7,17,0,7,0,13,5,5,5,17,3,3,75,11,1,4,11,103,0,37,49,11,1,3,
3,9,0,0,44,9,2,3,9,101,1,22,11,26,44,256,2,0,3,30,26,44,226,2,0,3,30,11,47,0,14,45,0,28,111,0,10,
138,2,59,22,4,32,0,11,5,3,27,0,11,3,26,256,2,59,44,1,20,26,273,3,0,0,0,20,26,273,3,0,0,0,8,16,0,7
,14,0,18,18,0,7,149,1,54,7,8,46,2,19,9,2,30,0,20,4,20,273,3,54,25,1,0,40,28,6,2,2,2,56,30,0,3,27,
14,0,3,3,41,2,5,188,1,2,53,0,70,50,4,6,5,1,21,21,0,1,0,0,0,1,1,23,4,4,192,0,1,59);

%nfl(7,3,'CIN','DET',27,24,7,7,10,3,0,7,3,7,7,0,16,1,1,4,10,0,0,53,10,1,1,6,50,0,25,29,19,3,0,13,
19,0,0,76,10,1,3,4,30,0,34,31,24,34,372,3,0,1,8,24,34,364,3,0,1,8,7,27,0,10,24,0,18,57,0,6,155,1,
82,8,4,64,0,30,5,4,57,1,18,6,24,372,3,82,32,0,28,51,257,3,0,0,0,18,51,357,3,0,0,0,20,50,0,5,27,0,
25,77,0,9,155,2,50,15,2,50,0,43,2,3,44,0,27,5,28,357,3,50,49,0,0,63,42,3,11,7,1,21,21,0,1,8,8,0,2
,3,54,3,4,189,0,1,50,0,50,40,5,7,3,1,35,35,0,2,1,1,0,1,2,36,3,4,173,0,3,65);

%nfl(7,4,'BUF','MIA',23,21,14,3,0,6,0,0,14,7,0,0,8,6,1,9,19,0,0,66,13,1,4,6,53,1,30,12,12,5,2,3,1
3,0,1,64,14,3,4,4,32,0,29,48,21,32,202,0,1,4,24,21,32,178,0,1,4,24,11,36,1,6,16,0,30,90,1,6,61,0,
17,13,4,49,0,21,5,2,36,0,30,2,21,202,0,30,32,0,19,37,194,3,2,2,21,19,37,173,3,2,2,21,12,60,0,9,43
```

```
,0,25,120,0,5,76,0,46,10,6,69,0,19,11,5,40,2,16,8,19,194,3,46,37,1,1,51,45,4,6,3,2,49,26,0,2,14,1
4,0,3,3,39,2,7,318,1,1,62,0,65,55,9,2,6,2,59,44,0,4,11,7,0,0,1,0,3,6,282,0,2,58);

%nfl(7,5,'NEP','NYJ',27,30,14,7,0,6,0,7,3,17,0,3,12,6,3,1,12,1,1,70,13,2,2,7,100,1,23,40,13,11,3,
11,21,0,0,89,14,2,4,9,45,1,46,13,22,46,228,0,1,4,23,22,46,205,0,1,4,23,11,50,1,8,36,1,20,90,2,8,1
14,0,30,17,5,44,0,19,7,3,34,0,14,7,22,228,0,30,46,0,17,33,233,1,1,4,27,17,33,206,1,1,4,27,34,104,
0,6,32,1,52,177,1,8,97,1,22,10,4,80,0,27,7,3,41,0,25,7,17,233,1,27,33,0,1,92,56,8,6,7,4,96,28,0,3
,58,38,0,2,2,44,3,8,404,3,1,62,1,60,37,5,6,3,1,17,17,0,3,44,21,0,3,3,42,3,6,240,0,2,52);

%nfl(7,6,'DAL','PHI',17,3,0,3,7,7,0,0,0,0,3,0,18,2,2,5,16,0,0,75,15,2,2,12,75,0,36,13,13,3,3,4,18
,1,1,75,14,0,2,5,33,0,23,47,28,47,317,1,2,2,23,28,47,294,1,2,2,23,19,65,0,1,6,0,26,74,1,8,110,0,1
9,16,6,71,1,25,7,6,53,0,14,7,28,317,1,26,46,0,11,20,129,0,3,0,0,22,49,194,0,3,3,15,18,55,0,3,25,0
,23,84,0,6,88,0,26,7,3,33,0,21,5,3,32,0,15,12,22,209,0,26,48,0,0,49,39,6,6,4,2,49,39,0,5,23,9,0,1
,1,38,2,9,347,0,6,50,0,62,54,3,5,3,1,23,23,0,1,5,5,0,1,2,31,0,9,419,1,1,58);

%nfl(7,7,'CHI','WAS',41,45,10,7,7,17,0,3,21,7,14,0,10,8,3,2,8,0,0,52,14,3,4,5,30,1,26,4,13,13,2,7
,13,0,0,73,12,4,5,5,47,1,33,56,14,20,204,1,0,1,7,17,28,219,1,1,2,13,16,91,3,4,33,0,22,140,3,4,105
,0,35,7,6,75,0,28,10,3,24,0,9,4,17,232,1,35,28,0,18,29,298,2,1,1,8,18,29,290,2,1,1,8,19,95,0,11,8
4,0,43,209,3,9,134,1,38,9,2,75,1,45,2,5,58,0,19,8,
18,298,2,45,29,0,0,83,52,8,5,3,7,105,28,0,3,85,81,1,2,3,49,5,3,147,0,2,65,1,63,39,3,6,5,3,53,19,0
,0,0,0,0,1,1,38,6,5,218,0,0,53);

%nfl(7,8,'STL','CAR',15,30,2,3,7,3,0,7,10,10,3,0,10,3,2,4,13,0,2,59,11,1,3,8,68,0,26,40,9,8,4,2,9
,0,0,57,11,2,4,7,59,1,33,20,21,30,255,1,1,2,8,23,34,254,1,1,4,20,17,53,0,3,9,0,21,63,0,2,97,0,73,
6,5,39,0,24,5,4,34,1,25,4,23,274,1,73,34,2,15,17,204,1,0,2,24,15,17,180,1,0,2,24,15,40,0,13,36,1,
38,102,1,5,69,1,19,6,4,47,0,25,4,3,35,0,18,4,15,204,1,25,17,0,0,62,44,8,1,2,3,73,32,0,3,26,20,0,2
,2,42,1,4,159,0,0,52,1,61,43,9,4,4,2,54,28,0,1,-1,0,0,3,3,50,3,3,154,0,1,56);

%nfl(7,9,'SDC','JAX',24,6,7,7,3,7,0,0,3,3,0,0,14,10,3,7,12,0,0,67,9,2,4,8,61,0,37,30,12,5,1,3,11,
1,3,59,8,0,3,6,45,0,22,30,22,26,285,1,0,1,9,22,26,276,1,0,1,9,21,110,1,9,29,1,40,158,2,4,69,1,29,
4,3,67,0,36,6,4,47,0,26,4,22,285,1,36,26,0,23,36,318,0,1,6,43,23,36,275,0,1,6,43,9,37,0,2,19,0,17
,78,0,5,120,0,43,8,8,80,0,22,13,6,58,0,12,9,23,318,0,43,36,0,0,49,45,7,5,7,1,18,18,0,1,11,11,0,1,
1,20,3,3,134,0,1,47,0,61,55,2,1,3,2,62,33,0,1,0,0,0,2,2,30,0,3,150,1,1,54);

%nfl(7,10,'CLE','GBP',13,31,0,3,3,7,0,14,3,0,14,0,9,5,3,7,18,2,5,68,9,1,2,12,106,0,26,40,14,7,5,7
,13,0,0,66,11,3,4,10,97,0,33,20,17,42,149,1,1,3,16,17,42,133,1,1,3,16,11,39,0,2,20,0,23,83,0,7,55
,1,15,9,4,49,0,19,9,2,21,0,14,6,17,149,1,19,40,0,25,36,260,3,0,1,7,25,36,253,3,0,1,7,22,82,1,4,12
,0,29,104,1,8,103,1,39,10,5,72,1,26,5,5,42,1,17,6,25,260,3,39,33,0,0,65,49,2,1,5,4,189,86,0,1,0,0
,0,2,2,46,1,3,133,1,1,56,0,60,40,4,7,8,2,45,26,0,1,18,18,0,1,2,26,4,3,90,0,1,35);

%nfl(7,11,'HOU','KCC',16,17,3,7,6,0,0,7,7,3,0,0,10,4,0,4,12,0,0,54,11,0,1,4,40,0,27,48,10,8,2,7,1
5,0,1,68,11,2,5,5,24,0,32,12,15,25,271,1,0,5,50,15,25,221,1,0,5,50,15,50,0,4,11,0,24,73,0,4,89,0,
42,6,3,76,1,35,4,1,42,0,42,2,15,271,1,42,25,1,23,34,240,0,1,2,9,23,34,231,0,1,2,9,21,86,1,6,28,1,
32,126,2,4,70,0,43,5,5,66,0,21,9,3,37,0,21,4,23,240,0,43,34,1,0,59,59,3,4,6,1,22,22,0,1,6,6,0,3,3
,48,1,5,249,0,3,58,0,51,45,6,6,5,4,123,57,0,4,32,26,0,1,1,22,2,4,174,0,2,63);

%nfl(7,12,'BAL','PIT',16,19,3,3,0,10,0,7,3,3,6,0,10,7,2,7,14,1,1,61,7,1,2,9,67,0,28,59,7,7,3,7,12
,0,0,55,9,1,3,7,50,0,31,1,24,34,215,1,0,1,10,24,34,205,1,0,1,10,15,45,0,2,14,0,26,82,0,3,61,0,41,
6,2,35,0,22,3,4,32,0,12,8,24,215,1,41,34,0,17,23,160,1,0,3,15,17,23,145,1,0,3,15,19,93,0,3,25,0,2
9,141,0,6,50,0,13,7,4,41,0,19,4,1,19,0,19,2,17,160,1,19,23,1,0,59,44,3,1,4,4,81,32,0,1,12,12,0,3,
3,46,1,3,126,1,1,43,0,67,49,3,5,2,3,97,44,0,1,18,18,0,4,4,42,1,1,36,0,0,36);

%nfl(7,13,'DEN','IND',33,39,7,7,3,16,0,10,16,7,6,0,19,2,2,5,16,1,1,73,17,3,5,12,103,0,28,13,11,5,
3,5,17,0,0,71,18,3,4,6,52,0,31,47,29,49,386,3,1,4,21,29,49,365,3,1,4,21,15,40,1,4,25,0,20,64,1,8,
150,1,49,13,7,96,0,25,12,4,82,1,31,9,29,386,3,49,48,2,21,38,228,3,0,2,15,21,38,213,3,0,2,15,14,37
,0,1,30,0,31,121,1,5,50,0,14,8,4,44,1,27,7,3,42,0,28,3,21,228,3,28,38,1,0,74,40,8,7,8,4,123,56,0,
4,16,12,0,2,2,47,3,7,331,0,1,53,0,68,44,1,9,10,4,104,32,0,3,35,15,0,3,3,52,4,9,440,0,6,60);

%nfl(7,14,'SEA','ARI',34,22,7,10,14,3,0,0,10,3,9,0,14,6,1,7,12,0,1,64,14,3,4,10,70,0,27,40,16,2,4
,5,15,1,2,70,12,2,3,3,22,0,32,20,18,29,235,3,0,3,26,18,29,209,3,0,3,26,21,91,1,8,29,0,32,135,1,4,
77,0,32,7,3,50,1,31,4,5,40,1,15,7,18,235,3,32,29,2,30,45,258,1,2,7,54,30,45,204,1,2,7,54,13,22,1,
2,5,0,18,30,1,5,58,0,15,9,7,53,0,18,7,5,33,0,11,8,30,258,1,19,44,0,0,60,54,9,8,13,2,18,18,0,3,21,
15,0,2,2,51,4,3,124,0,0,46,0,57,47,3,4,9,3,58,25,0,0,0,0,0,3,3,52,1,4,197,1,1,54);

%nfl(7,15,'MIN','NYG',7,23,7,0,0,0,0,3,7,7,6,0,10,1,2,7,18,0,3,68,13,0,1,3,38,1,23,38,14,2,1,7,19
,0,0,73,14,1,4,5,72,0,36,22,20,53,190,0,1,1,14,20,53,176,0,1,1,14,16,28,0,1,2,0,14,30,0,4,41,0,12
,10,3,32,0,18,9,2,28,0,22,4,20,190,0,22,51,2,23,39,200,1,0,2,7,23,39,193,1,0,2,7,18,36,1,11,23,0,
32,64,1,5,50,0,13,7,5,45,0,16,6,3,40,1,24,3,23,200,1,24,39,1,0,89,63,7,6,6,3,90,69,0,4,119,86,1,0
,1,0,1,7,312,1,2,56,0,56,40,5,8,13,2,25,14,0,3,25,13,0,3,3,36,2,9,438,1,2,57);

data sasdat.week7; set week7_game1
```

```
week7_game2
week7_game3
week7_game4
week7_game5
week7_game6
week7_game7
week7_game8
week7_game9
week7_game10
week7_game11
week7_game12
week7_game13
week7_game14
week7_game15;
run;


/*  WEEK 8   */

%nfl(8,1,'SFO','JAX',42,10,14,14,7,7,0,0,3,7,0,0,9,14,2,6,9,2,2,55,9,5,5,4,35,1,28,29,10,8,2,4,14
,3,5,70,9,0,2,6,76,0,31,31,10,16,164,1,0,0,0,11,17,177,1,0,0,0,9,84,0,19,71,2,38,221,4,4,56,0,21,
6,2,56,0,43,3,3,52,1,31,4,11,177,1,43,17,1,29,45,228,1,0,0,0,29,45,228,1,0,0,0,19,75,0,4,15,0,25,
90,0,
7,74,0,15,10,6,47,0,11,8,3,43,1,29,6,29,228,1,29,45,1,0,63,62,5,7,0,3,73,47,0,2,4,4,0,0,0,0,6,1,6
1,0,0,61,0,50,44,1,3,0,7,136,40,0,1,16,16,0,1,1,38,1,4,178,1,0,51);

%nfl(8,2,'DAL','DET',30,31,0,10,3,17,0,7,0,0,24,0,8,3,2,3,13,0,0,56,15,1,1,2,31,0,24,49,17,11,1,3
,11,1,2,78,14,4,5,8,61,0,35,11,14,30,206,3,0,0,0,14,30,206,3,0,0,0,14,26,0,5,16,0,26,62,0,3,72,2,
50,6,2,64,1,60,10,3,18,0,13,4,14,206,3,60,30,0,33,48,488,1,2,1,8,33,48,480,1,2,1,8,21,92,1,4,32,1
,29,143,3,14,329,1,87,16,4,54,0,40,6,3,31,0,17,6,33,488,1,87,44,2,0,72,50,4,5,7,4,126,56,0,2,25,1
7,0,3,3,53,3,7,313,2,3,58,0,50,43,5,2,4,1,44,44,0,1,4,4,0,1,1,20,4,4,203,1,0,64);

%nfl(8,3,'CLE','KCC',17,23,0,10,7,0,0,6,14,0,3,0,9,4,0,3,12,1,2,52,11,1,1,9,70,0,23,55,12,6,2,10,
19,0,0,71,11,1,2,5,31,0,36,5,22,36,293,2,0,1,10,22,36,283,2,0,1,10,9,28,0,3,17,0,15,57,0,5,132,1,
47,10,4,81,0,37,4,3,27,0,15,8,22,293,2,47,35,1,24,36,225,2,0,6,30,24,36,195,2,0,6,30,18,74,0,6,40
,0,29,136,0,7,67,1,28,10,5,46,0,24,7,3,31,0,18,5,24,225,2,28,35,0,0,64,62,6,5,9,3,76,36,0,4,19,10
,0,1,1,44,2,4,280,0,2,54,0,41,41,4,3,4,2,52,34,0,5,38,20,0,3,4,42,2,5,240,0,1,56);

%nfl(8,4,'MIA','NEP',17,27,7,10,0,0,0,0,3,17,7,0,14,9,0,8,17,1,2,79,12,2,4,7,61,0,34,59,6,9,4,2,1
0,1,1,62,13,3,4,5,35,0,25,1,22,42,192,2,2,6,47,22,42,145,2,2,6,47,18,89,0,9,47,0,31,156,0,3,41,0,
25,10,5,37,0,11,8,4,37,0,15,6,22,192,2,25,40,1,13,22,116,1,1,3,16,13,22,100,1,1,3,16,14,79,1,11,4
6,0,37,152,2,4,60,1,26,5,2,27,0,23,5,3,15,0,8,6,13,116,1,26,21,0,0,81,27,3,2,4,3,52,23,0,3,28,13,
0,1,3,52,2,4,161,0,1,52,0,78,42,7,6,9,2,46,30,0,3,13,7,0,2,2,48,3,5,217,0,1,51);

%nfl(8,5,'BUF','NOS',17,35,0,10,0,7,0,7,14,7,7,0,13,5,2,5,13,0,1,68,12,2,3,6,45,0,27,30,14,4,3,7,
15,1,1,64,12,3,5,8,59,0,32,30,22,39,234,1,1,4,23,22,39,211,1,1,4,23,15,45,1,7,35,0,25,88,1,7,72,1
,17,11,7,72,0,22,11,3,56,0,26,5,22,234,1,26,39,2,26,34,332,5,0,4,23,26,34,309,5,0,4,23,14,65,0,7,
9,0,26,77,0,3,129,2,69,4,3,45,0,17,3,3,37,2,15,3,26,332,5,69,33,0,0,63,45,7,3,6,0,0,0,0,1,4,4,0,1
,2,37,2,3,137,0,0,53,0,56,48,8,6,8,2,51,32,0,1,0,0,0,0,2,0,5,4,187,1,2,55);

%nfl(8,6,'NYG','PHI',15,7,6,6,0,3,0,0,0,0,7,0,12,3,1,8,19,0,1,71,13,0,2,11,92,0,38,5,10,3,2,3,12,
0,2,58,12,0,1,4,48,1,21,55,25,39,246,0,0,1,9,24,39,237,0,0,1,9,20,70,0,9,19,0,31,88,0,7,86,0,26,1
0,7,51,0,22,12,3,42,0,27,4,25,246,0,27,38,1,17,26,158,0,1,3,24,23,35,152,0,2,4,36,15,48,0,1,1,0,1
9,48,0,8,63,0,13,11,3,54,0,25,4,4,17,0,7,5,23,188,0,25,34,1,0,49,43,6,5,2,1,4,4,0,2,9,5,0,5,5,46,
0,5,219,0,3,68,0,62,52,3,7,3,2,56,28,0,1,16,16,0,0,0,0,1,6,266,0,2,54);

%nfl(8,7,'NYJ','CIN',9,49,0,6,3,0,0,14,14,14,7,0,7,6,2,6,15,0,1,65,13,0,0,4,69,0,33,17,16,3,1,6,1
1,0,1,56,10,5,6,4,45,2,26,43,20,30,159,0,2,3,28,23,37,147,0,2,4,29,3,35,0,3,20,0,24,93,0,8,80,0,2
6,12,3,27,0,14,4,4,23,0,8,7,23,176,0,26,36,0,19,30,325,5,1,1,2,19,30,323,5,1,1,2,11,33,0,5,18,0,2
5,79,0,8,122,4,45,8,3,115,0,53,7,1,24,0,24,3,19,325,5,53,30,0,0,62,35,2,4,1,6,139,36,0,2,10,10,0,
3,3,50,0,5,248,0,2,56,2,77,43,6,7,7,4,133,71,0,4,20,13,0,0,0,0,7,3,161,0,1,58);

%nfl(8,8,'PIT','OAK',18,21,0,3,0,15,0,14,7,0,0,0,13,5,2,4,15,0,0,69,15,2,4,3,12,0,29,59,5,8,0,5,1
4,0,0,59,15,2,2,6,39,0,30,1,29,45,275,1,2,5,34,29,45,241,1,2,5,34,13,24,1,3,9,0,19,35,1,7,88,1,33
,11,9,82,0,21,13,3,39,0,17,4,29,275,1,33,44,0,10,19,88,0,2,2,6,10,19,82,0,2,2,6,9,106,1,24,73,2,3
8,197,3,4,45,0,16,6,2,32,0,18,4,1,9,0,9,1,10,88,0,18,19,1,0,59,46,8,4,3,1,25,25,0,4,47,44,0,1,3,4
7,1,7,299,2,1,65,0,70,50,10,6,6,3,46,22,0,1,14,14,0,0,0,0,3,8,372,1,2,58);

%nfl(8,9,'WAS','DEN',21,45,0,7,14,0,0,7,0,7,31,0,11,8,3,6,14,0,0,70,14,2,2,1,5,1,28,0,23,6,0,4,12
,2,2,80,15,3,4,6,57,1,32,0,15,30,132,1,2,3,26,20,39,154,1,4,3,26,17,93,1,5,11,0,28,112,1,8,90,0,1
7,14,7,46,0,14,11,2,20,0,10,5,20,180,1,17,39,1,30,44,354,4,3,2,15,30,44,339,4,3,2,15,13,43,0,12,3
```

```
8,1,34,107,1,6,89,1,35,6,6,81,1,24,10,7,75,1,35,11,30,354,4,35,44,1,1,66,60,3,7,1,0,0,0,0,2,36,34
,0,0,0,0,3,7,274,0,4,60,1,60,47,6,10,13,1,30,30,0,1,10,10,0,1,1,19,6,3,147,0,1,55);

%nfl(8,10,'ATL','ARI',13,27,3,3,0,7,0,0,21,3,3,0,17,1,2,8,20,1,2,79,13,1,3,10,55,0,34,19,9,5,3,3,
10,0,0,51,11,2,3,8,52,0,24,41,34,61,301,1,4,4,36,34,61,265,1,4,4,36,1,13,0,2,8,0,14,27,0,12,121,0
,25,18,5,77,1,20,7,4,40,0,14,9,34,301,1,25,59,0,13,18,172,2,1,3,25,13,18,147,2,1,3,25,15,154,1,14
,38,0,30,201,1,1,51,0,51,1,4,48,1,20,7,3,30,1,15,4,13,172,2,51,18,0,0,51,47,6,3,5,2,54,27,0,2,27,
14,0,2,2,30,1,4,183,0,2,57,0,57,51,8,12,11,0,0,0,0,2,-4,3,0,2,2,39,3,5,232,1,1,57);

%nfl(8,11,'GBP','MIN',44,31,7,17,7,13,0,7,10,0,14,0,13,11,2,13,18,2,2,73,9,2,4,6,120,1,40,54,7,5,
3,2,8,0,0,43,10,3,4,7,46,1,19,6,24,29,285,2,0,2,3,24,29,282,2,0,2,3,29,94,1,7,57,1,42,182,2,7,123
,2,76,8,5,89,0,27,6,5,35,0,15,7,24,285,2,76,29,0,14,21,145,0,0,3,13,14,21,132,0,0,3,13,13,60,1,5,
38,1,19,111,3,4,51,0,17,4,2,26,0,17,3,3,23,0,13,3,14,145,0,18,20,0,0,45,29,2,1,5,2,34,18,0,2,93,9
3,1,3,3,45,5,0,0,0,0,0,0,80,50,7,0,3,6,247,109,1,0,0,0,0,1,1,36,4,4,186,0,1,53);

%nfl(8,12,'CAR','TBB',31,13,7,7,7,10,0,3,3,0,7,0,11,9,1,5,12,1,1,62,10,4,5,6,59,0,34,33,13,3,3,4,
14,0,2,68,11,1,2,3,21,0,25,27,23,32,221,2,0,3,26,23,32,195,2,0,3,26,11,50,1,8,43,1,27,129,2,5,80,
0,35,6,4,42,0,21,7,4,29,1,10,4,23,221,2,35,32,0,30,51,275,1,0,3,26,30,51,249,1,0,3,26,10,39,0,1,7
,0,14,48,0,5,79,0,29,13,5,48,1,15,8,3,47,0,24,4,30,275,1,29,50,1,0,58,50,7,7,4,2,44,23,0,2,7,5,0,
1,1,29,4,5,216,0,3,59,0,56,49,5,2,3,3,65,25,0,3,6,6,0,2,2,48,1,5,215,0,0,51);

%nfl(8,13,'SEA','STL',14,9,0,7,7,0,0,3,0,3,3,0,4,1,2,2,11,0,0,40,12,1,1,10,83,0,21,51,7,12,4,5,14
,0,1,71,11,0,4,8,53,0,38,9,10,18,139,2,0,7,48,10,18,91,2,0,7,48,8,23,0,3,16,0,15,44,0,5,93,2,80,7
,1,16,0,16,1,2,14,0,8,3,10,139,2,80,18,0,15,31,158,0,2,3,19,5,31,139,0,2,3,19,26,134,0,8,39,0,37,
200,0,4,59,0,23,5,2,33,0,26,4,3,31,0,19,7,15,158,0,26,31,0,0,63,61,4,4,5,0,0,0,0,3,9,9,0,0,0,0,2,
9,403,0,4,51,0,36,32,10,2,10,3,79,32,0,4,7,7,0,3,4,33,0,4,182,0,2,55);

data sasdat.week8; set week8_game1
week8_game2
week8_game3
week8_game4
week8_game5
week8_game6
week8_game7
week8_game8
week8_game9
week8_game10
week8_game11
week8_game12
week8_game13;
run;

/*  WEEK 9 */

%nfl(9,1,'CIN','MIA',20,22,0,3,7,10,0,0,10,7,3,2,17,10,1,10,20,1,1,93,15,1,3,3,63,0,40,2,7,7,1,3,
14,0,0,61,13,1,3,2,25,1,28,20,32,53,338,0,3,5,36,32,53,302,0,3,5,36,9,79,2,21,72,0,35,163,2,11,12
8,0,21,19,4,66,0,26,7,6,62,0,21,9,32,338,0,26,53,1,20,28,208,0,0,3,20,20,28,188,0,0,3,20,16,105,0
,12,38,0,30,157,1,6,82,0,40,8,3,39,0,21,5,4,24,0,9,4,20,208,0,40,28,1,0,55,51,5,1,5,3,45,23,0,6,4
9,15,0,2,2,54,2,4,154,0,4,50,1,81,72,5,7,5,3,79,30,0,0,0,0,0,2,3,44,2,8,391,0,2,58);

%nfl(9,2,'KCC','BUF',23,13,0,3,10,10,0,7,3,3,0,0,8,5,2,3,13,0,0,54,10,0,1,5,38,2,29,46,12,11,2,4,
13,0,2,77,12,0,3,6,48,0,30,14,19,29,124,0,0,2,9,19,29,115,0,0,2,9,17,90,0,4,7,0,23,95,0,7,67,0,12
,12,3,22,0,9,5,1,20,0,20,1,19,124,0,20,29,0,18,39,229,1,2,0,0,18,39,299,1,2,0,0,12,116,0,16,77,0,
38,241,0,2,64,1,59,4,4,44,0,18,8,2,39,0,27,3,18,229,1,59,39,1,1,75,47,2,7,0,4,84,26,0,1,0,0,0,3,3
,41,2,6,317,1,4,59,0,57,44,4,3,2,1,24,24,0,3,27,16,0,2,2,30,1,3,108,0,1,47);

%nfl(9,3,'MIN','DAL',23,27,3,7,7,6,0,3,3,14,7,0,13,8,1,5,13,2,3,68,12,2,4,4,35,0,31,27,16,3,1,5,1
4,0,0,63,10,1,2,5,45,1,28,33,25,37,236,1,1,2,12,25,37,224,1,1,2,12,25,140,1,4,29,1,29,169,2,6,56,
0,27,9,3,37,0,19,3,2,35,1,31,2,25,236,1,31,36,1,34,51,337,2,1,3,23,34,51,314,2,1,3,23,4,31,0,1,8,
0,9,36,0,8,102,1,26,10,6,68,0,18,9,6,64,0,34,11,34,337,2,34,50,0,0,49,44,7,2,3,6,125,45,0,2,35,26
,0,1,1,23,2,3,113,0,1,48,0,72,56,3,6,2,2,60,31,0,1,5,5,0,2,2,44,3,5,222,0,3,53);

%nfl(9,4,'TEN','STL',28,21,7,0,7,14,0,0,7,7,7,0,8,11,3,7,12,0,0,61,13,4,4,3,30,0,27,9,13,7,1,5,13
,0,1,69,12,3,3,6,44,0,32,51,13,22,185,0,2,4,20,13,22,165,0,2,4,20,23,150,2,9,38,1,35,198,4,3,69,0
,45,5,1,28,0,28,1,1,22,0,22,1,13,185,0,45,22,0,20,35,210,1,0,2,7,20,35,203,1,0,2,7,27,127,2,1,16,
0,32,160,2,4,55,0,25,8,6,51,0,13,7,3,36,1,17,6,20,210,1,25,34,2,0,27,55,1,3,1,3,85,37,0,2,8,8,0,0
,0,0,4,5,228,1,1,55,0,56,53,7,4,10,1,25,25,0,3,33,24,0,0,1,0,3,5,242,0,1,57);

%nfl(9,5,'NOS','NYJ',20,26,7,7,3,3,0,3,17,3,3,0,16,4,3,3,11,1,3,66,13,1,1,9,59,0,29,32,6,8,0,4,14
,0,0,58,12,2,4,8,62,0,30,28,30,51,382,2,2,2,16,30,51,366,2,2,2,16,6,24,0,4,19,0,13,41,0,9,116,2,5
1,12,4,93,0,60,5,6,70,0,25,10,30,382,2,60,51,0,8,19,115,0,0,2,0,9,20,140,0,0,2,0,18,139,1,9,29,0,
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36,198,2,2,57,0,44,3,2,46,0,25,4,1,19,0,19,3,9,140,0,44,20,0,0,64,36,1,3,4,3,61,22,0,0,0,0,0,2,3,
55,2,2,82,0,2,47,0,61,31,4,7,8,5,134,42,0,0,0,0,0,4,4,47,2,5,222,0,2,51);

%nfl(9,6,'SDC','WAS',24,30,0,14,0,10,0,0,7,7,10,6,20,4,1,3,9,1,1,63,9,2,3,7,63,1,25,58,12,13,2,12
,17,0,0,72,12,4,5,7,65,0,40,3,29,46,341,2,2,1,0,29,46,341,2,2,1,0,7,34,0,7,21,0,16,69,0,8,128,1,2
2,11,9,77,0,20,12,4,56,1,21,6,29,341,2,22,46,0,23,32,291,0,1,0,0,23,32,291,0,1,0,0,25,121,1,2,23,
0,40,209,4,7,172,0,38,11,5,55,0,23,6,4,37,0,14,5,23,291,0,38,32,0,1,85,56,2,5,0,5,114,27,0,0,0,0,
0,1,1,19,3,4,160,0,2,50,0,65,40,0,4,4,5,102,24,0,1,6,6,0,1,3,47,3,3,123,0,1,46);

%nfl(9,7,'ATL','CAR',10,34,0,10,0,0,0,7,7,3,17,0,10,2,0,4,10,0,0,48,12,1,2,7,59,0,23,29,13,9,5,8,
14,1,1,71,10,3,5,2,15,1,36,31,20,27,219,1,3,1,8,20,27,211,1,3,1,8,13,57,0,5,19,0,20,78,0,3,82,0,4
1,5,6,81,1,19,7,6,25,0,11,6,20,219,1,41,27,1,23,37,249,1,2,1,7,23,37,242,1,2,1,7,9,43,0,13,42,0,3
3,131,2,6,74,0,30,9,4,66,1,23,5,4,52,0,23,10,23,249,1,30,36,0,0,77,41,1,3,4,2,59,34,0,1,16,16,0,1
,1,28,1,5,225,0,1,52,1,55,29,1,5,3,0,0,0,0,1,24,24,0,2,2,55,4,3,128,0,2,57);

%nfl(9,8,'PHI','OAK',49,20,7,21,21,0,0,3,10,0,7,0,15,6,0,4,10,0,0,57,14,4,4,7,52,0,22,6,15,12,2,6
,18,0,1,92,15,2,4,8,70,0,37,54,22,28,406,7,0,1,1,24,31,418,7,0,1,1,7,54,0,12,44,0,25,124,0,5,150,
1,59,6,5,139,3,63,6,5,42,1,15,6,24,419,7,63,30,0,22,41,288,0,2,3,25,29,56,350,0,2,3,25,15,102,1,1
0,94,0,33,210,2,5,98,0,66,6,5,82,0,27,11,7,74,0,24,10,29,375,0,66,51,0,0,83,59,4,11,4,2,64,41,0,3
,39,32,0,0,0,0,7,6,259,0,2,64,0,61,46,7,1,1,3,63,22,0,0,0,0,0,2,2,53,2,7,315,1,1,57);

%nfl(9,9,'TBB','SEA',24,27,0,21,3,0,0,0,7,7,10,3,10,11,3,8,15,0,0,65,11,2,3,8,99,0,36,37,11,12,3,
8,12,0,0,61,10,3,6,6,67,0,30,12,17,23,168,2,0,3,25,18,24,145,3,0,3,25,28,158,0,5,20,0,38,205,0,4,
58,1,27,4,4,48,0,19,4,2,29,1,20,3,18,170,3,27,21,0,19,26,217,2,2,0,0,19,26,217,2,2,0,0,21,125,0,8
,37,0,35,198,1,6,75,1,28,10,3,49,0,22,5,2,43,1,27,2,19,217,2,28,26,1,0,71,39,1,4,6,2,43,25,0,1,0,
0,0,1,1,33,3,6,268,1,0,57,0,84,38,2,1,6,3,56,30,0,3,92,71,0,2,2,36,3,2,85,0,2,46);

%nfl(9,10,'BAL','CLE',18,24,3,7,0,8,0,7,7,7,3,0,11,6,1,7,16,1,1,67,12,2,2,9,80,0,29,10,11,4,4,4,1
5,2,2,68,12,2,3,6,55,0,30,50,24,41,250,2,1,5,27,24,41,223,2,1,5,27,3,25,0,11,17,0,21,55,0,5,78,0,
46,8,5,54,2,19,9,2,29,0,23,4,24,250,2,46,41,1,23,35,262,3,0,2,18,24,37,242,3,0,2,18,21,31,0,4,20,
0,29,73,0,7,122,0,46,9,3,44,0,27,7,5,39,0,17,6,24,260,3,46,37,1,0,69,47,4,4,6,2,45,23,0,4,71,36,0
,1,1,51,1,7,298,2,2,55,0,66,40,9,8,8,2,27,22,0,2,14,12,0,1,1,22,3,7,337,1,2,57);

%nfl(9,11,'PIT','NEP',31,55,0,10,14,7,0,7,17,3,28,0,18,6,0,5,13,1,3,73,14,3,4,8,96,0,31,12,17,13,
3,7,12,0,1,71,14,5,8,3,30,0,28,48,28,48,400,4,2,5,29,28,48,371,4,2,5,29,16,74,0,1,30,0,20,108,0,6
,98,0,42,11,7,96,3,20,8,5,71,1,27,9,28,400,4,42,48,1,23,33,432,4,0,3,19,23,33,413,4,0,3,19,26,115
,2,5,47,1,35,197,3,9,143,1,34,10,5,130,2,81,9,4,122,1,57,4,23,432,4,81,33,1,0,81,39,4,0,6,6,129,4
0,0,1,24,24,0,1,1,30,4,3,140,0,0,50,0,64,40,5,6,7,5,89,28,0,2,43,43,0,2,2,32,7,2,101,1,0,54);

%nfl(9,12,'IND','HOU',27,24,0,3,9,15,0,14,7,3,0,0,11,3,3,4,13,0,0,58,12,2,4,3,15,0,23,48,16,6,0,6
,14,0,1,68,12,1,2,5,86,0,36,12,18,40,271,3,0,4,26,18,40,245,3,0,4,26,6,49,0,8,20,0,14,69,0,7,121,
3,58,12,3,64,0,44,5,2,33,0,24,3,18,271,3,58,40,0,20,34,350,3,0,1,10,20,34,340,3,0,1,10,22,81,0,8,
36,0,33,143,0,9,229,3,62,13,3,54,0,31,6,4,46,0,20,6,20,350,3,62,33,0,0,67,56,4,3,6,3,96,39,0,1,34
,34,0,2,3,35,1,5,222,0,2,56,0,43,36,6,5,11,4,104,32,0,2,15,9,0,1,4,43,3,4,164,0,1,57);

%nfl(9,13,'CHI','GBP',27,20,7,10,7,3,0,10,0,10,0,0,15,10,0,6,14,1,1,75,12,2,4,4,45,0,33,9,6,9,2,1
,9,0,0,55,12,1,3,0,0,0,26,51,22,41,272,2,0,1,1,22,41,271,2,0,1,1,24,125,1,7,25,0,33,171,1,7,107,1
,23,13,5,60,1,16,9,5,54,0,33,8,22,272,2,33,40,0,11,19,114,0,1,4,25,12,21,113,0,1,5,28,22,150,1,6,
40,1,29,199,2,4,67,0,27,9,5,34,0,12,7,1,17,0,17,3,12,141,0,27,21,0,0,59,45,5,2,4,4,90,29,0,1,23,2
3,0,2,2,27,3,5,210,0,2,45,0,76,48,3,4,5,3,62,31,0,2,12,12,0,2,2,30,2,6,250,0,4,52);

data sasdat.week9; set week9_game1
week9_game2
week9_game3
week9_game4
week9_game5
week9_game6
week9_game7
week9_game8
week9_game9
week9_game10
week9_game11
week9_game12
week9_game13;
run;

/*  WEEK 10  */

%nfl(10,1,'CAR','SFO',10,9,0,7,0,3,0,3,6,0,0,0,11,4,0,7,17,0,0,66,12,0,0,3,25,0,32,3,3,6,1,2,13,0
,0,52,13,0,1,4,25,0,27,57,16,32,169,0,1,3,28,16,32,141,0,1,3,28,8,46,1,13,41,0,31,109,1,6,63,0,19
,11,4,48,0,17,8,2,19,0,11,4,16,169,0,19,32,1,11,22,91,0,1,6,45,11,22,46,0,1,6,45,16,82,0,4,16,0,2
```

```
4,105,0,3,30,0,14,6,3,23,0,9,5,2,21,0,11,2,11,91,0,14,22,1,0,51,46,9,5,7,2,42,23,0,5,65,25,0,1,2,
53,1,7,320,1,2,65,0,62,54,8,7,5,1,18,18,0,3,35,18,0,3,3,53,0,7,341,0,1,60);

%nfl(10,2,'SEA','ATL',33,10,3,20,3,7,0,0,3,7,0,0,12,12,1,9,15,0,0,69,9,2,2,9,80,0,35,30,9,3,4,4,1
2,1,1,54,10,1,1,1,15,0,24,30,19,26,287,2,0,1,8,19,26,279,2,0,1,8,24,145,1,8,33,0,42,211,1,6,106,1
,46,7,5,76,0,30,8,3,75,1,43,4,19,287,2,46,26,0,23,36,172,1,0,2,10,23,36,162,1,0,2,10,3,31,0,3,15,
0,16,64,0,7,49,0,31,8,5,29,0,12,5,5,28,0,10,7,23,172,1,31,36,1,0,43,37,3,4,4,1,22,22,0,3,55,32,0,
4,4,53,3,2,82,1,1,54,0,81,45,5,3,3,3,64,24,0,0,0,0,0,1,1,53,1,5,267,0,1,59);

%nfl(10,3,'DET','CHI',21,19,7,0,7,7,0,7,0,3,9,0,13,6,2,5,12,0,1,61,12,3,4,5,51,0,28,25,15,1,3,7,1
7,1,2,71,11,1,4,5,39,0,31,35,18,35,219,3,1,0,0,18,35,219,3,1,0,0,14,105,0,10,41,0,26,145,0,6,83,2
,19,17,5,70,0,23,5,2,28,0,17,3,18,219,3,25,35,0,21,40,250,1,1,1,9,27,49,300,2,1,2,12,17,33,0,2,5,
0,20,38,0,7,139,2,44,12,9,114,0,18,18,4,29,0,13,6,27,312,2,44,49,0,0,52,48,5,6,11,3,71,34,0,0,0,0
,0,0,1,0,3,4,178,0,1,59,0,51,37,3,7,0,4,114,39,0,1,16,16,0,2,2,32,1,5,213,0,0,50);

%nfl(10,4,'PHI','GBP',27,13,7,3,17,0,0,0,3,7,3,0,7,11,1,4,11,0,0,58,10,0,4,5,65,0,25,36,13,8,2,7,
16,1,2,75,11,0,4,5,31,0,34,24,12,18,228,3,0,3,17,12,18,211,3,0,3,17,25,155,0,8,38,0,37,204,0,3,10
2,2,45,5,4,80,1,55,5,2,25,0,23,4,12,228,3,55,18,1,24,39,280,1,2,1,8,29,44,297,1,2,1,8,24,73,0,1,1
9,0,30,99,0,8,112,0,36,13,6,56,0,30,10,4,44,0,13,7,29,305,1,36,44,0,0,77,61,4,8,1,2,10,10,0,0,0,0
,0,2,3,41,3,2,77,0,1,43,0,53,49,6,0,2,4,69,27,0,1,2,2,0,2,4,35,1,2,96,0,1,51);

%nfl(10,5,'JAX','TEN',29,27,10,3,7,9,0,0,7,3,17,0,8,4,1,3,12,0,0,56,15,2,3,4,19,1,29,24,13,4,2,10
,18,0,0,70,15,3,6,6,45,0,30,36,14,23,180,0,2,3,20,14,23,160,0,2,3,20,21,41,1,3,11,1,30,54,2,2,42,
0,22,4,2,40,0,23,4,3,39,0,27,6,14,180,0,27,23,0,22,33,264,2,0,1,9,26,42,279,2,1,1,9,12,30,0,9,22,
0,27,83,1,7,78,0,26,9,4,62,1,33,8,2,51,0,40,7,26,288,2,40,42,3,0,70,48,2,6,2,4,120,46,0,2,6,8,0,2
,2,44,3,7,304,1,3,53,0,60,48,7,7,6,4,81,30,0,2,15,11,0,2,2,39,3,5,219,0,1,53);

%nfl(10,6,'STL','IND',38,8,7,21,10,0,0,0,0,8,0,0,7,5,0,7,15,0,1,55,13,1,3,8,46,2,30,38,18,0,3,2,1
2,0,2,69,14,1,5,2,20,0,29,22,9,16,247,2,0,2,15,9,16,232,2,0,2,15,7,72,0,26,62,1,37,140,1,2,138,2,
81,3,2,54,0,35,4,1,18,0,18,1,
9,247,2,81,16,1,29,47,353,1,3,3,33,31,52,288,1,4,3,33,4,17,0,5,2,0,14,18,0,7,130,0,65,8,5,64,1,26
,5,1,57,0,57,1,31,421,1,65,50,1,0,62,42,4,12,7,1,27,27,0,4,145,98,1,1,1,32,5,5,242,0,1,61,0,59,41
,6,1,2,4,60,20,0,3,25,17,0,0,0,0,0,6,298,0,0,58);

%nfl(10,7,'OAK','NYG',20,24,10,7,3,0,0,7,7,7,3,0,4,8,0,2,12,0,0,55,11,1,3,8,65,1,27,58,8,9,2,7,14
,0,0,63,11,2,3,1,5,1,32,2,11,26,122,0,1,4,16,11,26,106,0,1,4,16,20,88,0,5,19,1,25,107,1,3,45,0,23
,9,3,30,0,16,3,2,22,0,16,2,11,122,0,23,24,1,12,22,140,1,1,3,22,12,22,118,1,1,3,22,30,115,1,5,21,0
,38,133,1,3,50,1,25,3,4,49,0,25,4,3,37,0,15,10,12,140,1,25,22,2,1,75,55,7,2,5,2,77,41,0,1,-
1,0,0,2,2,33,2,6,254,0,3,61,0,63,44,5,5,4,1,19,19,0,3,30,12,0,1,1,23,3,4,121,0,0,51);

%nfl(10,8,'BUF','PIT',10,23,3,0,0,7,0,0,10,7,6,0,9,4,3,3,14,1,1,64,13,1,2,4,28,0,24,44,9,8,2,8,17
,0,0,67,12,2,5,6,42,0,35,16,22,39,155,1,1,3,23,22,39,132,1,1,3,23,12,55,0,8,23,0,22,95,0,3,48,0,2
3,10,4,25,1,9,6,3,21,0,8,3,22,155,1,23,37,0,18,30,204,1,1,4,40,18,30,164,1,1,4,40,22,57,1,6,38,0,
33,136,1,6,104,0,40,11,3,39,0,34,3,2,31,1,26,2,18,204,1,40,30,0,0,68,50,9,2,3,1,18,18,0,4,13,7,0,
1,1,20,1,9,332,2,3,56,0,62,46,5,6,3,1,1,1,0,2,74,50,0,3,3,37,2,5,195,0,1,46);

%nfl(10,9,'CIN','BAL',17,20,0,0,3,14,0,10,7,0,0,3,13,7,1,5,19,3,5,87,16,1,2,9,134,0,37,58,11,1,6,
3,16,0,0,71,15,2,3,8,65,0,31,35,24,51,274,2,3,5,30,24,51,244,2,3,5,30,14,58,0,9,36,0,31,120,0,8,1
51,1,51,15,3,55,0,40,10,8,37,1,18,8,24,274,2,51,50,0,20,36,140,2,2,5,36,20,36,104,2,2,5,36,8,31,0
,18,30,0,30,85,0,5,46,1,18,14,3,28,0,14,4,6,26,0,13,6,20,140,2,18,36,1,0,77,45,5,10,6,2,50,26,0,6
,62,15,0,1,2,32,2,6,223,0,0,49,0,84,50,10,17,8,2,41,26,0,3,17,10,0,2,2,46,2,8,355,0,3,55);

%nfl(10,10,'HOU','ARI',24,27,7,10,0,7,0,7,7,6,7,0,15,2,0,6,16,0,1,67,14,3,3,7,53,0,28,52,12,6,1,3
,10,0,0,62,13,2,4,6,29,1,31,8,22,43,201,3,0,3,42,22,43,159,3,0,3,42,15,56,0,2,13,0,21,76,0,6,69,0
,22,11,5,37,2,14,12,3,34,0,12,6,22,201,3,22,41,1,20,32,241,2,1,1,6,20,32,241,2,1,1,6,11,55,0,13,4
2,0,29,97,0,5,72,1,19,8,4,57,1,26,5,2,31,0,20,2,20,247,2,46,31,2,0,62,50,1,5,8,5,118,31,0,2,12,12
,0,1,2,48,3,7,412,0,2,65,0,61,46,5,6,10,2,38,23,0,6,74,22,0,2,2,35,3,5,219,0,3,57);

%nfl(10,11,'DEN','SDC',28,20,7,14,7,0,0,0,6,7,7,0,17,5,0,3,8,0,0,60,11,2,2,3,28,0,21,57,11,7,2,7,
16,1,1,68,11,2,4,6,40,0,38,3,25,36,330,4,0,2,17,25,36,313,4,0,2,17,15,65,0,5,20,0,22,84,0,7,108,3
,34,10,3,96,1,74,5,3,52,0,34,5,25,330,4,74,36,1,19,29,218,1,0,4,20,19,29,198,1,0,4,20,14,59,1,9,3
6,0,35,131,1,4,62,0,24,8,4,41,0,18,5,2,36,0,30,4,19,218,1,30,29,0,0,71,56,7,7,5,4,103,30,0,2,6,6,
0,0,0,0,4,5,233,1,0,59,0,61,47,2,2,5,0,0,0,0,0,0,0,0,2,3,40,2,5,238,0,4,61);

%nfl(10,12,'DAL','NOS',17,49,3,7,7,0,0,7,21,7,14,0,4,4,1,0,9,0,0,43,10,1,2,11,82,0,20,28,20,15,5,
9,12,1,1,80,11,4,5,6,44,0,39,32,10,24,128,1,0,3,24,10,24,104,1,0,3,24,16,89,1,0,0,0,16,89,1,1,44,
0,44,2,2,27,0,19,6,1,21,1,21,5,10,128,1,44,23,0,34,41,392,4,0,1,9,34,41,383,4,0,1,9,14,145,1,17,8
7,1,38,242,3,7,107,1,22,8,7,76,1,28,7,3,75,1,52,4,34,392,4,52,40,1,0,78,54,4,4,3,6,132,34,0,0,0,0
,0,1,1,37,2,8,403,0,4,56,0,37,31,6,8,4,0,0,0,0,4,18,12,0,0,1,0,7,1,33,0,1,33);
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%nfl(10,13,'WAS','MIN',27,34,10,14,3,0,0,7,7,14,6,0,17,9,1,9,16,1,2,77,10,3,5,8,63,0,36,1,14,6,2,
6,10,0,0,52,10,3,3,1,7,0,23,59,24,37,281,3,0,4,39,24,37,242,3,0,4,39,26,139,0,7,44,0,36,191,0,7,1
19,1,32,10,6,62,1,17,9,5,61,0,29,5,24,281,3,32,36,0,17,21,174,2,1,1,5,21,27,216,2,1,1,5,20,75,2,2
,13,0,24,91,2,7,98,1,28,7,4,45,0,25,6,2,34,0,28,3,21,221,2,28,27,0,0,59,37,5,3,3,3,74,25,0,1,0,0,
0,2,2,40,3,3,135,0,0,56,0,93,33,3,2,8,6,98,23,0,2,34,20,0,2,2,40,4,1,50,0,0,50);

%nfl(10,14,'MIA','TBB',19,22,0,7,12,0,0,10,5,0,7,0,14,1,1,4,12,0,1,58,11,2,3,4,70,0,25,12,9,7,2,3
,12,0,0,60,12,2,4,9,70,0,34,48,27,42,229,2,1,2,18,27,42,211,2,1,2,18,7,2,0,1,2,0,14,2,0,11,120,2,
19,14,5,57,0,19,8,4,21,0,14,8,27,229,2,19,42,0,11,21,139,1,1,2,15,11,21,124,1,1,2,15,20,57,0,8,45
,1,37,140,1,3,64,0,30,5,3,28,0,14,8,1,19,0,19,1,11,139,1,30,21,0,0,59,51,7,5,3,2,30,20,0,1,34,34,
0,2,2,40,1,5,257,0,2,55,0,55,44,9,4,8,3,57,25,0,2,72,52,0,2,2,35,2,5,212,0,3,62);

data sasdat.week10; set week10_game1
week10_game2
week10_game3
week10_game4
week10_game5
week10_game6
week10_game7
week10_game8
week10_game9
week10_game10
week10_game11
week10_game12
week10_game13
week10_game14;
run;

/* WEEK 11 */

%nfl(11,1,'SFO','NOS',20,23,0,10,7,3,0,7,7,0,9,0,8,3,1,6,15,0,0,56,10,2,3,5,45,0,25,21,15,6,2,6,1
4,0,1,67,12,2,5,4,48,0,34,39,17,31,127,2,1,3,12,17,31,115,2,1,3,12,13,48,0,3,25,0,22,81,0,6,56,1,
14,9,4,33,1,17,5,1,10,0,10,2,17,127,2,17,29,0,30,43,305,1,1,1,10,30,43,295,1,1,1,10,11,49,0,6,25,
0,23,92,1,5,80,0,26,7,2,78,0,44,2,6,41,0,13,11,30,305,1,44,41,2,0,59,49,3,5,2,0,0,0,0,2,23,12,0,2
,2,55,2,7,346,0,3,55,0,53,37,5,8,7,1,82,82,0,3,5,5,0,3,3,42,2,3,154,0,1,59);


%nfl(11,2,'NYJ','BUF',14,37,0,0,7,7,0,0,20,14,3,0,6,5,1,2,11,1,2,56,14,2,3,4,24,0,26,18,9,5,0,8,1
9,1,1,67,14,1,1,8,64,1,33,42,8,23,103,0,3,4,30,12,29,133,1,3,4,30,15,98,1,5,27,0,23,134,1,2,71,0,
38,8,2,32,0,25,2,3,25,1,13,4,12,163,1,38,29,1,20,28,245,2,0,1,0,20,28,245,2,0,1,0,12,34,0,1,17,0,
38,68,1,6,81,1,43,9,2,74,1,40,4,2,40,0,31,3,20,245,2,43,28,0,0,98,59,5,4,4,5,115,35,0,1,16,16,0,0
,1,0,2,6,284,1,1,56,1,67,42,6,8,8,1,26,26,0,4,17,12,0,3,3,43,4,6,200,0,3,57);


%nfl(11,3,'BAL','CHI',20,23,10,7,0,3,0,0,13,0,7,3,10,9,4,8,18,1,2,75,11,2,3,5,46,0,35,41,10,5,3,5
,13,0,0,59,12,1,4,13,111,1,30,38,17,31,162,1,2,3,19,17,31,143,1,2,3,19,25,131,1,4,20,0,41,174,1,3
,37,0,16,5,5,32,1,13,8,2,31,0,17,4,17,162,1,17,31,0,19,31,216,1,0,2,1,19,31,215,1,0,2,1,18,83,0,3
,17,0,26,104,0,7,83,0,18,11,2,48,0,43,2,5,42,1,14,6,19,216,1,43,31,0,0,52,46,4,4,3,4,47,34,0,2,7,
4,0,2,2,52,2,4,177,1,0,51,1,70,56,9,4,2,3,32,28,0,1,0,0,0,3,3,46,2,6,232,0,2,51);

%nfl(11,4,'CLE','CIN',20,41,13,0,7,0,0,0,31,0,10,0,10,3,2,4,18,1,4,79,17,0,3,5,40,1,32,24,5,4,1,1
,14,0,0,59,18,2,3,8,64,2,27,36,27,56,248,1,3,4,20,27,56,228,1,3,4,20,8,69,0,4,20,0,19,102,0,5,125
,1,74,15,5,41,0,11,5,6,30,0,12,12,27,248,1,74,55,1,13,27,93,3,2,0,0,14,28,118,3,2,0,0,16,62,0,10,
45,0,31,106,0,4,41,0,25,5,2,27,1,25,6,1,15,0,15,1,14,118,3,25,27,0,1,62,24,1,4,1,2,42,25,0,3,25,1
1,0,2,2,28,2,6,231,0,0,52,0,72,43,6,15,10,0,0,0,0,3,39,27,0,2,2,41,5,9,408,1,3,66);

%nfl(11,5,'WAS','PHI',16,24,0,0,0,16,0,7,10,7,0,0,10,11,2,8,17,0,1,77,12,0,2,4,39,0,33,42,11,8,3,
4,13,1,2,62,12,3,4,9,68,0,26,18,17,35,264,2,1,4,28,17,35,236,2,1,4,28,22,93,0,10,44,0,38,191,0,6,
68,0,21,10,1,62,1,62,2,2,60,1,41,3,17,264,2,62,33,1,17,26,298,0,0,3,22,17,26,276,0,0,3,22,20,77,2
,9,47,1,33,126,3,4,82,0,26,4,4,73,0,49,4,1,42,0,42,1,17,298,0,49,25,0,0,54,52,8,1,4,1,23,23,0,1,0
,0,0,0,0,0,0,6,223,0,2,47,0,62,52,8,7,3,2,23,18,0,2,6,6,0,1,1,24,3,6,304,0,4,70);

%nfl(11,6,'DET','PIT',27,37,0,27,0,0,0,14,6,3,14,0,14,6,1,6,16,1,4,73,13,2,5,8,45,0,27,44,18,4,2,
6,16,1,1,73,14,1,4,4,23,0,32,16,19,46,362,2,1,2,18,19,46,344,2,1,2,18,9,49,1,12,31,0,25,107,1,6,1
79,2,79,13,3,48,0,37,4,3,42,0,25,9,19,362,2,79,45,2,29,45,367,4,0,1,9,29,45,358,4,0,1,9,18,36,0,6
,12,0,27,40,0,7,147,2,47,13,8,67,0,21,10,4,52,0,43,5,29,367,4,47,45,0,0,68,44,7,6,1,4,92,36,0,4,1
7,13,0,2,2,35,3,3,152,0,0,59,0,60,44,3,11,5,1,21,21,0,2,17,9,0,3,3,34,4,5,219,0,2,70);

%nfl(11,7,'ATL','TBB',28,41,0,6,7,15,0,3,21,14,3,0,10,7,7,1,7,1,2,66,12,1,2,7,45,0,26,46,11,10,3,
3,11,1,2,65,13,3,4,11,121,1,33,14,19,36,254,2,2,3,20,24,43,268,2,2,3,20,2,88,1,11,41,0,20,152,1,6
,134,1,80,9,7,63,0,18,9,3,36,1,16,9,24,288,2,80,43,1,20,23,231,2,0,2,7,20,25,224,2,0,2,7,30,163,2
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,4,16,0,38,186,2,10,165,1,53,12,4,21,0,7,5,1,20,0,20,1,20,231,2,53,25,0,0,70,60,4,1,2,0,0,0,0,2,1
6,12,0,2,2,49,2,1,24,0,1,24,1,63,46,6,8,8,3,61,26,0,0,0,0,0,2,3,46,5,4,168,1,2,46);

%nfl(11,8,'ARI','JAX',27,14,7,7,10,3,0,14,0,0,0,0,16,3,0,5,16,0,0,69,14,2,4,5,42,0,35,53,9,3,2,2,
14,2,3,60,14,1,1,6,40,0,24,7,30,42,419,2,0,3,17,30,42,402,2,0,3,17,12,14,1,9,3,0,24,14,1,6,193,1,
91,10,6,70,0,21,9,6,61,1,17,9,30,419,2,91,41,0,17,42,255,1,2,2,13,27,42,242,1,2,2,13,14,23,1,2,9,
0,16,32,1,1,62,1,62,1,8,61,0,29,10,3,32,0,21,5,27,255,1,62,42,0,0,53,53,4,8,4,0,0,0,0,4,22,10,0,2
,2,32,3,8,358,0,1,58,0,54,48,8,6,7,4,144,59,0,6,48,14,0,0,1,0,2,8,382,0,6,58);

%nfl(11,9,'OAK','HOU',28,23,14,0,14,0,0,0,17,0,6,0,8,4,0,5,18,0,0,65,18,3,3,8,77,0,31,31,10,3,1,2
,16,0,1,72,17,0,3,9,50,1,28,29,18,32,197,3,0,2,21,18,32,176,3,0,2,21,22,150,1,1,8,0,31,165,1,6,84
,1,36,8,5,54,1,26,6,1,33,0,33,3,18,197,3,36,32,0,13,24,170,1,1,2,21,25,49,304,1,1,2,21,19,88,0,2,
2,0,21,90,0,7,136,1,42,13,10,116,0,34,17,2,32,0,23,5,25,325,1,42,48,1,0,64,53,7,5,7,3,77,29,0,4,3
0,12,0,0,1,0,4,11,540,0,4,64,0,62,47,4,3,7,3,65,36,0,7,125,87,1,3,3,51,2,9,442,2,2,60);

%nfl(11,10,'SDC','MIA',16,20,7,3,3,3,0,3,7,7,3,0,14,7,1,4,11,0,0,63,10,1,3,10,76,0,31,24,15,5,1,2
,10,0,0,58,10,1,3,3,15,0,28,36,22,34,298,1,1,3,17,22,34,281,1,1,3,17,19,127,0,5,21,0,26,154,0,4,8
1,0,35,5,4,52,1,27,6,3,45,0,17,6,22,298,1,35,33,0,22,35,268,1,1,4,29,22,35,239,1,1,4,29,10,57,1,4
,21,0,19,104,1,6,90,1,39,7,5,65,0,16,13,4,52,0,29,6,22,268,1,39,35,0,0,47,43,7,5,3,2,43,22,0,3,46
,21,0,3,3,50,1,4,174,1,2,49,0,58,52,4,6,6,2,48,25,0,0,0,0,0,2,2,37,2,4,209,0,2,61);

%nfl(11,11,'GBP','NYG',13,27,0,6,0,7,0,7,3,10,7,0,13,3,0,2,8,0,1,54,13,1,2,5,38,0,24,46,9,8,2,4,1
4,2,2,63,10,1,3,3,30,1,35,14,24,34,339,0,3,0,0,24,34,339,0,3,0,0,14,27,1,1,12,0,20,55,1,8,117,0,2
9,9,6,91,0,52,8,2,55,0,45,6,24,339,0,52,32,0,25,35,279,1,1,4,23,25,35,256,1,1,4,23,18,66,0,5,9,1,
24,78,1,8,110,0,30,11,4,50,0,35,5,3,37,1,26,3,25,279,1,35,35,0,0,79,56,8,4,6,3,69,27,0,3,34,14,0,
2,2,57,1,4,180,0,1,52,1,68,50,5,4,5,2,35,23,0,1,32,32,0,2,2,40,3,5,265,1,1,61);

%nfl(11,12,'MIN','SEA',20,41,3,10,0,7,0,10,14,0,17,0,10,6,3,5,14,0,1,70,14,0,2,4,20,0,34,9,9,7,0,
4,11,0,0,50,12,4,5,7,96,1,25,51,13,22,129,1,2,2,3,18,35,204,2,3,2,3,7,67,0,21,65,0,33,132,0,5,69,
0,30,7,3,69,2,38,4,3,28,0,15,9,18,207,2,38,34,1,13,18,230,2,0,1,6,14,21,230,2,0,1,6,17,54,2,1,17,
0,28,93,2,4,69,0,34,5,2,63,1,44,2,1,27,0,27,1,14,236,2,44,20,0,0,70,36,5,3,4,5,117,35,0,0,0,0,0,2
,2,45,2,3,127,0,1,43,1,72,40,5,7,3,5,100,58,0,3,17,11,0,2,2,50,5,5,208,0,1,46);

%nfl(11,13,'KCC','DEN',17,27,0,10,0,7,0,10,7,7,3,0,14,5,5,4,13,0,1,73,14,2,4,9,53,0,30,7,15,6,3,6
,16,0,0,76,13,3,4,13,82,0,29,53,21,45,230,2,0,3,30,21,45,200,2,0,3,30,16,78,0,5,52,0,25,144,0,4,5
7,1,26,14,5,53,0,18,8,2,40,0,21,3,21,230,2,26,44,1,24,40,323,1,0,0,0,24,40,323,1,0,0,0,27,79,0,8,
25,2,36,104,2,5,121,0,70,13,8,72,0,20,10,5,71,0,33,6,24,323,1,70,40,1,0,64,58,3,4,0,1,23,23,0,5,3
3,13,0,1,1,20,2,7,358,3,1,60,0,61,41,4,10,5,1,28,28,0,3,17,12,0,2,3,54,3,6,275,0,1,54);

%nfl(11,14,'IND','TEN',30,27,0,6,17,7,0,14,3,0,10,0,12,10,2,6,13,0,0,69,11,3,4,5,51,0,32,23,10,7,
3,6,11,0,0,54,8,2,3,4,34,0,27,37,23,36,232,0,0,1,3,23,36,229,0,0,1,3,14,80,2,9,31,1,32,137,3,8,10
7,0,39,10,5,44,0,17,9,5,31,0,14,5,23,232,0,39,36,0,22,28,222,1,0,2,4,22,28,218,1,0,2,4,17,86,2,4,
26,0,24,122,2,10,91,1,19,10,9,80,0,17,12,2,53,0,42,3,22,222,1,42,28,1,0,51,45,6,3,5,4,76,27,0,2,1
5,16,0,3,3,50,3,3,111,1,1,43,0,64,50,2,4,4,3,63,23,0,1,4,4,0,2,2,38,3,3,117,0,0,48);

%nfl(11,15,'NEP','CAR',20,24,0,3,7,10,0,7,3,7,7,0,17,6,5,5,10,1,1,67,7,2,5,5,50,0,30,46,11,6,3,8,
11,0,0,54,7,2,2,7,47,0,29,14,29,40,296,1,1,2,13,29,40,283,1,1,2,13,10,49,0,13,48,1,25,107,1,8,65,
0,17,11,2,60,0,37,2,5,59,1,23,7,29,296,1,37,40,1,19,28,209,3,0,3,12,19,28,197,3,0,3,12,7,62,0,6,1
7,0,23,103,0,4,62,0,42,6,7,59,1,17,8,5,52,1,15,8,19,209,3,42,28,0,0,49,39,3,4,2,0,0,0,0,1,13,13,0
,2,2,42,2,1,34,0,1,34,0,69,39,3,3,6,3,53,19,0,0,0,0,0,1,1,43,3,2,87,0,0,50);

data sasdat.week11; set week11_game1
week11_game2
week11_game3
week11_game4
week11_game5
week11_game6
week11_game7
week11_game8
week11_game9
week11_game10
week11_game11
week11_game12
week11_game13
week11_game14
week11_game15;
run;

/*   WEEK 12   */
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```
%nfl(12,1,'SFO','WAS',27,6,7,3,14,3,0,0,6,0,0,0,12,3,0,4,14,1,2,59,12,3,4,4,25,0,31,26,5,5,0,4,15
,0,2,58,13,0,2,4,30,0,28,34,15,24,235,3,0,2,7,15,24,228,3,0,2,7,13,31,0,9,20,0,33,76,0,5,94,2,32,
6,4,70,1,40,7,4,45,0,13,7,15,235,3,40,24,1,16,26,118,0,1,6,42,16,26,76,0,1,6,42,14,52,0,4,27,0,26
,114,0,8,48,0,10,11,4,36,0,18,5,3,27,0,18,4,16,118,0,18,26,0,0,76,50,7,4,9,2,53,32,0,5,72,40,0,2,
2,49,3,4,196,1,1,58,0,69,41,6,4,2,6,102,20,0,1,13,13,0,2,2,36,0,7,315,0,0,51);

%nfl(12,2,'NOS','ATL',17,13,7,7,3,0,0,7,6,0,0,0,14,5,0,7,13,0,1,59,9,1,2,5,66,0,26,14,15,5,2,6,12
,0,0,66,9,1,2,3,25,0,33,46,23,33,278,2,0,1,7,23,33,271,2,0,1,7,10,73,0,9,32,0,25,103,0,5,100,1,44
,7,5,57,0,18,6,4,40,0,14,6,23,278,2,44,33,0,30,39,292,0,0,5,28,30,39,264,0,0,5,28,16,63,1,1,11,0,
22,91,1,9,79,0,15,11,6,67,0,17,8,4,43,0,17,6,30,292,0,22,38,1,0,78,32,3,3,10,1,20,20,0,1,0,0,0,1,
1,41,2,4,198,1,1,56,0,59,35,2,4,4,0,0,0,0,1,10,10,0,2,3,39,1,3,136,0,1,50);

%nfl(12,3,'PIT','CLE',27,11,3,10,7,7,0,3,0,0,8,0,12,7,0,4,14,0,1,68,13,1,2,2,8,1,33,39,15,4,0,6,1
7,1,2,73,14,1,1,2,10,0,26,21,22,34,217,2,0,0,0,22,34,217,2,0,0,0,23,80,0,2,9,0,34,85,0,6,92,1,41,
10,6,52,1,14,7,5,41,0,13,6,22,217,2,41,33,0,13,30,209,1,1,3,6,27,52,312,1,1,5,21,4,26,0,6,16,0,16
,55,0,14,237,1,47,17,3,32,0,16,10,5,27,0,8,8,27,333,1,47,52,3,1,55,43,2,3,9,2,47,28,0,2,19,14,0,2
,2,47,3,7,258,1,5,43,0,76,42,3,5,2,5,91,32,0,1,6,6,0,1,2,49,0,5,195,0,2,48);

%nfl(12,4,'TBB','DET',24,21,3,14,0,7,0,0,14,7,0,0,7,1,2,4,14,0,0,49,12,1,2,9,67,1,26,38,16,4,5,8,
15,1,1,72,12,3,3,5,39,0,33,22,14,21,247,2,0,4,40,14,21,207,2,0,4,40,18,35,0,1,3,0,24,22,0,3,108,2
,85,5,8,75,0,16,9,2,61,0,47,3,14,247,2,85,20,0,26,46,297,3,4,2,11,26,46,286,3,4,2,11,15,83,0,6,15
,0,24,104,0,7,115,0,21,14,7,77,1,28,10,3,16,0,19,6,26,297,3,28,46,1,1,60,46,6,9,4,2,83,44,0,2,19,
17,0,1,3,38,3,5,218,0,0,56,0,53,37,7,3,6,2,49,26,0,2,42,42,0,0,0,0,3,3,151,0,1,56);

%nfl(12,5,'MIN','GBP',26,26,3,10,7,3,3,7,0,0,16,3,13,13,2,6,16,0,0,79,14,2,5,5,53,0,40,33,16,11,3
,3,16,2,2,89,15,3,5,7,50,0,34,27,21,30,233,1,0,6,18,21,30,215,1,0,6,18,32,146,1,8,91,0,43,232,1,8
,54,0,21,11,2,54,0,31,4,3,36,0,15,5,21,233,1,31,30,1,21,36,218,1,0,0,0,28,53,298,1,0,2,18,25,110,
1,3,37,0,34,196,2,7,80,0,28,12,5,60,1,34,10,4,58,0,34,7,28,316,1,34,49,0,0,81,64,4,9,7,5,143,57,0
,2,0,0,0,4,4,47,2,6,257,0,3,50,0,89,66,13,2,7,3,63,22,0,3,8,8,0,2,2,27,2,8,326,0,3,48);

%nfl(12,6,'SDC','KCC',41,38,3,7,14,17,0,7,7,14,10,0,16,7,1,7,15,1,1,67,12,3,5,9,97,0,30,57,16,6,4
,3,9,0,0,59,13,4,5,7,62,0,29,3,27,39,392,3,0,1,5,27,39,387,3,0,1,5,14,55,1,6,25,1,27,104,2,9,124,
0,29,12,4,87,0,54,4,3,80,1,60,5,27,392,3,60,39,0,26,38,294,3,1,3,13,26,38,281,3,1,3,13,14,115,2,1
,3,0,18,114,2,4,91,1,36,5,7,59,0,17,10,5,51,1,22,6,26,294,3,36,36,1,0,52,52,6,6,4,5,137,37,0,1,5,
5,0,2,2,30,5,5,200,0,1,48,0,60,54,4,5,4,8,199,38,0,4,34,18,0,1,1,25,5,4,178,0,1,48);

%nfl(12,7,'CHI','STL',21,42,7,7,0,7,0,21,3,3,15,0,19,7,4,6,10,0,1,74,11,3,4,10,84,0,36,9,8,11,1,4
,10,0,0,53,10,3,5,6,39,1,23,51,36,47,352,2,1,1,8,36,47,344,2,1,1,8,16,77,0,2,4,0,26,80,1,10,117,1
,23,12,4,62,1,37,5,8,58,0,17,8,36,352,2,37,46,2,10,22,167,1,0,2,19,10,22,148,1,0,2,19,13,109,1,12
,87,1,29,258,3,4,80,1,29,5,2,39,0,32,5,2,19,0,16,2,10,167,1,32,22,0,0,38,38,2,1,3,4,90,26,0,1,0,0
,0,0,0,0,3,3,121,0,2,44,0,66,62,5,8,5,1,24,24,0,1,1,1,0,2,2,40,4,2,97,0,0,51);

%nfl(12,8,'CAR','MIA',20,16,3,3,7,7,0,7,9,0,0,0,10,9,1,6,17,2,2,69,14,2,3,8,56,0,30,12,12,1,0,4,1
6,0,0,62,13,0,2,6,55,0,29,48,19,38,174,1,1,2,15,19,38,159,1,1,2,15,7,51,1,10,31,0,28,136,1,5,69,0
,19,8,2,36,0,29,5,5,34,1,12,9,19,174,1,29,37,0,28,42,310,1,1,3,30,28,42,280,1,1,3,30,4,36,0,10,8,
0,17,50,0,5,127,1,57,10,5,78,0,26,5,4,39,0,18,4,28,310,1,57,41,0,0,58,54,5,4,8,1,17,17,0,1,41,41,
0,2,3,52,2,7,397,0,0,72,0,50,46,5,9,4,3,59,25,0,7,71,20,0,3,4,47,1,6,291,1,4,64);

%nfl(12,9,'NYJ','BAL',3,19,3,0,0,0,0,3,6,10,0,0,8,4,0,1,12,0,0,55,13,0,1,6,56,0,25,55,9,5,1,3,13,
0,0,62,13,0,4,5,41,0,34,5,9,22,127,0,2,3,22,10,24,118,0,2,3,22,11,41,0,9,35,0,28,102,0,2,48,0,30,
3,2,34,0,19,4,3,24,0,11,4,10,140,0,30,24,1,17,26,273,1,1,4,28,17,27,245,1,1,4,28,16,30,0,11,30,0,
31,67,0,4,103,1,66,6,2,74,0,60,4,3,55,0,27,5,17,273,1,66,27,0,0,73,47,7,5,5,5,102,28,0,2,26,16,0,
1,1,27,0,8,411,0,3,67,0,55,39,4,8,4,2,38,22,0,5,108,37,0,4,4,53,1,6,273,1,3,64);

%nfl(12,10,'JAX','HOU',13,6,7,3,0,3,0,0,3,3,0,0,11,4,1,7,17,1,1,65,12,1,2,7,63,0,33,41,5,5,1,4,15
,0,1,57,11,0,1,2,22,0,26,19,23,32,239,0,0,4,24,23,33,215,0,0,4,24,14,84,1,11,31,0,28,118,1,8,71,0
,16,11,4,61,0,51,5,6,60,0,15,6,23,239,0,51,32,0,18,34,169,0,1,2,28,18,34,141,0,1,2,28,13,74,0,1,2
,0,21,77,0,1,37,0,37,2,2,36,0,21,6,5,35,0,8,9,18,169,0,37,32,0,0,59,44,4,9,5,1,27,27,0,3,14,10,0,
2,3,53,7,6,259,2,2,59,0,71,52,6,5,13,3,60,24,0,3,19,12,0,2,2,49,0,7,314,0,1,53);

%nfl(12,11,'TEN','OAK',23,19,3,3,7,10,0,3,6,3,7,0,16,4,2,10,18,0,0,73,10,1,4,10,100,0,35,48,14,4,
1,3,10,0,0,55,11,0,2,4,50,0,24,12,30,42,320,2,0,2,8,30,42,312,2,0,2,8,20,73,0,5,26,0,29,114,0,6,1
09,1,54,6,6,103,1,31,7,5,46,0,14,9,30,320,2,54,40,0,19,32,260,1,1,0,0,19,32,260,1,1,0,0,16,73,0,5
,14,0,23,93,0,5,93,0,23,9,4,49,0,21,5,4,44,1,27,5,19,260,1,27,32,1,0,58,40,2,6,0,2,31,20,0,1,0,0,
0,3,3,33,2,5,163,0,1,49,0,78,57,2,1,5,5,108,31,0,2,18,12,0,4,6,52,1,2,95,0,0,54);

%nfl(12,12,'IND','ARI',11,40,3,0,0,8,0,7,20,7,6,0,9,4,2,5,13,0,2,55,11,1,2,6,89,0,23,11,18,5,4,7,
14,0,0,71,11,2,5,9,84,1,36,49,20,39,163,1,1,1,4,20,39,159,1,1,1,4,4,33,0,2,31,0,15,80,0,4,55,1,17
,8,5,38,0,12,9,3,35,0,14,5,20,163,1,17,38,0,26,37,314,2,0,3,24,26,38,290,2,0,3,24,13,54,1,10,50,0
,30,120,1,7,104,0,29,7,5,52,2,26,11,4,51,0,20,5,26,314,2,32,37,0,0,67,54,6,5,6,4,115,35,0,0,0,0,0
,1,1,27,3,5,223,0,0,54,1,44,34,1,8,8,0,0,0,0,3,23,12,0,4,5,50,4,2,72,0,2,37);
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%nfl(12,13,'DAL','NYG',24,21,7,7,7,3,0,0,6,7,8,0,15,4,5,4,11,0,0,62,12,1,2,11,85,1,29,21,8,11,3,3
,12,1,2,62,12,1,3,11,81,0,30,39,23,38,234,2,1,4,30,23,38,204,2,1,4,30,14,86,0,3,20,0,20,107,0,9,8
6,0,24,16,3,40,0,22,3,4,37,2,20,7,23,234,2,24,38,0,16,60,174,2,0,2,20,16,30,154,2,0,2,20,21,127,0
,9,75,0,30,202,0,3,64,0,22,7,3,39,1,27,5,2,27,0,22,4,16,174,2,27,30,1,0,70,52,4,3,3,3,65,25,0,4,1
5,10,0,1,1,35,3,7,313,1,3,51,0,65,50,4,7,5,4,85,30,0,1,16,16,0,2,2,23,1,5,273,0,2,68);

%nfl(12,14,'DEN','NEP',31,34,17,7,0,7,0,0,0,21,10,3,11,15,2,9,18,0,0,86,14,3,4,9,85,1,38,58,21,3,
3,6,14,0,1,84,16,4,6,5,36,0,34,6,19,36,150,2,1,2,18,19,36,132,2,1,2,18,37,224,1,7,40,0,48,280,1,5
,47,1,12,5,4,41,1,15,9,4,31,0,17,8,19,150,2,31,34,3,34,50,344,3,0,3,20,34,50,324,3,0,3,20,13,58,1
,10,31,0,31,116,1,9,110,2,43,11,7,90,1,33,10,8,60,0,14,11,34,344,3,43,48,3,0,92,54,4,2,5,3,36,12,
0,4,13,12,0,1,1,27,4,8,325,0,4,49,0,96,44,4,3,4,3,51,22,0,3,39,20,0,2,2,31,4,6,267,1,2,52);

data sasdat.week12; set week12_game1
week12_game2
week12_game3
week12_game4
week12_game5
week12_game6
week12_game7
week12_game8
week12_game9
week12_game10
week12_game11
week12_game12
week12_game13
week12_game14;
run;

/*  WEEK 13  */

%nfl(13,1,'STL','SFO',13,23,0,3,3,7,0,3,10,3,7,0,13,5,1,4,13,0,2,67,11,1,3,11,105,0,26,56,12,2,6,
4,12,0,0,62,12,2,4,9,85,0,33,4,19,37,218,1,1,3,20,19,38,198,1,1,3,20,19,72,0,3,21,0,26,114,0,3,49
,0,20,6,3,46,0,17,4,3,41,1,29,4,19,218,1,29,38,0,19,28,275,1,0,4,20,19,28,255,1,0,4,20,15,42,1,4,
21,0,30,83,1,9,98,0,21,13,4,82,1,23,5,2,68,0,60,4,19,275,1,60,28,1,0,66,53,11,5,4,4,67,20,0,1,10,
10,0,2,2,43,1,5,244,0,1,54,0,63,53,5,3,7,1,24,24,0,2,5,5,0,3,3,43,2,4,191,0,2,55);

%nfl(13,2,'JAX','CLE',32,28,7,13,0,12,0,7,7,7,7,0,13,7,2,7,16,0,0,72,15,2,4,5,35,0,30,35,13,9,2,6
,13,1,1,73,14,2,2,9,50,0,29,25,22,40,195,2,1,2,1,23,41,202,3,1,2,1,23,77,0,5,31,0,29,112,0,8,67,0
,25,11,6,64,1,20,11,3,26,1,14,4,23,203,3,25,41,0,24,40,370,3,2,3,28,24,40,342,3,2,3,28,14,57,1,7,
20,0,30,97,1,10,261,2,95,15,4,43,0,26,7,3,28,0,13,5,24,370,3,95,39,1,0,63,49,4,7,6,3,81,31,0,0,0,
0,0,3,3,44,3,7,306,1,4,58,0,65,47,3,6,5,1,10,10,0,3,49,38,0,0,1,0,4,4,158,1,1,55);

%nfl(13,3,'TEN','IND',14,22,0,7,7,0,0,6,6,3,7,0,11,10,3,6,15,1,1,74,12,2,2,6,74,0,33,55,8,7,3,3,1
4,1,1,62,14,1,2,7,50,0,26,5,21,37,201,1,3,1,16,21,37,185,1,3,1,16,18,69,0,8,54,1,36,162,1,5,81,0,
31,6,6,77,0,35,11,6,32,1,11,7,21,201,1,35,36,1,17,32,200,0,1,5,40,17,32,160,0,1,5,40,14,54,1,5,42
,0,25,104,1,3,50,0,21,5,5,46,0,20,7,3,42,0,17,8,17,200,0,23,32,0,0,53,47,8,11,8,3,78,32,0,2,43,33
,0,0,0,0,2,6,222,0,4,50,0,72,50,2,6,4,2,45,25,0,3,29,18,0,5,5,49,1,5,227,0,1,60);

%nfl(13,4,'CHI','MIN',20,23,3,3,14,0,0,0,7,3,10,3,13,7,0,2,11,0,0,65,14,0,1,6,51,0,34,8,13,13,2,4
,17,3,3,86,14,1,5,6,60,0,39,9,23,36,355,2,0,4,10,23,36,345,2,0,4,10,23,120,0,1,15,0,25,135,0,12,2
49,2,80,15,4,45,0,15,9,2,31,0,26,2,23,355,2,80,35,1,20,33,243,1,1,2,9,23,41,250,1,1,5,33,35,211,0
,2,27,1,40,246,1,7,78,1,19,9,3,76,0,32,9,4,61,0,22,5,23,283,1,32,38,0,0,86,56,6,7,8,3,87,57,0,2,8
,8,0,2,4,40,2,7,249,0,4,48,0,68,46,5,3,7,2,15,8,0,2,13,13,0,3,4,34,2,6,264,0,2,55);

%nfl(13,5,'MIA','NYJ',23,3,0,6,14,3,0,0,0,3,0,0,20,5,0,7,16,0,2,80,14,0,3,3,28,0,38,52,6,4,0,2,12
,0,2,54,13,0,2,4,25,0,21,8,28,43,331,2,1,1,3,28,43,328,2,1,1,3,22,72,0,3,22,0,36,125,0,9,127,1,31
,15,7,82,1,28,9,7,80,0,28,10,28,331,2,31,42,0,9,18,79,0,1,3,22,13,28,78,0,2,4,30,12,61,0,7,34,0,2
2,99,0,3,37,0,18,8,3,26,0,12,3,3,25,0,20,5,13,108,0,20,28,1,0,56,39,4,6,6,2,69,50,0,4,39,25,0,3,4
,43,2,3,128,0,2,53,0,87,51,5,4,4,5,136,41,0,1,6,6,0,1,1,20,0,7,316,0,1,51);

%nfl(13,6,'ARI','PHI',21,24,0,7,7,7,0,7,10,7,0,0,15,6,3,4,12,1,2,68,13,1,1,6,55,0,30,34,14,5,4,5,
16,1,1,73,13,2,4,5,48,0,29,26,24,41,302,3,2,5,42,24,41,260,3,2,5,42,18,76,0,3,15,0,22,90,0,5,99,1
,34,10,5,72,1,43,8,2,45,0,29,3,24,302,3,43,41,1,21,34,237,3,0,5,35,21,34,202,3,0,5,35,19,79,0,9,2
2,0,34,105,0,5,68,2,24,6,3,48,0,24,6,5,36,0,19,6,21,237,3,25,34,0,0,64,56,9,5,7,4,79,26,0,2,3,3,0
,0,0,0,3,5,231,0,2,53,0,56,47,5,11,4,3,86,32,0,3,11,8,0,1,1,32,3,8,354,0,7,69);

%nfl(13,7,'TBB','CAR',6,27,6,0,0,0,0,7,10,7,3,0,5,4,1,1,10,0,1,46,11,0,2,4,30,0,25,35,14,6,0,5,13
,2,2,63,11,2,5,3,25,0,34,25,14,21,180,0,1,5,40,14,21,140,0,1,5,40,17,63,0,2,3,0,20,66,0,3,75,0,60
,5,3,51,0,23,4,1,20,0,20,3,14,180,0,60,21,1,18,29,263,2,2,0,0,18,29,263,2,2,0,0,5,68,1,9,48,0,34,
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163,1,5,85,0,30,7,3,51,0,18,4,2,47,1,36,4,18,263,2,36,28,0,0,76,36,1,4,0,1,26,26,0,0,0,0,0,2,3,53
,0,4,190,0,0,54,0,49,31,6,4,5,2,34,18,0,3,25,11,0,2,2,23,3,3,138,0,1,55);

%nfl(13,8,'NEP','HOU',34,31,7,0,14,13,0,10,7,7,7,0,20,7,1,5,12,0,0,69,11,3,3,0,0,0,33,45,11,8,0,5
,11,0,1,59,12,3,3,2,25,0,26,15,29,41,371,2,1,1,6,29,41,365,2,1,1,6,12,44,1,10,38,0,27,88,2,6,127,
1,50,12,9,10,0,25,12,5,54,0,17,5,29,371,2,50,41,0,15,30,272,0,1,1,8,15,30,264,0,1,1,8,22,102,3,3,
13,0,28,121,4,8,121,0,29,9,2,77,0,66,5,3,36,0,17,11,15,272,0,66,28,0,0,51,36,2,8,7,6,149,41,0,1,1
1,11,0,2,3,53,4,3,132,1,1,51,0,68,57,2,6,5,2,71,50,0,1,6,6,0,1,1,43,4,3,134,0,1,55);

%nfl(13,9,'ATL','BUF',34,31,7,10,7,7,3,14,3,7,7,0,15,7,4,10,18,0,0,83,16,2,3,8,75,0,38,9,9,7,3,5,
14,0,0,63,14,2,3,6,49,0,24,51,28,47,311,1,0,6,39,28,47,272,1,0,6,39,23,84,2,1,38,1,30,151,3,10,14
3,0,29,14,6,73,0,20,15,4,42,1,12,7,28,311,1,29,47,1,18,32,210,1,0,0,0,18,32,210,1,0,0,0,15,149,1,
11,42,1,31,195,3,4,63,0,23,6,5,55,0,15,8,2,39,0,33,3,18,210,1,33,32,2,0,77,49,4,6,0,4,115,23,0,4,
24,10,0,2,2,49,4,7,278,0,4,53,0,101,68,8,9,9,2,55,28,0,3,27,17,0,1,1,29,4,7,299,0,1,51);

%nfl(13,10,'DEN','KCC',35,28,0,14,14,7,0,7,14,0,7,0,17,6,2,8,14,0,0,66,12,3,3,10,75,0,28,4,12,11,
4,5,13,1,2,67,11,3,5,9,102,1,31,56,22,35,403,5,2,0,0,22,35,403,5,2,0,0,13,117,0,15,18,0,31,132,0,
8,174,4,42,12,3,106,0,77,6,4,72,1,34,5,22,403,5,77,35,0,6,42,293,2,1,0,0,26,42,293,2,1,0,0,19,93,
1,4,46,0,25,159,1,3,56,0,24,7,5,43,0,28,6,3,42,1,17,3,26,293,2,28,41,0,0,52,52,1,5,0,4,81,24,0,3,
5,5,0,0,0,0,5,3,132,0,2,53,0,53,51,4,4,3,3,161,108,1,1,0,0,0,0,0,4,5,229,0,3,58);

%nfl(13,11,'CIN','SDC',17,10,0,7,7,3,0,0,7,0,3,0,6,13,0,6,12,0,0,61,10,1,2,3,30,0,29,40,13,5,1,6,
13,0,0,63,10,0,0,5,45,0,30,20,14,23,190,1,1,0,0,14,23,190,1,1,0,0,20,92,1,14,57,0,38,164,1,5,83,1
,28,7,3,65,0,50,3,2,12,0,9,3,14,190,1,50,22,1,23,37,252,1,1,2,9,23,37,243,1,1,2,9,14,61,0,7,22,0,
24,91,0,8,106,0,22,10,2,45,1,30,6,5,41,0,13,9,23,252,1,30,36,2,0,61,53,1,4,5,3,67,26,0,2,5,3,0,1,
1,46,2,4,222,0,2,75,0,68,55,4,3,0,2,36,20,0,1,0,0,0,1,1,48,1,4,157,0,3,56);

%nfl(13,12,'NYG','WAS',24,17,0,14,0,10,0,7,7,3,0,0,10,5,1,4,12,0,0,54,12,1,1,1,1,0,28,25,10,8,0,5
,16,2,3,68,12,2,3,8,55,0,31,35,22,28,235,1,1,3,29,22,28,206,1,1,3,29,6,45,0,14,35,2,23,80,2,6,80,
0,22,7,5,61,1,22,6,2,34,0,19,2,22,235,1,22,28,0,24,32,207,1,0,5,23,24,32,184,1,0,5,23,12,88,0,11,
26,1,31,139,1,9,61,0,16,12,3,41,1,19,4,4,34,0,20,4,24,207,1,20,32,1,0,87,56,7,3,9,4,69,21,0,3,22,
13,0,1,1,39,3,6,287,0,2,62,0,72,41,4,3,6,3,53,25,0,4,35,14,0,1,1,33,2,7,285,0,3,53);

%nfl(13,13,'GBP','DET',10,40,0,10,0,0,0,0,17,9,14,0,6,0,1,2,10,0,0,42,11,0,1,3,25,1,19,34,16,14,0
,9,12,0,0,79,13,3,6,5,50,0,40,26,10,20,139,0,1,7,37,10,20,102,0,1,7,37,10,16,0,2,4,0,15,24,0,3,79
,0,56,5,2,23,0,20,4,2,14,0,9,4,10,139,0,56,20,2,22,35,330,3,2,1,10,22,35,320,3,2,1,10,20,117,1,19
,94,1,43,241,2,6,101,1,20,10,3,68,0,36,7,5,65,0,32,5,22,330,3,36,34,2,0,89,51,0,4,1,2,41,26,0,0,0
,0,0,1,1,54,1,6,287,0,2,52,0,42,29,6,8,10,3,70,30,0,4,46,35,0,1,2,27,5,1,33,0,1,33);

%nfl(13,14,'OAK','DAL',24,31,7,14,0,3,0,7,7,7,10,0,12,4,0,7,13,0,0,55,11,2,2,10,71,1,27,41,10,10,
3,7,13,0,0,64,11,4,5,6,40,0,32,19,18,30,255,0,1,0,0,18,30,255,0,1,0,0,17,35,2,5,13,0,25,50,2,7,13
6,0,35,11,3,57,0,27,4,2,30,0,22,3,18,255,0,35,30,1,23,32,225,1,0,2,17,23,32,208,1,0,2,17,12,82,0,
17,63,3,30,144,3,7,61,1,25,9,3,53,0,22,3,5,39,0,10,5,23,225,1,25,32,1,0,63,56,5,3,2,5,97,27,0,4,4
2,14,0,1,1,45,3,5,265,1,2,60,0,55,40,3,3,2,2,61,32,0,4,27,14,0,1,1,19,4,5,238,0,1,58);

%nfl(13,15,'PIT','BAL',20,22,0,0,7,13,0,7,3,6,6,0,15,5,2,7,13,1,2,62,8,3,3,4,51,0,30,4,11,4,1,10,
17,0,0,62,9,1,4,9,55,0,29,56,28,44,257,2,0,0,0,28,44,257,2,0,0,0,16,73,1,1,11,0,18,72,1,8,86,0,21
,9,7,63,0,29,9,5,59,0,19,8,28,257,2,29,44,0,24,35,251,1,0,2,14,24,35,237,1,0,2,14,9,35,0,12,32,0,
25,74,0,6,93,1,54,10,4,53,0,34,7,6,38,0,22,7,24,251,1,54,35,0,0,65,41,2,4,4,4,102,27,0,0,0,0,0,0,
0,0,2,4,174,0,2,56,0,59,33,2,7,3,3,113,73,0,2,19,11,0,5,5,48,1,1,26,0,1,26);

%nfl(13,16,'NOS','SEA',7,34,0,7,0,0,0,17,10,7,0,0,7,2,3,6,15,0,2,56,11,1,1,7,52,0,26,22,14,6,3,7,
14,1,2,69,10,3,5,8,66,1,33,38,23,38,147,1,0,1,3,23,38,144,1,0,1,3,8,22,0,1,12,0,17,44,0,3,42,1,20
,9,7,32,0,10,8,4,27,0,14,7,23,147,1,20,38,1,22,30,310,3,0,1,8,22,30,302,3,0,1,8,8,47,0,16,45,0,38
,127,0,5,86,1,60,8,4,77,1,52,5,4,45,0,17,5,22,310,3,60,29,0,0,87,47,6,2,4,3,54,25,0,1,0,0,0,0,0,0
,1,6,294,0,2,58,0,58,31,3,7,6,2,40,21,0,5,17,12,0,2,2,26,4,3,120,0,0,50);

data sasdat.week13; set week13_game1
week13_game2
week13_game3
week13_game4
week13_game5
week13_game6
week13_game7
week13_game8
week13_game9
week13_game10
week13_game11
week13_game12
week13_game13
week13_game14
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week13_game15
week13_game16;
run;

/*  WEEK 14  */

%nfl(14,1,'SEA','SFO',17,19,0,14,0,3,0,6,10,0,3,0,11,1,1,5,12,0,0,50,10,1,2,9,85,0,27,32,9,8,2,5,
13,0,0,64,12,1,3,7,70,0,32,28,15,25,199,1,1,2,21,15,25,178,1,1,2,21,20,72,1,2,12,0,23,86,1,3,70,1
,39,4,6,65,0,25,8,3,36,0,14,4,15,199,1,39,25,0,15,29,175,1,1,2,20,15,29,155,1,1,2,20,17,110,0,9,3
1,0,33,163,0,6,93,0,27,8,4,40,0,17,8,3,21,0,11,5,15,175,1,27,29,0,0,60,51,6,6,3,4,79,27,0,3,49,38
,0,1,1,31,2,6,186,0,1,47,0,57,45,1,5,1,3,81,31,0,1,0,0,0,4,4,52,1,4,199,0,2,54);

%nfl(14,2,'IND','CIN',28,42,0,0,14,14,0,7,7,14,14,0,17,2,2,2,10,0,0,58,12,2,2,6,47,0,22,15,14,9,5
,6,12,1,1,70,13,5,5,7,60,0,37,45,29,46,326,4,0,0,0,29,46,326,4,0,0,0,2,32,0,6,20,0,12,63,0,6,107,
2,69,9,5,68,0,22,6,3,53,2,29,4,29,326,4,69,46,0,24,35,275,3,0,0,0,24,35,275,3,0,0,0,12,99,0,17,48
,2,35,155,3,6,72,1,22,8,3,60,1,29,4,4,49,0,22,4,24,275,3,29,33,0,0,75,41,1,4,0,7,140,33,0,1,0,0,0
,0,1,0,4,7,333,0,4,55,0,49,41,0,8,4,3,86,44,0,4,73,43,0,0,0,0,6,5,253,2,1,70);

%nfl(14,3,'ATL','GBP',21,22,0,21,0,0,0,7,3,6,6,0,12,6,0,6,13,0,1,59,10,1,1,3,15,1,26,28,12,7,1,7,
15,0,0,70,12,2,5,2,10,0,33,32,20,35,206,2,1,1,4,20,35,202,2,1,1,4,16,72,0,6,13,0,23,83,0,8,74,0,2
1,10,1,36,1,36,1,3,33,0,16,4,20,206,2,36,34,1,24,32,258,1,1,5,36,24,32,222,1,1,5,36,20,65,1,6,28,
0,33,112,1,4,85,0,46,4,6,66,1,21,7,2,28,0,19,4,24,258,1,46,32,1,1,78,60,5,3,4,6,126,26,0,1,8,8,0,
0,1,0,3,4,178,0,2,53,0,62,46,3,4,1,4,97,31,0,1,12,12,0,3,3,40,1,3,142,0,2,62);

%nfl(14,4,'CLE','NEP',26,27,3,3,13,7,0,0,0,11,16,0,17,5,2,7,15,0,0,70,12,1,2,7,75,0,31,40,21,7,2,
6,15,1,1,77,13,3,4,6,41,0,28,20,29,44,391,3,0,1,5,29,44,386,3,0,1,5,1,34,0,14,33,0,25,108,0,7,151
,1,80,10,9,121,1,21,9,2,49,1,40,2,29,391,3,80,42,0,32,52,418,2,1,4,21,32,52,397,2,1,4,21,8,42,0,8
,35,0,21,87,1,12,153,0,50,17,6,64,1,23,9,3,49,0,22,5,32,418,2,50,50,1,0,68,38,4,3,6,3,62,27,0,1,-
1,0,0,2,3,43,2,6,259,0,5,50,0,73,41,3,2,5,3,46,28,0,2,7,8,0,2,2,50,1,5,200,0,3,53);

%nfl(14,5,'OAK','NYJ',27,37,0,3,14,10,0,10,10,10,7,0,13,5,1,5,15,2,2,65,12,1,2,4,31,0,30,34,9,8,1
,7,13,0,0,58,10,2,3,4,36,1,29,26,18,31,245,2,1,3,32,20,36,233,2,1,3,32,19,123,1,2,20,0,26,150,1,7
,130,1,48,10,3,63,0,40,7,2,38,0,26,5,20,265,2,48,36,0,16,25,219,1,1,1,10,16,25,109,1,1,1,10,18,76
,1,5,50,1,32,143,2,3,61,0,30,6,3,55,0,32,5,4,41,1,25,7,16,219,1,32,25,0,0,59,40,4,2,6,8,135,27,0,
0,0,0,0,2,3,41,3,2,85,1,1,48,0,61,45,5,4,4,4,97,27,0,0,0,0,0,3,3,51,4,2,85,1,1,46);

%nfl(14,6,'DET','PHI',20,34,0,8,6,6,0,0,0,6,28,0,7,4,0,5,15,1,2,58,14,1,2,9,48,2,28,33,8,13,2,3,1
2,2,3,68,14,2,4,1,5,0,31,27,10,25,151,0,0,0,0,10,25,151,0,0,0,0,23,69,1,4,12,0,33,80,1,4,58,0,28,
7,3,52,0,33,5,1,23,0,23,3,10,151,0,33,24,3,11,22,179,1,1,0,0,11,22,179,1,1,0,0,29,217,2,4,50,1,46
,299,4,3,74,0,44,9,4,59,1,19,6,2,29,0,27,3,11,179,1,44,21,0,0,61,45,6,4,0,6,202,98,1,2,71,58,1,0,
0,0,0,6,236,1,2,51,0,50,42,3,7,0,2,41,23,0,2,-7,0,0,0,0,0,0,6,249,0,0,53);

%nfl(14,7,'MIA','PIT',34,28,3,7,14,10,0,7,0,14,7,0,12,5,1,6,14,0,0,60,13,4,6,5,36,0,28,55,12,4,0,
8,17,1,2,63,12,2,2,9,63,1,31,5,20,33,200,3,1,2,21,20,33,179,3,1,2,21,16,105,1,3,56,0,25,181,1,7,9
7,2,40,10,5,51,1,18,8,2,19,0,12,5,20,200,3,40,33,0,23,39,349,3,0,3,21,23,39,328,3,0,3,21,15,61,0,
3,8,0,21,84,0,5,137,1,55,9,4,65,1,21,6,5,57,1,19,9,23,349,3,55,39,1,0,70,45,3,5,2,4,82,25,0,2,22,
16,0,2,3,30,4,5,232,0,1,52,1,66,48,5,6,2,5,103,26,0,5,14,7,0,0,0,0,4,5,235,1,0,54);

%nfl(14,8,'BUF','TBB',6,27,3,0,3,0,0,14,10,3,0,0,10,1,3,1,11,0,0,62,15,0,1,11,114,0,28,10,5,4,4,4
,15,0,0,62,14,1,2,8,76,0,31,50,18,33,184,0,4,7,37,18,33,147,0,4,7,37,5,29,0,11,22,0,22,67,0,5,67,
0,33,11,4,26,0,14,7,1,26,0,26,1,18,184,0,33,33,1,9,25,90,2,2,1,9,9,25,81,2,2,1,9,22,127,1,7,26,0,
36,165,1,3,70,1,38,8,2,21,1,16,4,1,3,0,3,3,9,90,2,38,25,0,0,59,50,9,5,1,4,56,21,0,5,36,21,0,2,2,4
6,0,7,306,0,3,55,0,64,52,9,8,13,1,20,20,0,2,21,11,0,2,2,53,3,8,357,1,1,58);

%nfl(14,9,'KCC','WAS',45,10,17,21,0,7,0,0,10,0,0,0,10,9,1,2,11,1,2,61,14,3,5,3,30,2,34,10,11,2,0,
3,15,0,2,65,15,1,1,4,27,0,25,50,14,20,137,2,0,0,0,15,23,154,2,1,0,0,19,150,1,11,30,1,38,192,2,4,7
0,1,22,5,4,21,0,10,5,2,20,0,11,3,15,154,2,22,23,0,12,26,164,1,1,5,16,19,42,192,1,1,6,31,12,31,0,4
,29,0,17,65,0,4,67,0,30,6,3,44,1,27,5,5,37,0,12,12,19,223,1,30,41,1,0,63,46,7,7,4,2,123,95,1,7,17
7,74,1,1,2,33,6,3,113,2,0,47,0,71,50,5,2,1,8,179,39,0,0,0,0,0,1,1,50,1,8,338,0,2,58);

%nfl(14,10,'MIN','BAL',26,29,0,3,3,20,0,7,0,0,22,0,11,3,1,5,17,1,1,63,15,1,1,6,90,0,27,48,17,4,2,
6,16,1,3,79,17,3,3,5,45,1,32,12,17,38,265,2,0,0,0,17,38,265,2,0,0,0,15,89,1,7,13,0,25,114,1,5,141
,1,79,7,5,53,0,19,10,4,48,1,27,8,17,265,2,79,38,1,28,50,245,3,3,2,17,28,50,228,3,3,2,17,17,67,0,1
,22,0,27,97,0,7,92,1,35,11,6,48,1,18,11,5,42,0,13,5,28,245,3,35,49,0,0,76,48,5,8,5,5,131,42,0,1,1
4,14,0,2,2,40,2,9,397,1,1,54,0,61,37,3,13,2,4,152,77,1,4,44,22,0,0,0,0,3,6,328,2,2,69);

%nfl(14,11,'TEN','DEN',28,51,14,7,7,0,0,10,10,14,17,0,6,8,1,2,9,2,3,48,11,2,2,8,66,0,20,40,25,9,5
,5,13,3,3,91,13,5,7,7,60,0,39,20,13,24,172,1,1,2,14,13,24,158,1,1,2,14,12,46,1,9,46,2,22,96,3,4,1
14,1,57,8,2,24,0,16,6,2,17,0,13,3,13,172,1,57,24,1,39,59,397,4,0,0,0,39,59,397,4,0,0,0,14,78,1,15
,77,1,32,154,2,8,117,1,24,12,7,88,1,38,10,5,61,1,30,10,39,397,4,38,58,0,0,74,69,2,7,1,5,209,95,0,
0,0,0,0,0,0,4,4,201,0,0,62,0,42,34,5,4,4,5,126,34,0,4,27,10,0,3,3,64,6,2,65,0,2,36);
```

```
%nfl(14,12,'STL','ARI',10,30,3,0,0,7,0,7,7,9,7,0,7,3,4,3,11,0,1,50,12,1,1,11,90,0,24,53,14,6,5,8,
14,0,0,65,11,3,5,6,31,1,35,7,16,27,181,0,2,4,24,16,27,157,0,2,4,24,1,56,0,14,25,1,19,100,1,3,49,0
,31,6,3,46,0,18,4,1,21,0,21,2,16,181,0,31,27,0,27,32,269,1,0,1,7,27,32,262,1,0,1,7,11,46,1,17,41,
1,32,107,2,12,96,1,19,12,3,42,0,31,4,3,32,0,16,3,27,269,1,32,32,1,0,69,54,5,4,2,5,126,32,0,1,1,1,
0,1,1,44,1,5,257,2,0,64,1,49,45,7,6,7,2,21,26,0,2,3,9,0,0,2,0,4,4,189,1,3,54);

%nfl(14,13,'NYG','SDC',14,37,0,0,7,7,0,7,17,7,6,0,10,6,2,3,8,1,2,54,10,2,2,7,72,0,23,4,15,7,3,10,
15,0,0,70,10,3,5,6,30,0,36,56,20,32,259,1,2,2,18,20,32,241,1,2,2,18,16,81,0,4,11,1,20,92,1,5,135,
0,51,7,5,42,0,14,6,2,27,0,18,4,20,259,1,51,31,1,21,28,249,3,0,2,5,21,28,244,3,0,2,5,29,103,1,7,42
,0,40,144,1,3,59,2,43,3,4,52,1,39,5,4,50,0,23,6,21,249,3,43,28,1,0,77,62,2,0,4,7,126,23,0,0,0,0,0
,0,0,0,2,3,141,0,1,48,0,60,47,3,11,5,2,34,18,0,2,2,2,0,3,3,43,4,1,39,0,1,39);

%nfl(14,14,'CAR','NOS',13,31,6,0,0,7,0,0,21,3,7,0,9,7,0,6,15,1,1,62,10,1,2,5,35,0,32,27,19,3,2,7,
12,0,0,61,10,4,5,5,45,0,27,33,22,34,160,1,0,5,49,22,34,111,1,0,5,49,13,52,0,6,48,0,23,128,0,6,49,
1,17,8,8,40,0,13,12,2,22,0,11,4,22,160,1,17,34,0,30,42,313,4,0,2,9,30,42,304,4,0,2,9,1,38,0,7,14,
0,17,69,0,9,125,2,21,13,6,58,2,22,11,3,40,0,21,4,30,313,4,22,42,0,0,49,45,3,5,7,2,73,38,0,1,32,32
,0,2,3,45,1,5,227,0,1,57,0,62,42,7,1,7,1,22,22,0,2,17,17,0,1,1,19,4,4,177,0,1,54);

%nfl(14,15,'HOU','JAX',20,27,0,7,10,3,0,7,10,7,3,0,19,3,1,8,17,1,2,80,13,2,5,14,177,0,35,22,7,4,7
,4,14,0,0,57,14,2,2,8,57,0,24,38,17,29,198,1,1,2,28,33,58,323,2,2,3,34,14,53,0,1,13,0,19,83,0,13,
154,0,27,21,3,76,0,46,7,8,73,1,22,14,33,357,2,46,58,0,12,27,117,2,0,1,6,13,28,132,3,0,1,6,14,103,
0,4,33,0,28,149,0,2,42,1,41,4,3,26,0,11,6,1,21,1,21,2,13,138,3,41,28,0,0,45,37,4,3,4,3,40,24,0,3,
21,16,0,2,2,34,2,5,219,0,2,59,0,66,52,5,2,8,2,48,29,0,2,25,17,0,2,2,40,3,8,341,1,1,57);

%nfl(14,16,'DAL','CHI',28,45,7,7,0,14,0,7,17,11,10,0,11,13,0,5,10,1,2,55,9,4,4,4,50,0,23,16,19,10
,4,8,11,0,0,69,9,4,7,2,15,0,36,44,11,20,104,3,0,2,14,14,25,130,3,0,2,14,18,146,0,9,53,1,28,198,1,
2,36,0,18,3,2,32,0,25,2,2,20,1,11,3,14,144,3,25,25,0,27,36,348,4,0,1,7,27,36,341,4,0,1,7,20,102,0
,8,38,0,32,149,1,6,100,0,22,8,5,84,1,26,9,7,73,1,34,9,27,348,4,34,36,0,0,61,55,3,3,0,8,136,43,0,0
,0,0,0,0,0,4,3,112,0,1,41,0,50,42,2,1,0,3,62,27,0,1,19,19,0,3,3,34,4,0,0,0,0,0);

data sasdat.week14; set week14_game1
week14_game2
week14_game3
week14_game4
week14_game5
week14_game6
week14_game7
week14_game8
week14_game9
week14_game10
week14_game11
week14_game12
week14_game13
week14_game14
week14_game15
week14_game16;
run;

/*  WEEK 15  */

%nfl(15,1,'SFO','TBB',33,14,7,10,3,13,0,0,7,0,7,0,11,11,0,6,15,0,0,71,12,1,4,8,62,1,39,50,8,3,2,1
,10,0,2,50,11,1,1,4,32,0,20,10,19,29,203,2,0,2,14,19,29,189,2,0,2,14,22,86,0,4,42,0,40,187,0,5,79
,1,52,7,5,45,1,14,6,3,43,0,25,8,19,203,2,52,29,0,18,34,179,2,1,4,35,18,34,144,2,1,4,35,11,27,0,1,
12,0,12,39,0,7,82,1,26,9,5,58,1,16,8,3,21,0,8,5,18,179,2,26,32,1,0,39,35,5,7,5,2,29,23,0,5,51,15,
0,4,4,47,3,4,173,1,2,50,0,78,63,5,5,3,5,83,28,0,1,9,9,0,0,0,0,2,7,334,0,2,56);

%nfl(15,2,'SDC','DEN',27,20,3,14,7,3,0,10,0,0,10,0,10,11,3,6,12,0,0,66,10,2,4,4,35,0,38,49,16,1,2
,2,9,1,1,53,9,2,3,6,43,0,21,11,12,20,166,2,0,2,6,12,20,160,2,0,2,6,29,127,1,9,29,0,44,177,1,3,54,
0,32,3,3,46,0,20,6,2,29,2,19,5,12,166,2,32,20,0,27,41,289,2,1,1,12,27,41,277,2,1,1,12,3,19,0,3,-
1,0,11,18,0,6,59,2,15,10,5,49,0,15,5,4,49,0,22,8,27,289,2,22,41,0,0,41,41,4,6,2,0,0,0,0,2,11,6,0,
2,2,38,3,3,126,0,3,53,0,61,48,4,1,2,4,108,39,0,0,0,0,0,2,2,42,2,4,186,0,1,51);


%nfl(15,3,'WAS','ATL',26,27,7,13,0,6,0,14,3,7,3,0,18,4,0,5,10,0,0,67,13,1,5,9,66,0,26,8,10,5,4,5,
14,0,1,62,14,3,5,7,73,0,33,52,29,45,381,3,2,1,8,29,45,373,3,2,1,8,18,98,0,3,5,0,21,103,0,7,129,1,
53,10,4,99,0,62,7,8,64,1,17,9,29,381,3,62,44,5,29,38,210,1,1,3,21,29,38,189,1,1,3,21,15,38,2,4,17
,0,21,54,2,6,62,1,15,7,5,53,0,19,7,5,37,0,13,7,29,210,1,19,38,1,0,81,44,3,3,5,0,0,0,0,4,15,8,0,2,
2,37,2,3,158,0,0,58,0,72,30,1,5,3,3,78,33,0,3,25,25,0,2,2,51,3,6,296,0,3,69);
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%nfl(15,4,'CHI','CLE',38,31,0,10,7,21,0,3,7,14,7,0,11,10,2,9,14,0,0,64,12,2,4,7,40,1,34,48,12,7,1
,3,9,0,0,56,11,1,2,9,90,2,25,12,22,31,265,3,2,2,4,22,31,261,3,2,2,4,24,127,0,3,44,1,31,179,1,6,95
,1,41,13,5,72,1,45,5,6,71,0,23,6,22,265,3,45,31,1,23,39,273,1,2,0,0,23,39,273,1,2,0,0,8,38,1,2,30
,0,17,93,1,4,68,0,44,7,3,67,1,43,10,4,46,0,16,4,23,273,1,44,38,0,1,46,38,2,5,4,4,97,40,0,1,21,21,
0,1,1,23,5,3,110,0,1,43,1,64,46,9,6,8,4,44,23,0,0,0,0,0,1,1,35,4,5,211,0,2,50);

%nfl(15,5,'HOU','IND',3,25,3,0,0,0,0,7,13,5,0,0,6,6,0,5,15,0,1,63,13,0,0,14,114,0,26,49,9,6,4,5,1
5,0,1,69,14,2,3,4,36,0,33,11,18,34,168,0,2,4,36,18,34,132,0,2,4,36,16,72,0,4,21,0,25,107,0,6,62,0
,22,6,3,52,0,39,5,3,20,0,9,6,18,168,0,39,34,0,19,32,180,2,1,1,1,19,32,179,2,1,1,1,19,64,0,5,38,0,
36,152,0,8,78,0,41,12,4,45,1,18,5,4,38,1,18,6,19,180,2,41,32,0,0,77,43,4,5,4,4,108,32,0,2,11,11,0
,1,1,49,0,8,396,2,3,56,0,65,45,4,6,8,2,50,28,0,3,67,51,0,3,3,43,2,6,258,2,2,51);

%nfl(15,6,'NEP','MIA',20,24,3,7,0,10,0,0,7,3,14,0,19,9,1,9,17,1,2,78,10,1,4,1,2,0,31,21,16,3,1,4,
11,1,2,64,11,2,3,4,21,0,28,39,34,55,364,2,1,1,7,34,55,357,2,1,1,7,11,47,0,8,34,0,22,96,0,13,139,1
,24,19,10,131,0,30,14,4,42,0,30,7,34,364,2,30,54,0,25,37,312,3,0,4,23,25,37,289,3,0,4,23,15,61,0,
5,16,0,23,89,0,6,105,1,39,9,5,70,0,19,8,5,64,0,24,9,25,312,3,39,37,1,0,51,47,5,3,5,1,19,19,0,0,0,
0,0,2,3,23,2,3,146,0,1,57,0,61,54,2,4,7,2,25,13,0,2,9,9,0,1,1,32,3,4,189,0,2,52);

%nfl(15,7,'PHI','MIN',30,48,3,6,13,8,0,7,10,10,21,0,22,3,0,7,14,0,1,65,14,2,5,9,94,0,23,34,14,11,
4,8,13,0,0,73,12,5,6,3,25,0,36,26,30,48,428,3,1,4,32,30,48,396,3,1,4,32,5,41,0,8,38,0,13,79,0,10,
195,1,51,16,5,68,0,24,7,6,57,1,17,9,30,428,3,51,48,0,26,35,382,2,1,3,12,26,35,370,2,1,3,12,30,51,
3,3,19,1,35,85,4,11,163,1,57,13,4,95,0,42,5,2,55,0,37,2,26,382,2,57,35,0,0,76,52,9,1,5,2,83,47,0,
1,1,1,0,3,3,51,1,4,165,0,1,46,0,52,38,5,1,10,5,45,15,0,1,16,16,0,2,3,38,6,2,97,0,2,50);

%nfl(15,8,'SEA','NYG',23,0,3,10,3,7,0,0,0,0,0,0,11,9,1,3,13,0,0,67,13,2,4,8,50,0,33,58,10,1,1,1,1
0,0,0,53,14,0,1,5,38,0,26,2,18,27,206,1,1,4,29,20,29,193,1,1,4,29,8,50,0,16,47,1,34,134,1,6,73,0,
30,6,6,71,1,25,7,2,25,0,17,6,20,222,1,30,29,0,18,31,156,0,5,3,24,22,35,156,0,5,4,30,11,17,0,3,8,0
,14,25,0,7,67,0,14,8,3,37,0,20,3,2,25,0,16,7,22,186,0,20,35,0,0,55,44,6,9,6,0,0,0,0,7,73,22,0,3,3
,49,2,7,289,1,3,53,0,89,66,8,3,7,3,74,31,0,1,4,4,0,0,0,0,0,8,380,0,2,57);

%nfl(15,9,'BUF','JAX',27,20,3,17,0,7,0,3,7,3,7,0,10,12,3,5,13,0,0,72,14,3,3,7,67,0,32,35,11,9,2,8
,15,0,1,72,12,2,4,6,80,0,27,25,17,24,193,2,1,4,25,17,24,168,2,1,4,25,17,80,0,13,67,0,44,198,1,5,8
2,1,20,6,5,54,0,27,5,1,28,0,28,1,17,193,2,28,24,1,21,36,237,2,2,5,42,21,36,195,2,2,5,42,25,109,0,
2,28,0,31,159,0,4,54,1,25,7,3,52,0,28,4,4,44,0,30,8,21,237,2,30,36,2,0,63,59,7,7,9,2,38,19,0,2,4,
3,0,2,3,42,3,4,180,0,0,53,0,72,54,4,1,5,1,17,17,0,3,10,7,0,2,2,55,2,3,136,0,1,48);

%nfl(15,10,'KCC','OAK',56,31,21,14,14,7,0,3,14,14,0,0,12,5,2,4,9,1,1,51,13,4,5,8,91,1,25,53,12,8,
6,7,14,1,1,74,13,4,5,10,90,0,34,7,17,20,287,5,0,2,12,20,25,306,5,0,2,12,9,34,1,8,20,1,24,78,2,8,1
95,4,71,8,2,33,0,23,3,3,24,0,11,4,20,318,5,71,25,1,18,35,297,2,4,0,0,20,41,331,2,5,0,0,23,91,2,3,
19,0,33,130,2,4,59,0,26,9,4,58,1,28,7,2,52,0,45,7,20,331,2,52,40,2,1,62,48,0,8,0,4,107,50,0,1,9,9
,0,0,0,0,8,4,198,1,2,61,0,50,49,3,2,1,5,130,29,0,1,6,6,0,1,1,34,4,1,48,0,0,48);

%nfl(15,11,'NYJ','CAR',20,30,3,3,7,7,0,3,13,0,14,0,10,7,2,8,15,0,0,60,10,2,3,3,20,0,26,59,12,9,0,
5,11,0,1,62,9,1,5,6,59,1,33,1,15,28,167,1,1,4,27,15,28,140,1,1,4,27,11,66,0,6,44,0,28,157,1,3,50,
1,35,4,3,44,0,18,4,1,25,0,25,3,15,167,1,35,28,0,16,24,273,1,0,2,12,16,24,261,1,0,2,12,15,81,0,12,
18,1,36,131,1,5,88,0,27,8,3,87,1,72,4,3,61,0,36,4,16,273,1,72,24,0,0,62,44,6,2,2,1,22,22,0,1,0,0,
0,2,2,54,2,3,132,0,0,56,1,56,36,6,1,8,3,49,32,0,1,0,0,0,3,3,40,3,2,92,0,1,52);

%nfl(15,12,'GBP','DAL',37,36,3,0,14,20,0,13,13,3,7,0,16,8,2,7,13,0,0,68,14,5,5,7,59,0,28,18,17,6,
4,2,9,0,0,69,12,2,3,7,79,0,31,42,26,39,299,4,1,2,16,26,39,299,4,1,2,16,21,141,1,3,12,0,27,150,1,6
,83,0,27,6,6,66,1,22,6,5,61,1,21,9,26,315,4,39,37,0,29,48,358,2,2,3,26,29,48,358,2,2,3,26,18,134,
1,0,0,0,18,134,1,11,153,1,37,17,4,71,1,27,8,4,46,0,27,5,29,384,2,37,48,0,0,56,41,3,10,4,0,0,0,0,1
,26,26,0,1,1,57,4,4,197,1,1,54,0,61,43,7,5,4,2,46,24,0,1,7,7,0,5,5,50,3,2,103,
1,0,57);

%nfl(15,13,'ARI','TEN',37,34,7,3,10,14,3,10,0,7,17,0,12,11,1,6,12,0,0,68,12,3,4,9,69,1,30,58,23,3
,6,7,14,0,0,80,12,3,4,3,16,0,33,44,20,30,231,1,0,2,16,20,30,215,1,0,2,16,10,71,0,21,69,2,36,145,2
,4,87,0,38,5,6,49,0,18,9,2,33,0,20,5,20,231,1,38,30,0,36,58,402,4,2,3,8,36,58,394,4,2,3,8,13,40,0
,3,22,0,19,66,0,12,150,0,26,20,7,92,0,33,9,8,53,1,22,11,36,402,4,33,55,1,1,71,51,5,7,7,3,72,28,0,
0,0,0,0,3,3,47,4,4,212,1,1,58,0,69,47,5,6,6,7,140,33,0,2,18,9,0,2,3,45,4,3,145,0,2,51);

%nfl(15,14,'NOS','STL',16,27,0,3,0,13,0,14,10,3,0,0,24,5,1,5,15,4,4,80,10,2,6,8,77,0,32,12,8,5,4,
7,14,0,0,54,11,1,3,4,30,0,27,48,39,56,393,1,2,4,22,39,56,371,1,2,4,22,7,24,0,8,21,0,20,61,1,8,92,
1,23,13,6,78,0,30,7,7,62,0,28,8,39,393,1,30,56,1,14,20,158,2,0,0,0,14,20,158,2,0,0,0,28,133,1,1,6
,0,34,144,1,4,41,0,14,4,1,31,0,31,2,3,29,1,31,3,14,158,2,31,20,0,0,50,48,4,4,1,0,0,0,0,0,0,0,0,1,
3,45,1,2,107,0,1,54,0,62,58,5,9,7,2,53,29,0,1,7,7,0,2,2,35,3,4,167,0,2,52);

%nfl(15,15,'CIN','PIT',20,30,0,7,0,13,0,21,6,3,0,0,13,5,1,4,14,3,5,67,11,3,3,6,50,0,28,24,11,6,2,
2,10,2,2,62,11,2,4,4,25,1,31,36,25,44,230,2,0,1,8,24,44,222,2,0,1,8,13,33,1,4,20,0,22,57,1,9,93,0
,19,18,5,48,1,13,9,3,33,1,19,3,25,230,2,19,43,1,20,25,191,1,1,1,7,20,25,184,1,1,1,7,24,57,1,6,26,
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0,36,106,1,5,66,1,20,6,5,50,0,17,5,5,38,0,21,6,20,191,1,21,25,0,0,73,48,4,2,2,5,150,52,0,0,0,0,0,
0,0,0,2,4,166,0,0,48,0,63,48,3,6,4,1,20,20,0,2,78,67,1,3,3,45,3,3,115,0,1,48);

%nfl(15,16,'BAL','DET',18,16,0,9,3,6,0,7,0,3,6,0,11,4,3,4,14,0,0,60,13,0,3,7,60,0,27,35,12,6,1,4,
13,0,0,63,11,2,2,8,89,0,32,25,20,38,222,0,0,1,7,20,38,215,0,0,1,7,12,56,0,7,21,0,21,90,0,6,80,0,2
7,9,4,69,0,25,12,4,31,0,24,6,20,222,0,27,38,0,18,34,235,1,3,1,5,18,34,230,1,3,1,5,17,86,1,9,24,0,
28,119,1,6,98,0,37,14,4,51,0,23,6,2,23,0,18,2,18,235,1,37,34,0,0,60,44,3,7,5,2,60,36,0,1,24,24,0,
6,6,61,0,5,240,0,2,53,0,53,45,5,5,6,2,38,33,0,4,26,16,0,1,1,40,1,5,230,1,3,57);

data sasdat.week15; set week15_game1
week15_game2
week15_game3
week15_game4
week15_game5
week15_game6
week15_game7
week15_game8
week15_game9
week15_game10
week15_game11
week15_game12
week15_game13
week15_game14
week15_game15
week15_game16;
run;


/* WEEK 16 */

%nfl(16,1,'MIA','BUF',0,19,0,0,0,0,0,3,7,0,9,0,4,2,0,2,14,0,1,52,13,0,0,6,37,0,23,29,8,9,1,7,19,0
,0,77,14,1,4,4,31,0,36,61,10,27,82,0,0,7,46,12,33,89,0,2,7,46,3,8,0,9,6,0,12,14,0,2,53,0,50,10,4,
38,0,13,11,4,32,0,13,7,12,135,0,50,32,0,15,25,193,0,1,1,6,15,25,187,0,1,1,6,18,105,1,21,83,0,51,2
03,1,3,70,0,57,5,2,31,0,16,3,2,27,0,14,5,15,193,0,57,25,0,0,104,67,4,1,3,5,83,30,0,3,0,2,0,0,0,0,
0,10,501,2,6,74,0,56,39,9,10,10,0,0,0,0,4,0,7,0,4,4,45,1,6,218,1,0,52);

%nfl(16,2,'ATL','SFO',24,34,0,10,0,14,0,3,0,10,21,0,20,2,3,8,15,1,1,69,12,2,4,5,37,0,30,28,8,11,1
,4,9,0,0,54,8,3,4,7,45,1,29,32,37,48,348,2,2,1,7,37,48,341,2,2,1,7,16,53,1,3,10,0,20,61,1,12,141,
1,39,15,3,70,0,59,3,8,63,1,15,11,37,348,2,59,48,0,13,21,197,1,0,3,17,13,21,180,1,0,3,17,21,97,1,6
,51,1,30,199,2,5,102,0,47,7,6,72,1,22,7,1,17,0,17,1,13,197,1,47,21,0,0,54,48,5,2,4,3,773,30,0,2,3
3,22,0,1,1,35,3,5,244,1,2,56,1,69,56,7,5,8,3,79,30,0,2,20,10,0,2,2,49,4,3,156,1,0,53);

%nfl(16,3,'MIN','CIN',14,42,7,0,7,0,0,14,14,14,0,0,4,5,1,0,9,0,2,48,13,0,0,5,40,0,20,28,20,4,0,8,
14,1,2,77,13,4,4,6,55,1,39,32,13,37,114,1,3,4,20,13,27,94,1,3,4,20,3,54,1,11,45,0,17,115,1,1,36,1
,36,2,4,27,0,14,6,2,22,0,17,3,13,114,1,36,27,1,27,38,363,4,0,2,18,27,38,345,4,0,2,18,12,24,1,13,2
0,0,37,81,1,7,97,2,29,12,6,85,0,21,7,2,47,0,41,4,27,363,4,41,38,1,0,80,45,4,4,3,6,158,48,0,1,22,2
2,0,0,0,0,2,5,197,0,2,55,1,49,32,3,10,6,1,3,3,0,2,27,21,0,0,0,0,6,4,160,0,1,52);


%nfl(16,4,'IND','KCC',23,7,0,13,10,0,0,7,0,0,0,0,10,5,4,7,18,1,1,72,12,0,2,3,31,0,38,20,8,8,2,1,8
,1,1,53,11,0,1,7,65,0,21,40,26,37,241,1,0,1,9,26,37,232,1,0,1,9,10,79,1,16,43,0,34,135,1,7,80,0,2
1,8,5,52,0,31,7,4,42,0,17,6,26,241,1,33,37,0,16,28,153,0,1,5,21,16,28,132,0,1,5,21,16,106,1,6,47,
0,20,155,1,5,46,0,16,10,5,38,0,15,6,3,32,0,15,4,16,153,0,19,27,3,0,53,45,3,6,6,0,0,0,0,4,32,12,0,
3,4,46,2,4,201,0,1,56,0,66,60,3,4,5,5,140,28,0,3,23,25,0,0,1,0,1,5,270,0,2,61);


%nfl(16,5,'TBB','STL',13,23,7,3,3,0,0,0,14,3,6,0,7,4,3,4,14,1,2,56,12,1,3,3,26,0,25,54,8,8,2,6,14
,1,2,60,10,1,4,7,85,0,34,6,16,26,158,0,0,7,47,16,26,111,0,0,7,47,20,37,1,1,19,0,23,59,1,5,98,0,30
,10,4,27,0,8,6,4,13,0,9,3,16,158,0,30,25,2,16,20,158,0,0,1,10,16,20,148,0,0,1,10,33,104,1,1,27,1,
39,129,2,3,44,0,28,5,2,27,0,18,2,2,24,0,21,3,16,158,0,28,20,2,0,66,53,9,0,3,0,0,0,0,0,0,0,0,2,2,3
5,1,4,186,0,0,56,0,50,44,8,2,7,0,0,0,0,3,34,15,0,3,3,54,2,2,8,0,1,46);


%nfl(16,6,'CLE','NYJ',13,24,3,7,0,3,0,0,10,0,14,0,11,7,1,5,12,1,2,64,9,1,4,3,24,0,27,17,13,11,1,1
2,18,0,1,76,11,3,4,6,35,0,32,43,18,40,178,0,2,3,10,18,40,168,0,2,3,10,17,64,1,1,22,0,21,115,1,6,9
7,0,24,16,4,26,0,11,6,2,23,0,16,4,18,178,0,24,40,0,20,36,214,2,0,0,0,20,37,214,2,0,0,0,20,109,0,7
,54,0,39,208,1,5,70,0,22,11,3,35,0,16,5,4,33,2,15,5,20,214,2,22,37,0,0,63,47,3,7,0,3,92,50,0,2,39
,29,0,2,2,27,1,3,148,0,2,50,0,58,35,2,11,10,0,0,0,0,0,0,0,0,1,2,21,3,3,138,0,0,51);
```

```
%nfl(16,7,'DAL','WAS',24,23,7,7,0,10,0,3,3,14,3,0,11,4,1,4,10,2,2,52,11,3,5,6,42,0,26,13,10,6,1,7
,16,0,1,64,10,2,4,8,44,0,33,47,17,27,226,2,1,2,12,17,27,214,2,1,2,12,23,96,1,1,-
1,0,23,95,1,4,84,0,51,6,4,73,1,31,11,2,29,0,20,2,17,226,2,51,27,1,21,36,197,1,1,0,0,21,36,197,1,1
,0,0,24,88,1,2,10,0,28,100,1,11,144,1,28,18,1,14,0,14,3,2,13,0,8,4,21,197,1,28,35,0,0,72,46,3,3,3
,3,51,19,0,1,62,62,0,1,1,25,3,3,155,0,0,57,0,59,35,3,3,2,5,107,29,0,3,35,18,0,3,3,47,2,3,131,0,2,
46);


%nfl(16,8,'NOS','CAR',13,17,0,6,0,7,0,0,7,3,7,0,12,6,2,5,18,0,1,81,14,1,2,4,40,0,38,48,7,2,1,0,9,
0,0,44,13,1,3,3,26,0,21,12,30,44,281,1,2,6,42,30,45,239,1,2,6,42,13,83,0,6,18,0,30,126,0,5,73,1,4
6,11,5,63,0,35,10,3,47,0,21,3,30,281,1,46,45,0,13,22,181,1,1,4,40,13,22,141,1,1,4,40,12,67,1,1,7,
0,18,81,1,2,66,0,37,4,1,44,0,44,2,4,35,0,14,7,13,181,1,44,21,0,0,45,31,5,2,6,1,21,21,0,4,30,11,0,
2,2,40,1,7,340,1,2,61,0,95,45,8,8,8,2,41,21,0,2,20,13,0,1,1,40,2,8,406,0,2,60);


%nfl(16,9,'TEN','JAX',20,16,3,3,7,7,0,7,6,3,0,0,10,10,2,3,13,3,4,73,11,1,2,1,4,0,35,39,11,4,0,3,1
1,1,3,57,11,2,3,4,15,0,24,21,17,26,181,1,1,3,17,17,26,164,1,1,3,17,19,91,1,22,90,0,44,182,1,6,117
,1,30,8,4,35,0,11,7,4,22,0,14,7,17,181,1,30,26,0,24,34,237,2,1,2,11,24,34,226,2,1,2,11,13,45,0,1,
11,0,21,63,0,5,71,1,24,6,4,50,1,30,6,4,45,0,17,7,24,237,2,30,34,0,0,47,47,6,4,4,0,0,0,0,1,-
1,0,0,2,2,52,2,3,140,1,0,50,0,66,58,4,2,6,1,43,43,0,1,4,4,0,1,1,36,1,4,182,0,2,56);


%nfl(16,10,'DEN','HOU',37,13,3,13,0,21,0,3,3,7,0,0,20,4,1,2,11,0,1,70,15,1,3,8,67,0,28,53,8,5,1,6
,16,0,0,66,14,1,2,4,57,0,31,7,32,51,400,4,0,1,3,32,51,397,4,0,1,3,11,76,0,4,32,0,18,114,0,10,131,
2,35,17,8,123,1,36,14,6,78,1,25,8,32,400,4,36,51,0,18,37,176,1,2,3,23,18,37,153,1,2,3,23,8,30,0,1
2,29,0,26,87,0,5,66,0,40,5,4,63,0,33,13,4,35,1,15,6,18,176,1,40,36,0,0,43,51,9,7,4,4,99,32,0,5,21
,8,0,3,3,44,4,6,292,0,1,55,0,64,50,2,9,6,1,22,22,0,5,70,51,0,2,2,45,1,8,359,0,2,57);


%nfl(16,11,'NYG','DET',23,20,3,10,0,7,3,0,3,9,8,0,13,2,0,6,17,1,1,65,13,1,1,5,30,1,29,43,13,9,2,8
,17,0,0,80,14,2,3,7,60,0,37,45,23,42,256,1,1,2,18,23,42,238,1,1,2,18,16,40,0,1,2,0,21,41,0,6,80,1
,20,12,4,53,0,25,7,4,52,0,16,7,23,256,1,26,42,1,25,42,222,0,2,2,15,25,42,207,0,2,2,15,20,91,1,12,
34,0,36,148,2,10,63,0,14,10,3,43,0,17,7,3,43,0,17,4,25,222,0,17,41,1,1,79,55,3,6,6,1,56,56,0,3,23
,9,0,3,3,52,2,6,279,0,2,54,0,54,45,5,6,5,4,55,23,0,1,50,50,0,1,1,37,1,6,270,0,2,55);


%nfl(16,12,'ARI','SEA',17,10,0,3,3,11,0,0,3,0,7,0,6,4,6,6,19,0,0,70,15,0,3,7,46,0,37,24,6,3,1,2,1
3,0,0,51,13,1,3,9,102,0,22,36,13,25,178,1,4,2,10,13,25,168,1,4,2,10,15,64,0,21,63,0,43,139,0,1,63
,0,63,2,1,31,1,31,5,2,25,0,17,2,13,178,1,63,25,0,11,27,89,1,1,4,19,11,27,89,1,1,4,19,18,71,0,2,32
,0,20,103,0,3,38,0,18,7,2,34,0,28,3,1,11,1,11,3,11,108,1,28,24,1,0,55,37,5,6,9,2,46,25,0,2,6,6,0,
3,3,46,0,5,244,0,3,55,0,84,36,4,8,9,5,125,37,0,3,47,29,0,1,2,27,1,9,335,0,3,44);


%nfl(16,13,'PIT','GBP',38,31,7,3,21,7,0,7,7,7,10,0,10,8,3,2,10,2,2,59,13,4,5,7,58,1,26,40,12,11,3
,6,14,0,0,72,14,4,6,9,90,0,33,20,16,28,167,2,1,1,5,17,29,192,2,1,1,5,26,124,1,1,13,1,29,151,2,6,1
05,0,36,13,1,30,0,30,1,3,17,0,6,4,17,197,2,36,29,1,21,39,232,1,1,3,13,21,39,219,1,1,3,13,15,84,2,
10,47,0,30,151,3,9,84,0,21,12,5,54,1,21,13,3,46,0,31,5,21,232,1,31,39,1,1,69,54,4,4,4,5,117,46,0,
2,41,41,0,1,1,31,5,5,178,0,3,39,0,63,46,2,4,3,6,167,70,0,2,16,10,0,1,1,22,4,5,208,0,1,51);


%nfl(16,14,'OAK','SDC',13,26,0,10,0,3,0,3,7,10,6,0,10,3,1,4,13,1,2,54,9,1,3,12,73,0,25,18,11,7,6,
6,11,0,0,67,11,2,5,3,24,0,34,42,20,36,206,0,1,1,0,20,36,206,0,1,1,0,10,45,0,4,8,1,17,59,1,5,71,0,
24,8,2,43,0,37,3,3,27,0,16,3,20,206,0,37,36,1,19,29,201,1,1,1,5,19,29,196,1,1,1,5,25,99,1,8,52,0,
37,148,1,4,54,0,22,4,3,42,0,16,3,2,38,0,24,5,19,201,1,24,29,2,0,77,57,4,3,2,6,140,29,0,0,0,0,0,2,
2,42,1,5,271,0,2,63,0,64,47,0,4,2,2,11,9,0,3,35,28,0,4,4,48,2,1,37,0,0,37);


%nfl(16,15,'NEP','BAL',41,7,14,3,3,21,0,0,0,0,7,0,10,7,4,4,13,0,0,62,12,3,3,7,58,2,31,58,13,5,1,5
,14,0,3,74,15,1,3,9,83,0,28,2,14,26,172,1,0,2,14,14,26,158,1,0,2,14,16,76,2,15,54,0,34,142,2,7,77
,0,19,11,2,45,0,34,3,1,21,0,21,4,14,172,1,34,26,0,22,38,260,0,2,4,25,23,42,237,0,3,4,25,11,40,0,3
,39,0,28,121,1,3,69,0,42,8,4,51,0,21,7,4,44,0,17,5,23,262,0,42,42,1,1,73,41,5,10,7,1,22,22,0,1,11
,11,0,2,2,45,5,7,334,1,4,60,0,71,31,3,4,4,2,61,33,0,4,36,22,0,0,1,0,1,4,212,1,1,64);


%nfl(16,16,'CHI','PHI',11,54,0,3,8,0,0,21,3,9,21,0,15,2,1,5,14,2,3,63,13,1,2,2,10,0,29,40,12,16,0
,5,9,1,1,63,12,5,5,2,15,1,30,20,20,35,222,1,1,5,46,22,39,196,1,1,5,46,9,29,0,7,20,0,19,61,0,5,85,
0,30,8,6,76,0,21,9,4,36,1,14,9,22,242,1,30,36,1,21,25,230,2,0,2,5,21,25,225,2,0,2,5,18,133,2,1,11
5,1,36,289,4,3,58,1,24,4,3,53,1,32,3,6,29,0,16,6,21,230,2,32,23,1,0,58,48,2,0,3,8,169,37,0,0,0,0,
0,1,1,50,0,6,227,0,2,50,1,54,50,7,7,5,3,21,17,0,2,2,5,0,1,1,49,7,2,88,0,2,47);

data sasdat.week16; set week16_game1
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```
week16_game2
week16_game3
week16_game4
week16_game5
week16_game6
week16_game7
week16_game8
week16_game9
week16_game10
week16_game11
week16_game12
week16_game13
week16_game14
week16_game15
week16_game16;
run;

/*  WEEK 17  */

%nfl(17,1,'SFO','ARI',23,20,17,0,0,6,0,0,7,0,13,0,15,3,1,3,13,0,1,59,14,2,5,4,20,0,27,40,16,3,0,4
,15,3,4,72,13,1,2,3,30,0,32,20,21,34,310,2,0,2,18,21,34,292,2,0,2,18,1,26,0,4,24,0,23,83,0,9,149,
1,63,11,3,45,1,26,5,2,34,0,29,3,21,310,2,63,62,0,28,49,407,2,1,1,8,28,49,399,2,1,1,8,10,47,0,9,30
,0,22,83,0,6,113,0,49,11,6,91,0,44,12,5,78,0,30,6,28,407,2,49,48,1,0,59,50,2,3,4,3,84,41,0,3,45,2
1,0,3,4,56,2,6,258,1,4,58,0,57,49,5,3,4,3,47,18,0,1,2,2,0,2,4,49,2,3,148,0,0,51);

%nfl(17,2,'CAR','ATL',21,20,0,14,7,0,0,7,3,7,3,0,5,9,2,7,15,0,0,57,10,2,2,4,38,1,25,34,13,5,2,7,1
6,1,1,69,12,1,3,5,56,0,34,26,15,27,149,2,1,1,0,15,27,149,2,1,1,0,12,72,0,10,33,0,29,134,0,2,75,0,
56,2,6,42,1,8,8,2,16,0,12,3,15,149,2,56,27,1,28,40,280,2,1,9,49,28,40,231,2,1,9,49,13,41,0,5,36,0
,20,76,0,8,91,1,39,14,7,58,0,12,9,4,56,0,23,4,28,280,2,39,40,0,1,66,48,12,3,14,1,31,31,0,3,33,15,
0,0,0,0,3,6,292,1,3,64,0,58,37,3,2,1,0,0,0,0,3,34,23,0,2,2,42,2,5,242,0,2,57);


%nfl(17,3,'BAL','CIN',17,34,6,0,11,0,0,7,10,0,17,0,12,2,3,4,15,0,2,66,14,1,4,6,56,0,26,3,12,7,2,7
,13,0,0,66,14,2,3,10,76,1,33,57,30,50,192,1,3,2,17,30,50,175,1,3,2,17,5,28,0,6,15,0,14,47,0,8,63,
0,11,11,7,35,0,9,7,5,30,1,9,9,30,192,1,14,48,0,21,36,281,2,4,0,0,21,36,281,2,4,0,0,11,66,0,6,23,1
,30,111,1,3,74,0,38,5,5,61,1,17,7,4,61,1,53,10,21,281,2,53,36,0,0,68,44,2,6,0,6,169,35,0,1,3,3,0,
3,3,38,0,6,285,0,1,55,1,66,43,2,12,7,4,105,28,0,5,35,14,0,2,2,39,4,3,108,0,2,50);

%nfl(17,4,'HOU','TEN',10,16,7,0,0,3,0,0,6,7,3,0,11,6,2,4,10,0,0,57,11,1,2,5,55,0,27,45,6,8,3,4,14
,0,0,61,13,1,2,7,76,0,32,15,22,34,229,0,2,1,6,22,34,223,0,2,1,6,16,50,1,4,8,0,22,65,1,6,76,0,31,6
,6,49,0,13,9,3,49,0,18,7,22,229,0,31,34,2,15,24,166,0,1,1,6,15,24,160,0,1,1,6,27,127,1,1,16,0,36,
151,1,5,50,0,34,7,2,39,0,32,6,1,32,0,32,1,15,166,0,34,24,0,0,64,50,7,5,7,3,83,42,0,0,0,0,0,1,1,19
,1,5,229,0,3,53,0,56,36,4,8,2,2,54,27,0,1,18,18,0,3,3,55,1,6,253,0,6,56);

%nfl(17,5,'JAX','IND',10,30,0,3,0,7,0,17,3,7,3,0,17,2,0,3,14,3,5,70,11,1,2,5,50,0,26,20,17,4,2,8,
16,1,1,70,13,3,5,2,10,0,33,40,30,51,331,1,1,3,23,30,51,308,1,1,3,23,13,39,0,2,3,0,16,42,0,8,75,1,
15,9,3,70,0,36,6,5,51,0,14,6,30,331,1,36,49,1,26,37,282,1,0,1,8,27,41,299,1,0,1,8,12,31,1,8,25,1,
28,80,2,11,155,0,41,15,4,32,1,9,7,1,25,0,25,4,29,307,1,41,40,0,0,70,42,2,7,4,2,50,28,0,0,0,0,0,1,
1,37,1,5,230,0,0,49,0,61,35,3,7,8,1,21,21,0,1,5,5,0,3,3,39,3,5,237,1,3,65);

%nfl(17,6,'NYJ','MIA',20,7,0,14,0,6,0,0,7,0,0,0,10,10,2,6,15,0,0,70,11,2,5,5,36,0,32,24,15,2,1,6,
13,0,1,62,11,1,1,5,38,0,27,36,17,27,190,0,0,0,0,18,28,220,0,0,0,0,21,76,0,10,44,1,42,154,2,5,66,0
,31,6,3,41,0,23,4,5,40,0,12,8,18,220,0,34,28,0,20,40,204,1,3,0,0,20,40,204,1,3,0,0,17,73,0,2,19,0
,22,92,0,4,58,0,21,7,4,43,0,21,6,2,38,0,25,5,20,204,1,25,39,0,0,49,42,4,7,3,1,16,16,0,1,7,7,0,
2,3,35,2,5,210,0,3,54,0,62,54,2,2,2,4,53,38,0,3,27,15,0,0,0,0,1,5,244,3,0,63);

%nfl(17,7,'DET','MIN',13,14,0,0,7,6,0,7,0,0,7,0,9,4,1,5,15,0,0,60,11,1,2,6,52,0,32,37,12,6,1,3,11
,0,0,56,11,1,3,4,25,0,27,23,22,33,217,1,0,5,35,22,33,182,1,0,5,35,14,32,0,8,31,0,22,63,0,5,75,0,3
2,10,5,64,0,24,7,5,33,1,19,6,22,217,1,32,32,0,20,33,189,1,1,3,18,20,33,171,1,1,3,18,14,115,0,2,54
,1,20,174,1,5,44,0,14,6,5,43,0,14,7,2,31,1,23,5,20,189,1,23,33,1,0,55,33,2,7,4,1,20,20,0,2,8,8,0,
2,2,53,1,7,355,1,2,63,0,65,43,7,1,6,3,51,23,0,3,77,50,0,0,0,0,2,6,244,0,3,53);


%nfl(17,8,'WAS','NYG',6,20,0,6,0,0,0,0,10,7,3,0,7,5,0,5,20,1,3,75,18,0,2,3,30,0,28,21,7,6,1,3,14,
0,0,68,17,0,3,3,20,0,31,39,19,49,169,0,2,3,9,19,49,160,0,2,3,9,16,62,0,3,24,0,23,91,0,6,56,0,21,1
0,3,33,0,14,11,4,32,0,13,8,19,169,0,21,48,2,10,24,152,1,1,1,7,12,32,156,1,2,1,7,2,57,1,17,56,0,32
,122,1,6,90,1,30,7,2,50,0,35,4,2,9,0,6,5,12,163,1,35,31,1,0,74,55,10,12,3,5,93,27,0,5,23,10,0,2,2
,49,0,9,364,0,3,53,0,81,57,4,17,5,3,66,32,0,4,9,8,0,2,3,38,2,8,352,0,4,50);
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```
%nfl(17,9,'CLE','PIT',7,20,0,0,0,7,0,7,7,3,3,0,10,4,1,6,15,0,3,64,11,0,1,3,30,0,29,43,11,6,0,5,12
,0,0,61,12,2,4,2,15,0,30,17,23,41,240,1,1,3,26,23,41,214,1,1,3,26,18,69,0,1,6,0,20,79,0,7,82,0,20
,10,5,69,0,24,7,2,38,1,35,5,23,240,1,35,41,1,19,31,179,1,2,1,7,19,31,172,1,2,1,7,20,90,1,2,11,0,2
9,120,1,9,87,0,24,14,2,26,0,17,4,3,25,1,12,6,19,179,1,24,31,0,0,71,40,1,4,1,0,0,0,0,1,21,21,0,0,0
,0,1,5,192,1,0,44,0,56,47,5,6,3,0,0,0,0,3,21,9,0,2,2,32,2,4,167,1,0,45);

%nfl(17,10,'GBP','CHI',33,28,0,13,7,13,0,7,0,14,7,0,14,9,2,9,18,3,3,76,11,3,6,1,15,0,35,9,8,9,0,5
,10,0,0,49,10,4,4,5,40,0,24,51,25,39,318,2,2,3,5,25,39,313,2,2,3,5,11,88,0,21,66,1,34,160,1,10,16
1,0,34,16,2,55,2,48,2,6,41,0,12,7,25,318,2,48,39,0,15,24,226,2,1,1,2,15,24,224,2,1,1,2,22,110,2,2
,11,0,24,121,2,3,80,0,67,8,6,74,1,37,10,4,47,1,33,4,15,226,2,67,24,1,0,48,42,2,3,1,2,40,22,0,1,0,
0,0,2,2,33,3,2,80,0,0,50,0,65,59,2,3,3,7,138,39,0,1,49,49,0,0,0,0,4,4,137,1,1,39);


%nfl(17,11,'DEN','OAK',34,14,14,17,0,3,0,0,0,0,14,0,19,9,0,9,15,0,0,73,11,3,4,6,56,0,35,29,13,3,1
,5,13,0,1,60,11,2,2,2,10,0,24,31,25,28,266,4,0,1,9,34,41,334,4,0,3,17,10,72,0,12,30,0,29,124,0,6,
113,2,63,6,3,42,0,19,6,5,51,1,12,6,34,351,4,63,41,0,21,38,207,2,0,2,16,21,38,191,2,0,2,16,9,49,0,
4,9,0,20,64,0,4,63,0,24,7,5,40,1,14,9,3,38,0,22,8,21,207,2,24,38,1,0,45,39,6,1,2,1,0,0,0,1,0,0,0,
2,2,54,4,3,120,1,1,48,0,68,56,6,0,3,2,51,27,0,1,1,1,0,0,1,0,2,5,229,1,2,52);


%nfl(17,12,'BUF','NEP',20,34,3,0,7,10,0,6,10,0,18,0,10,8,1,4,13,0,3,38,11,2,4,6,54,0,27,13,7,12,5
,4,13,0,0,68,13,1,4,4,31,0,32,47,16,29,247,1,0,4,23,16,29,224,1,0,4,23,19,105,0,14,60,1,35,169,1,
3,62,1,41,5,3,55,0,27,4,3,53,0,37,6,16,247,1,41,28,0,14,24,122,1,1,1,7,14,24,115,1,1,1,7,24,189,2
,12,74,0,43,267,2,9,65,0,14,11,3,42,1,22,5,1,9,0,9,3,14,122,1,22,24,0,0,83,37,4,1,2,1,28,28,0,0,0
,0,0,2,2,51,2,4,169,0,2,51,0,60,40,6,1,6,4,189,83,0,2,7,7,0,4,4,43,2,3,137,1,1,53);


%nfl(17,13,'TBB','NOS',17,42,7,7,3,0,0,14,14,7,7,0,11,4,3,3,13,1,3,62,12,1,1,8,78,0,25,48,14,7,0,
7,13,1,2,62,12,3,3,9,94,0,34,12,22,41,219,2,1,2,4,22,42,215,2,1,2,4,11,35,0,5,35,0,18,75,0,5,93,1
,48,7,5,58,1,24,10,4,35,0,12,12,22,219,2,48,39,0,24,31,381,4,0,1,11,24,31,370,4,0,1,11,12,50,0,7,
20,1,30,98,2,7,76,1,76,1,4,73,1,44,5,5,71,1,33,8,24,381,4,76,31,0,0,56,44,6,4,4,3,69,26,0,0,0,0,0
,1,1,54,2,5,240,0,2,52,0,48,38,5,8,5,1,22,22,0,1,0,0,0,0,0,0,6,4,161,1,2,50);


%nfl(17,14,'KCC','SDC',24,27,14,7,3,0,0,7,7,0,10,3,11,9,2,6,14,0,1,69,12,3,3,1,5,0,34,36,9,9,1,9,
17,1,1,72,12,2,4,4,22,0,37,8,21,30,200,1,0,2,11,21,30,189,1,0,2,11,27,81,2,7,59,0,37,143,2,3,67,0
,48,7,6,62,1,28,6,5,45,0,24,6,21,200,1,48,30,0,22,33,229,3,1,3,10,22,33,219,3,1,3,10,24,144,0,5,1
8,0,36,186,0,5,89,0,38,8,7,42,0,9,7,3,34,1,30,5,22,229,3,38,32,0,0,76,62,3,5,6,4,125,41,0,1,32,32
,0,1,2,46,3,5,229,1,0,54,0,82,61,12,2,6,3,70,28,0,2,6,7,0,2,2,36,3,5,252,0,3,52);

%nfl(17,15,'STL','SEA',9,27,0,0,3,6,0,7,6,7,7,0,8,1,2,2,11,0,0,50,12,1,2,12,87,0,26,20,8,7,5,4,13
,1,1,63,11,1,3,7,65,1,33,40,21,30,157,1,2,2,12,21,30,145,1,2,2,12,15,1,0,2,2,0,18,13,0,5,54,0,21,
6,4,33,0,13,5,5,30,1,14,7,21,157,1,21,30,0,15,23,172,1,0,4,14,15,23,158,1,0,4,14,23,97,1,7,13,0,3
6,111,1,8,129,1,47,9,3,21,0,14,5,1,8,0,8,1,15,172,1,47,21,0,0,73,42,7,2,8,3,54,31,0,5,57,32,0,1,1
,36,0,7,337,0,1,58,1,60,32,5,4,6,0,0,0,0,2,-2,5,0,2,2,35,3,6,318,0,3,68);


%nfl(17,16,'PHI','DAL',24,22,3,14,0,7,0,0,10,6,6,0,12,9,0,5,13,0,1,66,13,3,4,6,50,0,29,43,16,4,1,
3,11,1,2,64,12,1,2,1,5,0,30,17,17,26,263,2,0,5,34,17,27,229,2,0,5,34,27,131,0,2,11,1,34,137,1,3,7
1,1,35,5,3,45,0,22,5,3,43,0,17,5,17,263,2,35,25,1,30,46,358,2,2,0,0,30,46,358,2,2,0,0,17,48,0,1,8
,0,18,56,0,12,135,0,34,16,8,99,1,32,13,5,39,0,18,7,30,358,2,39,44,1,0,63,41,2,5,2,1,11,11,0,2,24,
23,0,1,1,47,3,5,237,0,1,56,0,66,49,7,0,7,2,65,36,0,3,18,11,0,3,3,44,10,3,111,0,2,44);


data sasdat.week17; set week17_game1
week17_game2
week17_game3
week17_game4
week17_game5
week17_game6
week17_game7
week17_game8
week17_game9
week17_game10
week17_game11
week17_game12
week17_game13
week17_game14
week17_game15
week17_game16;
run;
```

```
/*      sort by Team          */

%macro sort(macro_week);
libname sasdat 'H:\Stat 330 SAS\sasdat';
proc sort data=sasdat.week&macro_week;
by Team;
run;
%mend;

%sort(1);
%sort(2);
%sort(3);
%sort(4);
%sort(5);
%sort(6);
%sort(7);
%sort(8);
%sort(9);
%sort(10);
%sort(11);
%sort(12);
%sort(13);
%sort(14);
%sort(15);
%sort(16);
%sort(17);

libname sasdat 'H:\Stat 330 SAS\sasdat';

%macro teams(macro_teams);
libname sasdat 'H:\Stat 330 SAS\sasdat';
data week_&macro_teams; set sasdat.week&macro_teams;
keep Team;
run;
%mend;

%teams(1);
%teams(2);
%teams(3);
%teams(4);
%teams(5);
%teams(6);
%teams(7);
%teams(8);
%teams(9);
%teams(10);
%teams(11);
%teams(12);
%teams(13);
%teams(14);
%teams(15);
%teams(16);
%teams(17);



/* For weeks with 2 teams total with byes */
%macro twobyes(macro_byeweek);
libname sasdat 'H:\Stat 330 SAS\sasdat';

data testing;
merge week_1 (rename=(Team=Team1))
week_&macro_byeweek(in=a);
run;


data byeweek_&macro_byeweek; set testing;
if Team1 NE Team then fteambye='yes';
if Team1=lag(Team) then fteambye='';
```

```
if Team1=lag2(Team) then steambye=1;
if fteambye='yes' and steambye='' then byeweek=&macro_byeweek;
if byeweek NE ' ';
drop fteambye steambye Team;
run;
%mend;

%twobyes(4);
%twobyes(6);
%twobyes(7);
%twobyes(11);


/*For 4 byes in a week*/
%macro fourbyes(macro_fbyeweek);

data testing;
merge week_1 (rename=(Team=Team1))
week_&macro_fbyeweek(in=a);
run;

data byeweek_&macro_fbyeweek; set testing;
if Team1 NE Team then fteambye='yes';
if Team1=lag(Team) then fteambye='';
if Team1=lag2(Team) then steambye=1;
if Team1=lag3(Team) then tteambye=1;
if Team1=lag4(Team) then fourthteambye=1;
if fteambye='yes' and steambye='' and tteambye='' and fourthteambye='' then
byeweek=&macro_fbyeweek;
if byeweek NE ' ';
drop fteambye steambye tteambye fourthteambye Team;
run;

%mend;

%fourbyes(5);
%fourbyes(10);
%fourbyes(12);

/*For 6 byes in a week*/
%macro sixbyes(macro_sbyeweek);

data testing;
merge week_1 (rename=(Team=Team1))
week_&macro_sbyeweek(in=a);
run;

data byeweek_&macro_sbyeweek; set testing;
if Team1 NE Team then fteambye='yes';
if Team1=lag(Team) then fteambye='';
if Team1=lag2(Team) then steambye=1;
if Team1=lag3(Team) then tteambye=1;
if Team1=lag4(Team) then fourthteambye=1;
if Team1=lag5(Team) then fifthteambye=1;
if Team1=lag6(Team) then sixthteambye=1;
if fteambye='yes' and steambye='' and tteambye='' and fourthteambye='' and fifthteambye='' and
sixthteambye='' then byeweek=&macro_sbyeweek;
if byeweek NE ' ';
drop fteambye steambye tteambye fourthteambye fifthteambye sixthteambye Team;
run;

%mend;

%sixbyes(8);
%sixbyes(9);


%macro insertbyes(weeknum);
libname sasdat 'H:\Stat 330 SAS\sasdat';

data stackbyes;
```

```
set sasdat.week&weeknum
byeweek_&weeknum;
drop byeweek;
run;

data fixteams; set stackbyes;
if Team=' ' then Team=Team1;
drop Team1;
run;

data byesinserted_&weeknum; set fixteams;
if Win=' ' and Loss=' ' and Tie=' ' then do;

Win=0; Loss=0; Tie=0; Win_pct=0; Loss_pct=0; PF=0; PA=0; spread=0; home_win=0; home_loss=0;
home_games=0; home_win_pct=0; home_loss_pct=0; away_win=0; away_loss=0; away_games=0;
away_win_pct=0; away_loss_pct=0; div_win=0; div_loss=0;
div_games=0; div_win_pct=0; div_loss_pct=0; conf_win=0; conf_loss=0; conf_games=0;
conf win pct=0; conf loss pct=0; q1 points=0; q2 points=0; q3 points=0; q4_points=0; ot_points=0;
firsthalf=0; secondhalf=0; firstthree=0; pfirstdowns=0; rfirstdowns=0;
penalty_fdowns=0; total_first_downs=0; thirddown_suc=0; thirddown_fail=0; thirddown_att=0;
thirddown_convpct=0; thirddown_failpct=0; fourthdown_suc=0; fourthdown_fail=0; fourthdown_att=0;
fourthdown_convpct=0;
fourthdown_failpct=0; total_yds=0; total_plays=0; total_drives=0; total_plays_drive=0;
total_yds_play=0; total_yds_drive=0; redzone_suc=0; redzone_fail=0; redzone_att=0;
redzone_convpct=0; redzone_failpct=0; num_penalties=0; penalty_yards=0; yards_per_penalty=0;
dst_tds=0;
picksixes=0; dst_td_fum=0; top=0; fqb_comp=0; fqb_incomp=0; fqb_att=0; fqb_comp_pct=0;
fqb_incomp_pct=0; fqb_pass_yds=0; fqb_yds_comp=0; fqb_pass_tds=0; fqb_tds_comp=0; fqb_ints=0;
fqb rating=0; fqb sack yds=0; total comps=0; total att=0;
total_comp_pct=0; total_incomps=0; total_incomp_pct=0; total_passing_yds=0; total_yds_comp=0;
total_pass_tds=0; total_tds_comp=0; total_ints=0; total_sacks=0; total_sack_yds=0; fr_car=0;
fr_yds=0; fr_yds_car=0;
fr_tds=0; fr_tds_car=0; sr_car=0; sr_yds=0; sr_yds_car=0; sr_tds=0; sr_tds_car=0; toptwo_car=0;
toptwo_yds=0; toptwo_yds_car=0; toptwo_tds=0; toptwo_tds_car=0; total_carries=0;
total_rush_yds=0; total_yds_car=0;
total_rush_tds=0; total_tds_car=0; fwr_rec=0; fwr_yds=0; fwr_yds_rec=0; fwr_tar=0;
fwr_comp_pct=0; fwr_tds=0; fwr_tds_rec=0; fwr_lg=0; swr_rec=0; swr_yds=0; swr_yds_rec=0;
swr_tar=0; swr_comp_pct=0; swr_tds=0; swr_tds_rec=0;
swr_lg=0; twr_rec=0; twr_yds=0; twr_yds_rec=0; twr_tar=0; twr_comp_pct=0; twr_tds=0;
twr_tds_rec=0; twr_lg=0; topthree_rec=0; topthree_rec_yds=0; topthree_yds_rec=0; topthree_tar=0;
topthree comp pct=0;
topthree_rec_tds=0; topthree_tds_rec=0; topthree_lg=0; total_rec=0; total_rec_yds=0;
total_yds_rec=0; total_rec_tds=0; total_tds_rec=0; total_tar=0; total_comp_pct=0; lg_rec=0;
off_tds=0; fum_lost=0; turnovers=0;
total_tackles=0; solo_tackles=0; joint_tackles=0; tfl=0; pds=0; qb_hits=0; num_krs=0; kr_yds=0;
kr_avg=0; kr_lg=0; kr_tds=0; num_pr=0; pr_yds=0; pr_avg=0; pr_lg=0; pr_tds=0; fg_att=0;
fg_made=0; fg_pct=0; fg_lg=0; longestfg_length=' ';
xp_made=0; kick_points=0; punts=0; punt_yds=0; punt_avg=0; punt_lg=0; tbs=0; und_twenty=0;
end;
run;

proc sort data=byesinserted_&weeknum;
by Team;
run;

%mend;

%insertbyes(4);
%insertbyes(5);
%insertbyes(6);
%insertbyes(7);
%insertbyes(8);
%insertbyes(9);
%insertbyes(10);
%insertbyes(11);
%insertbyes(12);

%macro finalassign(weeknum);
libname sasdat 'H:\Stat 330 SAS\sasdat';
data r_week&weeknum; set sasdat.week&weeknum;
drop Team Conf Div Week longestfg_length;
```

```
run;
%mend;

%finalassign(1);
%finalassign(2);
%finalassign(3);
%finalassign(13);
%finalassign(14);
%finalassign(15);
%finalassign(16);
%finalassign(17);


%macro finalassignbye(weeknum);
libname sasdat 'H:\Stat 330 SAS\sasdat';
data r_week&weeknum; set byesinserted_&weeknum;
drop Team Conf Div Week longestfg_length;
run;
%mend;

%finalassignbye(4);
%finalassignbye(5);
%finalassignbye(6);
%finalassignbye(7);
%finalassignbye(8);
%finalassignbye(9);
%finalassignbye(10);
%finalassignbye(11);
%finalassignbye(12);

/* Exporting final data sets for each week into comma separted Excel files (.csv) */

%macro Excel;
%do n = 1 % to 17;
libname sasdat "H:\Stat 330 SAS\sasdat";
proc export data = r_week&n
outfile = "H:\Stat 330 SAS\sasdat\r_week&n..csv"
dbms = csv label replace;
run;
%end;
%mend Excel;

%Excel


/*Extract team names for R analysis*/

libname sasdat "H:\Stat 330 SAS\sasdat";
data sortteams; set sasdat.week1;
keep Team;
run;

proc sort data=sortteams out=teamnames;
by Team;
run;

/*Export csv file for teamnames for R analysis*/

proc export data = teamnames
outfile = "H:\Stat 330 SAS\sasdat\teamnames.csv"
dbms = csv label replace;
run;
```

(E) R Code

```
#######################
# data set read in
#######################

setwd('H:/Stat 330 SAS/sasdat')
numbers=c(1:17)
all.weeks=0
for (i in 1:17)
{
  each.week = read.csv(paste("r_week",numbers[i],".csv", sep=""), header=TRUE)
  each.week[is.na(each.week)] = 0
  all.weeks = all.weeks + each.week
}

teamnames=read.csv(file="teamnames.csv", header=T)
nfl=cbind(teamnames, all.weeks)

#####################
# fix percent calcs
#####################

nfl$Win_pct=nfl$Win_pct/16;
nfl$Loss_pct=nfl$Loss_pct/16;
nfl$home_win_pct=nfl$home_win_pct/8;
nfl$home_loss_pct=nfl$home_loss_pct/8;
nfl$away_win_pct=nfl$away_win_pct/8;
nfl$away_loss_pct=nfl$away_loss_pct/8;
nfl$div_win_pct=nfl$div_win_pct/6;
nfl$div_loss=6-nfl$div_win
nfl$div_games=nfl$div_win + nfl$div_loss
nfl$div_loss_pct=1-nfl$div_win_pct;
nfl$conf_win_pct=nfl$conf_win_pct/12;
nfl$conf_loss_pct=nfl$conf_loss_pct/12;
nfl$thirddown_convpct=nfl$thirddown_convpct/16;
nfl$thirddown_failpct=nfl$thirddown_failpct/16;
nfl$fourthdown_convpct=nfl$fourthdown_suc/nfl$fourthdown_att
nfl$fourthdown_failpct=1-nfl$fourthdown_convpct
nfl$total_plays_drive=nfl$total_plays_drive/16;
nfl$total_yds_play=nfl$total_yds_play/16;
nfl$total_yds_drive=nfl$total_yds_drive/16;
nfl$redzone_convpct=nfl$redzone_suc/nfl$redzone_att
nfl$redzone_failpct=1-nfl$redzone_convpct
nfl$yards_per_penalty=nfl$yards_per_penalty/16;
nfl$fqb_comp_pct=nfl$fqb_comp_pct/16;
nfl$fqb_incomp_pct=nfl$fqb_incomp_pct/16;
nfl$fqb_yds_comp=nfl$fqb_yds_comp/16;
nfl$fqb_tds_comp=nfl$fqb_tds_comp/16;
nfl$fqb_rating=nfl$fqb_rating;
nfl$total_comp_pct=nfl$total_comp_pct/16;
nfl$total_incomp_pct=nfl$total_incomp_pct/16;
nfl$total_yds_comp=nfl$total_yds_comp/16;
nfl$total_tds_comp=nfl$total_tds_comp/16;
nfl$fr_yds_car=nfl$fr_yds_car/16;
nfl$fr_tds_car=nfl$fr_tds_car/16;
nfl$sr_yds_car=nfl$sr_yds_car/16;
nfl$sr_tds_car=nfl$sr_tds_car/16;
nfl$toptwo_yds_car=nfl$toptwo_yds_car/16
nfl$toptwo_tds_car=nfl$toptwo_tds_car/16;
```

```
nfl$total_yds_car=nfl$total_yds_car/16;
nfl$total_tds_car=nfl$total_tds_car/16;
nfl$fwr_yds_rec=nfl$fwr_yds_rec/16;
nfl$fwr_comp_pct=nfl$fwr_comp_pct/16;
nfl$fwr_tds_rec=nfl$fwr_tds_rec/16;
nfl$swr_yds_rec=nfl$swr_yds_rec/16;
nfl$swr_comp_pct=nfl$swr_comp_pct/16;
nfl$swr_tds_rec=nfl$swr_tds_rec/16;
nfl$twr_yds_rec=nfl$twr_yds_rec/16;
nfl$twr_comp_pct=nfl$twr_comp_pct/16;
nfl$twr_tds_rec=nfl$twr_tds_rec/16;
nfl$topthree_yds_rec=nfl$topthree_yds_rec/16;
nfl$topthree_comp_pct=nfl$topthree_comp_pct/16;
nfl$topthree_tds_rec=nfl$topthree_tds_rec/16;
nfl$total_yds_rec=nfl$total_yds_rec/16;
nfl$total_tds_rec=nfl$total_tds_rec/16;
nfl$kr_avg=nfl$kr_avg/16;
nfl$pr_avg=nfl$pr_avg/16;
nfl$fg_pct=nfl$fg_pct/16;
nfl$punt_avg=nfl$punt_avg/16;


##################################

#  one predictor models

##################################

oneway.function=function(response) {
y=response

if (y=='nfl$Win') {assign('y',nfl$Win)
} else if (y=='nfl$spread') {assign('y',nfl$spread)
}


var.names = names(nfl)

#choosing only predictors that make sense to test
if (y=='nfl$Win~') {
var.names = c(var.names[7:9], var.names[13], var.names[18], var.names[23], var.names[28],
var.names[30:43], var.names[45], var.names[47:48], var.names[50], var.names[52:59],
var.names[61], var.names[63:183])
print('Models using Win as the response variable')
} else if (y=='nfl$spread~') {
var.names = c(var.names[7:8], var.names[2], var.names[13], var.names[18], var.names[23],
var.names[28], var.names[30:43], var.names[45], var.names[47:48], var.names[50],
var.names[52:59], var.names[61], var.names[63:183])
print('Models using Spread as the response variable')
}
info=matrix(ncol=3, nrow=155)

colnames(info) = c("p.value", "significant", "adjusted r squared")
rownames(info)=var.names

for (i in 1:155)
{
    resp=paste(y,'nfl$',sep='')

    model = lm(paste(resp,var.names[i], sep=""))
```

```
    #saving p-value
    info[i,1] = summary(model)$coef[2,4]

    #saving significance, 1 if significant and 0 if not significant
    info[i,2] = (info[i,1]<=.05)*1 + (info[i,1]>.05)*0

    #saving adjusted r squared
    info[i,3] = summary(model)$adj.r.squared
}

info.significant = info[info[,2]==1,]

data.info=data.frame(info.significant)


if (mean(data.info$significant)==1) {data.info$significant='yes'
}

oneway=data.info[order(-data.info$adjusted.r.squared), , drop = FALSE]
oneway
}


##########################################

# 2 explanatory variables predictor models

##########################################

twoways.function=function(numvars,response,deepertype){
N=numvars
y=response
type=deepertype

if (y=='nfl$Win') {assign('y',nfl$Win)
} else if (y=='nfl$spread') {assign('y',nfl$spread)
}

if (y=='nfl$Win~') {
win_names=oneway.function('nfl$Win~')
pred=rownames(win_names)

} else if (y=='nfl$spread~') {
win=names(nfl)[2]
spread_names=oneway.function('nfl$spread~')
pred=c(win,rownames(spread_names))
pred=pred[-2]
}


if (type=='top') {
print('Top Predictors')
top15=head(pred,N)
} else if (type=='deeper') {
print('Deeper Predictors')
try=head(pred,N+4)
top15=c(try[-(1:4)])
} else if (type=='deepest') {
print('Deepest Predictors')
try=head(pred,N+8)
top15=c(try[-(1:8)])
```

```
}

top14plus=rep(NA,N-1)
for (i in 1:(N-1))
{
top14plus[i]=paste(top15[i],'+',sep='')
}

nfl_top15=rep(NA,N)
for (i in 1:N)
{
nfl_top15[i]=paste('nfl$',top15[i],sep='')
}

nfl_top14plus=rep(NA,N-1)
for (i in 1:(N-1))
{
nfl_top14plus[i]=paste('nfl$',top14plus[i],sep='')
}

nflwin_top14plus=rep(NA,N-1)
for (i in 1:(N-1))
{
nflwin_top14plus[i]=paste(y,nfl_top14plus[i],sep='')
}

revtop15=rev(top15)
revtop15new=rep(NA,N)
############################################################
for (j in 1:(N-1))
{
          for (m in 1:(N-j))
          {
          revtop15new[m]=paste(top14plus[j],revtop15[m],sep='')
          }

          info=matrix(ncol=3, nrow=N-j)
          colnames(info) = c("p.value", "significant", "adjusted r squared")
          rownames(info) = head(revtop15new,N-j)
                    for (i in j:(N-1))
                    {
                              mod=lm(paste(nflwin_top14plus[j], nfl_top15[i+1], sep=''))

                              f=summary(mod)$fstatistic[1]
                              numdf=summary(mod)$fstatistic[2]
                              dendf=summary(mod)$fstatistic[3]
                              p=pf(f,numdf,dendf,lower.tail=F)

                              info[N-i,1] = p
                              info[N-i,2] = (info[N-i,1]<=.05)*1 + (info[N-i,1]>.05)*0
                              info[N-i,3] = summary(mod)$adj.r.squared

                    }

          data.info=data.frame(info)
          for (n in j:(N-1))
          {

          if (data.info$significant[N-n]==1) {data.info$significant[N-n]='yes'
      } else {data.info$significant[N-n]='no'
          }
```

```
          }

          data.info=data.info[order(-data.info$adjusted.r.squared), , drop = FALSE]


for (b in 1:(N-1))
{
          if (j==b) {
          assign(paste('data.info',b,sep=''),data.info)
                      }

}
}
#################################################################

twoways=NULL
for (i in 1:(N-1))
{
  data=get(paste("data.info", i, sep=""))
  twoways=rbind(twoways,data)
}

twoways=twoways[order(-twoways$adjusted.r.squared), , drop = FALSE]

#getting rid of a multicollinearity models
twoways<-twoways[!(twoways$adjusted.r.squared==1),]
twoways
}

#############################################################

# 3 way models

#############################################################
threeways.function=function(numvars,response,deepertype){
N=numvars
y=response
type=deepertype

if (y=='nfl$Win') {assign('y',nfl$Win)
} else if (y=='nfl$spread') {assign('y',nfl$spread)
}

if (y=='nfl$Win~') {
win_names=oneway.function('nfl$Win~')
pred=rownames(win_names)

} else if (y=='nfl$spread~') {
win=names(nfl)[2]
spread_names=oneway.function('nfl$spread~')
pred=c(win,rownames(spread_names))
pred=pred[-2]
}

if (type=='top') {
top9=head(pred,N)
print('Top Predictors')
} else if (type=='deeper') {
```

```
try=head(pred,N+4)
top9=c(try[-(1:4)])
print('Deeper Predictors')
} else if (type=='deepest') {
print('Deepest Predictors')
try=head(pred,N+8)
top9=c(try[-(1:8)])
}

top7plus=rep(NA,N-2)

for (i in 1:(N-2))
{
top7plus[i]=paste(top9[i],'+',sep='')
}

top8plus=rep(NA,N-1)

for (i in 1:N-1)
{
top8plus[i]=paste(top9[i],'+',sep='')
}


nfl_top9=rep(NA,N)

for (i in 1:N)
{
nfl_top9[i]=paste('nfl$',top9[i],sep='')
}


nfl_top7plus=rep(NA,N-2)

for (i in 1:(N-2))
{
nfl_top7plus[i]=paste('nfl$',top7plus[i],sep='')
}


nfl_top8plus=rep(NA,N-1)

for (i in 1:N-1)
{
nfl_top8plus[i]=paste('nfl$',top8plus[i],sep='')
}


nflwin_top7plus=rep(NA,N-2)

for (i in 1:(N-2))
{

nflwin_top7plus[i]=paste(y,nfl_top7plus[i],sep='')
}

var.names = names(nfl)

#choosing only predictors that make sense to test
if (y=='nfl$Win~') {
```

```
var.names = c(var.names[7:9], var.names[13], var.names[18], var.names[23], var.names[28],
var.names[30:43], var.names[45], var.names[47:48], var.names[50], var.names[52:59],
var.names[61], var.names[63:183])
} else if (y=='nfl$spread~') {
var.names = c(var.names[7:8], var.names[2], var.names[13], var.names[18], var.names[23],
var.names[28], var.names[30:43], var.names[45], var.names[47:48], var.names[50],
var.names[52:59], var.names[61], var.names[63:183])
}


modcomplete=0

for (i in 1:(N-2))
{
          for (j in (i+1):(N-1))

          {

          hello=paste(nflwin_top7plus[i],nfl_top8plus[j],sep='')
          hey=paste(top7plus[i],top8plus[j],sep='')

                    info=matrix(ncol=3, nrow=N-j)

                    revtop9new=NULL
                    for (k in j:(N-1))

                    {
                    colnames(info)=c('p.value','significant','adjusted.r.squared')
                    mod=lm(paste(hello,nfl_top9[k+1],sep=''))

                    revtop9new[N-k]=paste(hey,top9[j+N-k],sep='')

                                        f=summary(mod)$fstatistic[1]
                                        numdf=summary(mod)$fstatistic[2]
                                        dendf=summary(mod)$fstatistic[3]
                                        p=pf(f,numdf,dendf,lower.tail=F)


                                        info[N-k,1] = p
                                        info[N-k,2] = (info[N-k,1]<=.05)*1 + (info[N-k,1]>.05)*0
                                        info[N-k,3] = summary(mod)$adj.r.squared

                    }
                    modcomplete=modcomplete+1
                    revrevtop9new=rev(revtop9new)
                    rownames(info)=head(revrevtop9new,N-j)

                    data.info=data.frame(info)

          for (n in j:(N-1))

          {

                    if (data.info$significant[N-n]==1) {data.info$significant[N-n]='yes'
          } else {data.info$significant[N-n]='no'
                    }

          }
```

```
                    assign(paste('data.info',modcomplete,sep=''),data.info)

          }
}

threeways=NULL
 for (r in 1:modcomplete)
{
  data=get(paste("data.info", r, sep=""))
  threeways=rbind(threeways,data)
}

threeways=threeways[order(-threeways$adjusted.r.squared), , drop = FALSE]

#getting rid of a multicollinearity models
#threeways=threeways[!(threeways$adjusted.r.squared==1),]

threeways
}

#can change parameter of oneway.function to any response variable desired,
#as long as you include old parameter in predictors, and remove new
#response variable as predictor in var.names.
#head(x,50) prints out the first 50 observations in dataset.
head(oneway.function('nfl$Win~'),50)
head(oneway.function('nfl$spread~'),50)

#can change second parameter of twoways.function to any response variable desired,
#as long as you include old parameter in predictors, and remove new
#response variable as predictor in var.names.

#also, can change first parameter to anything else to create a new desired number of total two
predictor models.
#For example, this 15 entered will create 15 choose 2 = 84 models with 2 predictors each,
making every possible combination of 2 predictors.
#Another example, if one entered 10, the function will create 10 choose 2 =  45 models with 2
predictors each, making every possible
#combination of 2 predictors.

#twoways.function(15,'nfl$Win~')
head(twoways.function(15,'nfl$Win~','top'),50)
head(twoways.function(15,'nfl$spread~','top'),50)

#can change second parameter of threeways.function to any response variable desired,
#as long as you include old parameter in predictors, and remove new
#response variable as predictor in var.names.

#Also, can change the first parameter, 15 in this case,  to anything else to create a new
desired number of total two predictor models.
#For example, this 15 entered will create 15 choose 3 = 455 models with 3 predictors each,
making every possible comination of 3 predictors.
#Another example, if one entered 10, the function will create 10 choose 3 = 120 models with 3
predictors each, making every possible
#combination of 3 predictors.

head(threeways.function(15,'nfl$Win~','top'),50)
head(threeways.function(15,'nfl$spread~','top'),50)


#top predictors
```

```
a=head(oneway.function('nfl$Win~'),50)
b=head(twoways.function(15,'nfl$Win~','top'),50)
c=head(threeways.function(15,'nfl$Win~','top'),50)

d=head(oneway.function('nfl$spread~'),50)
e=head(twoways.function(15,'nfl$spread~','top'),50)
f=head(threeways.function(15,'nfl$spread~','top'),50)

top.win.allmodels.sorted=rbind(a,b,c)
top.win.allmodels.sorted=top.win.allmodels.sorted[order(-
top.win.allmodels.sorted$adjusted.r.squared), , drop = FALSE]
head(top.win.allmodels.sorted,50)

top.spread.allmodels.sorted=rbind(d,e,f)
top.spread.allmodels.sorted=top.spread.allmodels.sorted[order(-
top.spread.allmodels.sorted$adjusted.r.squared), , drop = FALSE]
head(top.spread.allmodels.sorted,50)

#deeper predictors

aa=head(oneway.function('nfl$Win~'),50)
a=aa[5:50,]
b=head(twoways.function(15,'nfl$Win~','deeper'),50)
c=head(threeways.function(15,'nfl$Win~','deeper'),50)

dd=head(oneway.function('nfl$spread~'),50)
d=dd[5:50,]
e=head(twoways.function(15,'nfl$spread~','deeper'),50)
f=head(threeways.function(15,'nfl$spread~','deeper'),50)

deeper.win.allmodels.sorted=rbind(a,b,c)
deeper.win.allmodels.sorted=deeper.win.allmodels.sorted[order(-
deeper.win.allmodels.sorted$adjusted.r.squared), , drop = FALSE]
head(deeper.win.allmodels.sorted,50)

deeper.spread.allmodels.sorted=rbind(d,e,f)
deeper.spread.allmodels.sorted=deeper.spread.allmodels.sorted[order(-
deeper.spread.allmodels.sorted$adjusted.r.squared), , drop = FALSE]
head(deeper.spread.allmodels.sorted,50)

#deepest predictors

aa=head(oneway.function('nfl$Win~'),50)
a=aa[9:50,]
b=head(twoways.function(15,'nfl$Win~','deepest'),50)
c=head(threeways.function(15,'nfl$Win~','deepest'),50)

dd=head(oneway.function('nfl$spread~'),50)
d=dd[9:50,]
e=head(twoways.function(15,'nfl$spread~','deepest'),50)
f=head(threeways.function(15,'nfl$spread~','deepest'),50)

deepest.win.allmodels.sorted=rbind(a,b,c)
deepest.win.allmodels.sorted=deepest.win.allmodels.sorted[order(-
deepest.win.allmodels.sorted$adjusted.r.squared), , drop = FALSE]
head(deepest.win.allmodels.sorted,50)

deepest.spread.allmodels.sorted=rbind(d,e,f)
deepest.spread.allmodels.sorted=deepest.spread.allmodels.sorted[order(-
deepest.spread.allmodels.sorted$adjusted.r.squared), , drop = FALSE]
head(deepest.spread.allmodels.sorted,50)
```

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