STOR538 P2

#### Madison Duffy

#### 2023-03-28

library(readr)  
library(tidyverse)

## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──  
## ✔ dplyr 1.1.0 ✔ purrr 1.0.1  
## ✔ forcats 1.0.0 ✔ stringr 1.5.0  
## ✔ ggplot2 3.4.1 ✔ tibble 3.1.8  
## ✔ lubridate 1.9.2 ✔ tidyr 1.3.0  
## ── Conflicts ────────────────────────────────────────── tidyverse\_conflicts() ──  
## ✖ dplyr::filter() masks stats::filter()  
## ✖ dplyr::lag() masks stats::lag()  
## ℹ Use the ]8;;http://conflicted.r-lib.org/ conflicted package ]8;; to force all conflicts to become errors

library(dplyr)  
library(MASS)

##   
## Attaching package: 'MASS'  
##   
## The following object is masked from 'package:dplyr':  
##   
## select

library(caret)

## Loading required package: lattice

##   
## Attaching package: 'caret'

## The following object is masked from 'package:purrr':  
##   
## lift

data = read\_csv("~/Downloads/Final\_Data.csv")

## New names:  
## Rows: 1066 Columns: 52  
## ── Column specification  
## ──────────────────────────────────────────────────────── Delimiter: "," dbl  
## (52): ...1, Home ID, Away ID, Game\_id, Day, Home\_pts, Away\_pts, Spread\_P...  
## ℹ Use `spec()` to retrieve the full column specification for this data. ℹ  
## Specify the column types or set `show\_col\_types = FALSE` to quiet this message.  
## • `` -> `...1`

cut\_data = data[,c(6:52)]  
head(cut\_data)

## # A tibble: 6 × 47  
## Home\_…¹ Away\_…² Sprea…³ Spread Home\_…⁴ Away\_…⁵ Home\_…⁶ Away\_…⁷ Home\_…⁸ Away\_…⁹  
## <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1 126 117 4.5 9 6 4 0.561 0.5 0.343 0.382  
## 2 123 109 7.5 14 11 9 0.455 0.426 0.356 0.25   
## 3 117 107 15 10 4 15 0.5 0.429 0.28 0.257  
## 4 108 116 8.5 -8 8 12 0.463 0.441 0.429 0.361  
## 5 115 108 12.5 7 14 16 0.415 0.384 0.263 0.311  
## 6 108 130 4.5 -22 9 21 0.449 0.49 0.303 0.462  
## # … with 37 more variables: Home\_Steals <dbl>, Away\_Steals <dbl>,  
## # Home\_TPG <dbl>, Away\_TPG <dbl>, Home\_TSG <dbl>, Away\_TSG <dbl>,  
## # Home\_TOG <dbl>, Away\_TOG <dbl>, Home\_PPG <dbl>, Away\_PPG <dbl>,  
## # Home\_SPG <dbl>, Away\_SPG <dbl>, Home\_OPG <dbl>, Away\_OPG <dbl>,  
## # Matchup\_ID <dbl>, Left\_ID <dbl>, Right\_ID <dbl>, Left\_pts <dbl>,  
## # Right\_pts <dbl>, Left\_FGPct <dbl>, Right\_FGPct <dbl>, Left\_oreb <dbl>,  
## # Right\_oreb <dbl>, Left\_3Pct <dbl>, Right\_3Pct <dbl>, Left\_TPG <dbl>, …

cut\_data = na.omit(cut\_data)

cut\_data2 = data[,c(6,7:29, 33:52)]  
cut\_data2 = na.omit(cut\_data2) #eliminate spread\_pred? not sure what that is

full\_mod = lm(Spread~., data = cut\_data2)

step\_mod = stepAIC(full\_mod, direction = "both", trace = FALSE)

## Warning: attempting model selection on an essentially perfect fit is nonsense

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## changing AIC

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summary(step\_mod)

##   
## Call:  
## lm(formula = Spread ~ Home\_pts + Away\_pts + Home\_oreb + Away\_oreb +   
## Home\_FGPct + Away\_FGPct + Home\_3Pct + Away\_3Pct + Home\_TPG +   
## Away\_TPG + Home\_TSG + Away\_TSG + Home\_TOG + Away\_TOG + Home\_PPG +   
## Away\_PPG + Home\_SPG + Away\_SPG + Home\_OPG + Away\_OPG + Left\_pts +   
## Right\_pts + Left\_FGPct + Right\_FGPct + Left\_oreb + Right\_oreb +   
## Left\_3Pct + Right\_3Pct + Left\_TPG + Right\_TPG + Left\_TSG +   
## Right\_TSG + Left\_TOG + Right\_TOG + Left\_PPG + Right\_PPG +   
## Left\_SPG + Right\_SPG + Left\_OPG + Right\_OPG, data = cut\_data2)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.120e-12 -5.690e-15 2.700e-16 5.310e-15 2.149e-12   
##   
## Coefficients: (10 not defined because of singularities)  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -2.418e-13 4.025e-14 -6.008e+00 2.63e-09 \*\*\*  
## Home\_pts 1.000e+00 4.193e-16 2.385e+15 < 2e-16 \*\*\*  
## Away\_pts -1.000e+00 1.397e-15 -7.161e+14 < 2e-16 \*\*\*  
## Home\_oreb 1.656e-16 8.371e-16 1.980e-01 0.84324   
## Away\_oreb -6.133e-15 2.279e-15 -2.691e+00 0.00724 \*\*   
## Home\_FGPct 5.848e-14 8.454e-14 6.920e-01 0.48929   
## Away\_FGPct -7.503e-13 2.728e-13 -2.750e+00 0.00606 \*\*   
## Home\_3Pct 5.575e-15 3.795e-14 1.470e-01 0.88323   
## Away\_3Pct 3.233e-13 1.186e-13 2.726e+00 0.00652 \*\*   
## Home\_TPG -4.356e-21 6.877e-18 -1.000e-03 0.99949   
## Away\_TPG 2.081e-17 6.832e-17 3.050e-01 0.76070   
## Home\_TSG -2.224e-18 8.041e-17 -2.800e-02 0.97794   
## Away\_TSG 8.436e-17 2.664e-16 3.170e-01 0.75155   
## Home\_TOG 1.956e-18 4.716e-17 4.100e-02 0.96692   
## Away\_TOG 1.352e-16 1.440e-16 9.390e-01 0.34804   
## Home\_PPG -4.410e-16 2.928e-16 -1.506e+00 0.13231   
## Away\_PPG -1.753e-15 2.212e-15 -7.920e-01 0.42838   
## Home\_SPG -1.322e-15 2.949e-15 -4.480e-01 0.65405   
## Away\_SPG -9.243e-15 8.888e-15 -1.040e+00 0.29858   
## Home\_OPG 2.733e-16 1.722e-15 1.590e-01 0.87394   
## Away\_OPG 4.540e-16 5.032e-15 9.000e-02 0.92812   
## Left\_pts 3.624e-16 1.430e-15 2.530e-01 0.80004   
## Right\_pts NA NA NA NA   
## Left\_FGPct 7.456e-13 2.760e-13 2.702e+00 0.00701 \*\*   
## Right\_FGPct NA NA NA NA   
## Left\_oreb 4.671e-15 2.311e-15 2.021e+00 0.04354 \*   
## Right\_oreb NA NA NA NA   
## Left\_3Pct -3.501e-13 1.186e-13 -2.953e+00 0.00323 \*\*   
## Right\_3Pct NA NA NA NA   
## Left\_TPG -2.082e-17 6.830e-17 -3.050e-01 0.76050   
## Right\_TPG NA NA NA NA   
## Left\_TSG -9.855e-17 2.673e-16 -3.690e-01 0.71241   
## Right\_TSG NA NA NA NA   
## Left\_TOG -1.141e-16 1.438e-16 -7.940e-01 0.42767   
## Right\_TOG NA NA NA NA   
## Left\_PPG 1.738e-15 2.212e-15 7.860e-01 0.43215   
## Right\_PPG NA NA NA NA   
## Left\_SPG 7.708e-15 8.921e-15 8.640e-01 0.38776   
## Right\_SPG NA NA NA NA   
## Left\_OPG -1.224e-15 5.002e-15 -2.450e-01 0.80667   
## Right\_OPG NA NA NA NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 8.011e-14 on 991 degrees of freedom  
## Multiple R-squared: 1, Adjusted R-squared: 1   
## F-statistic: 9.227e+29 on 30 and 991 DF, p-value: < 2.2e-16

other\_mod = lm(Spread~(Home\_pts+Away\_pts+Home\_oreb+Away\_oreb+Home\_FGPct+Away\_FGPct+Home\_3Pct+Away\_3Pct+Home\_TPG+Away\_TPG+Home\_TSG+Away\_TSG+Home\_TOG+Away\_TOG+ Home\_PPG+Away\_PPG+Home\_SPG+Away\_SPG+Home\_OPG+Away\_OPG+Left\_pts+Right\_pts+Left\_FGPct+Right\_FGPct+Left\_oreb+Right\_oreb+Left\_3Pct+Right\_3Pct+Left\_TPG+Right\_TPG+Left\_TSG+Right\_TSG+Left\_TOG+Right\_TOG+Left\_PPG+Right\_PPG+Left\_SPG+Right\_SPG+Left\_OPG+Right\_OPG)^2, data = cut\_data2)  
  
summary(other\_mod)

##   
## Call:  
## lm(formula = Spread ~ (Home\_pts + Away\_pts + Home\_oreb + Away\_oreb +   
## Home\_FGPct + Away\_FGPct + Home\_3Pct + Away\_3Pct + Home\_TPG +   
## Away\_TPG + Home\_TSG + Away\_TSG + Home\_TOG + Away\_TOG + Home\_PPG +   
## Away\_PPG + Home\_SPG + Away\_SPG + Home\_OPG + Away\_OPG + Left\_pts +   
## Right\_pts + Left\_FGPct + Right\_FGPct + Left\_oreb + Right\_oreb +   
## Left\_3Pct + Right\_3Pct + Left\_TPG + Right\_TPG + Left\_TSG +   
## Right\_TSG + Left\_TOG + Right\_TOG + Left\_PPG + Right\_PPG +   
## Left\_SPG + Right\_SPG + Left\_OPG + Right\_OPG)^2, data = cut\_data2)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -4.620e-13 -4.950e-15 0.000e+00 4.130e-15 2.349e-13   
##   
## Coefficients: (521 not defined because of singularities)  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 7.112e-14 1.964e-13 3.620e-01 0.717332   
## Home\_pts 1.000e+00 2.868e-15 3.487e+14 < 2e-16 \*\*\*  
## Away\_pts -1.000e+00 7.613e-13 -1.313e+12 < 2e-16 \*\*\*  
## Home\_oreb 2.825e-14 5.779e-15 4.889e+00 1.25e-06 \*\*\*  
## Away\_oreb 7.124e-12 9.400e-13 7.579e+00 1.07e-13 \*\*\*  
## Home\_FGPct -1.196e-12 5.842e-13 -2.046e+00 0.041086 \*   
## Away\_FGPct 1.140e-09 1.431e-10 7.964e+00 6.47e-15 \*\*\*  
## Home\_3Pct 1.263e-12 2.439e-13 5.177e+00 2.93e-07 \*\*\*  
## Away\_3Pct 1.685e-10 3.967e-11 4.247e+00 2.45e-05 \*\*\*  
## Home\_TPG 2.684e-16 1.391e-16 1.929e+00 0.054077 .   
## Away\_TPG -3.415e-14 1.824e-15 -1.873e+01 < 2e-16 \*\*\*  
## Home\_TSG 8.723e-16 9.746e-16 8.950e-01 0.371107   
## Away\_TSG -1.065e-13 1.909e-14 -5.580e+00 3.41e-08 \*\*\*  
## Home\_TOG -1.696e-15 7.008e-16 -2.420e+00 0.015763 \*   
## Away\_TOG -2.255e-13 1.882e-14 -1.198e+01 < 2e-16 \*\*\*  
## Home\_PPG 3.665e-15 2.670e-15 1.373e+00 0.170178   
## Away\_PPG -7.250e-12 9.528e-13 -7.609e+00 8.64e-14 \*\*\*  
## Home\_SPG -2.973e-14 2.107e-14 -1.411e+00 0.158639   
## Away\_SPG -7.918e-12 2.627e-13 -3.014e+01 < 2e-16 \*\*\*  
## Home\_OPG -7.207e-16 1.272e-14 -5.700e-02 0.954839   
## Away\_OPG 9.510e-12 2.773e-12 3.429e+00 0.000640 \*\*\*  
## Left\_pts 5.911e-12 7.615e-13 7.762e+00 2.85e-14 \*\*\*  
## Right\_pts NA NA NA NA   
## Left\_FGPct -1.140e-09 1.431e-10 -7.967e+00 6.31e-15 \*\*\*  
## Right\_FGPct NA NA NA NA   
## Left\_oreb -7.135e-12 9.403e-13 -7.588e+00 1.00e-13 \*\*\*  
## Right\_oreb NA NA NA NA   
## Left\_3Pct -1.677e-10 3.968e-11 -4.225e+00 2.69e-05 \*\*\*  
## Right\_3Pct NA NA NA NA   
## Left\_TPG 3.392e-14 1.821e-15 1.863e+01 < 2e-16 \*\*\*  
## Right\_TPG NA NA NA NA   
## Left\_TSG 1.067e-13 1.901e-14 5.611e+00 2.87e-08 \*\*\*  
## Right\_TSG NA NA NA NA   
## Left\_TOG 2.261e-13 1.879e-14 1.203e+01 < 2e-16 \*\*\*  
## Right\_TOG NA NA NA NA   
## Left\_PPG 7.243e-12 9.528e-13 7.603e+00 9.05e-14 \*\*\*  
## Right\_PPG NA NA NA NA   
## Left\_SPG 7.954e-12 2.620e-13 3.036e+01 < 2e-16 \*\*\*  
## Right\_SPG NA NA NA NA   
## Left\_OPG -9.516e-12 2.773e-12 -3.431e+00 0.000635 \*\*\*  
## Right\_OPG NA NA NA NA   
## Home\_pts:Away\_pts 5.351e-14 8.816e-15 6.070e+00 2.07e-09 \*\*\*  
## Home\_pts:Home\_oreb 6.691e-17 6.332e-17 1.057e+00 0.291034   
## Home\_pts:Away\_oreb -1.635e-13 3.070e-14 -5.325e+00 1.35e-07 \*\*\*  
## Home\_pts:Home\_FGPct -1.885e-15 6.621e-15 -2.850e-01 0.775921   
## Home\_pts:Away\_FGPct -1.672e-11 3.286e-12 -5.087e+00 4.64e-07 \*\*\*  
## Home\_pts:Home\_3Pct 2.551e-16 2.455e-15 1.040e-01 0.917277   
## Home\_pts:Away\_3Pct -3.333e-12 3.549e-13 -9.391e+00 < 2e-16 \*\*\*  
## Home\_pts:Home\_TPG 2.049e-19 4.999e-19 4.100e-01 0.682013   
## Home\_pts:Away\_TPG -1.413e-15 2.969e-16 -4.759e+00 2.36e-06 \*\*\*  
## Home\_pts:Home\_TSG -1.452e-18 5.659e-18 -2.570e-01 0.797591   
## Home\_pts:Away\_TSG -1.355e-14 1.460e-15 -9.276e+00 < 2e-16 \*\*\*  
## Home\_pts:Home\_TOG -1.544e-18 3.085e-18 -5.010e-01 0.616847   
## Home\_pts:Away\_TOG -2.933e-15 7.675e-16 -3.821e+00 0.000144 \*\*\*  
## Home\_pts:Home\_PPG 7.357e-17 2.364e-17 3.112e+00 0.001928 \*\*   
## Home\_pts:Away\_PPG 9.353e-14 1.532e-14 6.106e+00 1.67e-09 \*\*\*  
## Home\_pts:Home\_SPG 3.495e-16 2.022e-16 1.729e+00 0.084310 .   
## Home\_pts:Away\_SPG -8.294e-14 2.569e-14 -3.228e+00 0.001304 \*\*   
## Home\_pts:Home\_OPG -9.084e-17 1.138e-16 -7.980e-01 0.424921   
## Home\_pts:Away\_OPG -1.615e-13 2.919e-14 -5.534e+00 4.37e-08 \*\*\*  
## Home\_pts:Left\_pts -5.842e-14 9.477e-15 -6.164e+00 1.18e-09 \*\*\*  
## Home\_pts:Right\_pts 3.558e-18 1.833e-17 1.940e-01 0.846124   
## Home\_pts:Left\_FGPct 1.672e-11 3.286e-12 5.088e+00 4.62e-07 \*\*\*  
## Home\_pts:Right\_FGPct NA NA NA NA   
## Home\_pts:Left\_oreb 1.635e-13 3.070e-14 5.324e+00 1.36e-07 \*\*\*  
## Home\_pts:Right\_oreb NA NA NA NA   
## Home\_pts:Left\_3Pct 3.332e-12 3.548e-13 9.394e+00 < 2e-16 \*\*\*  
## Home\_pts:Right\_3Pct NA NA NA NA   
## Home\_pts:Left\_TPG 1.413e-15 2.969e-16 4.758e+00 2.36e-06 \*\*\*  
## Home\_pts:Right\_TPG NA NA NA NA   
## Home\_pts:Left\_TSG 1.355e-14 1.460e-15 9.277e+00 < 2e-16 \*\*\*  
## Home\_pts:Right\_TSG NA NA NA NA   
## Home\_pts:Left\_TOG 2.933e-15 7.675e-16 3.821e+00 0.000144 \*\*\*  
## Home\_pts:Right\_TOG NA NA NA NA   
## Home\_pts:Left\_PPG -9.353e-14 1.532e-14 -6.106e+00 1.67e-09 \*\*\*  
## Home\_pts:Right\_PPG NA NA NA NA   
## Home\_pts:Left\_SPG 8.295e-14 2.569e-14 3.228e+00 0.001302 \*\*   
## Home\_pts:Right\_SPG NA NA NA NA   
## Home\_pts:Left\_OPG 1.615e-13 2.919e-14 5.533e+00 4.41e-08 \*\*\*  
## Home\_pts:Right\_OPG NA NA NA NA   
## Away\_pts:Home\_oreb 6.306e-14 2.453e-15 2.570e+01 < 2e-16 \*\*\*  
## Away\_pts:Away\_oreb 2.697e-14 2.843e-15 9.486e+00 < 2e-16 \*\*\*  
## Away\_pts:Home\_FGPct -7.594e-12 1.446e-12 -5.251e+00 1.99e-07 \*\*\*  
## Away\_pts:Away\_FGPct -1.368e-12 1.572e-13 -8.704e+00 < 2e-16 \*\*\*  
## Away\_pts:Home\_3Pct 4.152e-12 6.604e-13 6.287e+00 5.60e-10 \*\*\*  
## Away\_pts:Away\_3Pct 3.711e-12 7.055e-13 5.260e+00 1.90e-07 \*\*\*  
## Away\_pts:Home\_TPG -2.371e-19 6.285e-19 -3.770e-01 0.706125   
## Away\_pts:Away\_TPG 4.661e-16 2.864e-16 1.627e+00 0.104099   
## Away\_pts:Home\_TSG -9.968e-19 5.826e-18 -1.710e-01 0.864187   
## Away\_pts:Away\_TSG 1.878e-14 2.705e-15 6.941e+00 8.66e-12 \*\*\*  
## Away\_pts:Home\_TOG 1.117e-18 3.137e-18 3.560e-01 0.721880   
## Away\_pts:Away\_TOG 2.839e-15 1.410e-15 2.013e+00 0.044529 \*   
## Away\_pts:Home\_PPG -4.239e-17 2.846e-17 -1.489e+00 0.136806   
## Away\_pts:Away\_PPG -5.540e-14 6.408e-15 -8.645e+00 < 2e-16 \*\*\*  
## Away\_pts:Home\_SPG -9.724e-17 2.061e-16 -4.720e-01 0.637276   
## Away\_pts:Away\_SPG 3.513e-13 8.180e-14 4.295e+00 1.99e-05 \*\*\*  
## Away\_pts:Home\_OPG 1.048e-17 1.123e-16 9.300e-02 0.925677   
## Away\_pts:Away\_OPG 2.400e-13 4.372e-14 5.489e+00 5.62e-08 \*\*\*  
## Away\_pts:Left\_pts 3.408e-18 1.958e-17 1.740e-01 0.861897   
## Away\_pts:Right\_pts 4.906e-15 7.999e-16 6.133e+00 1.42e-09 \*\*\*  
## Away\_pts:Left\_FGPct 1.366e-12 1.572e-13 8.685e+00 < 2e-16 \*\*\*  
## Away\_pts:Right\_FGPct NA NA NA NA   
## Away\_pts:Left\_oreb -2.696e-14 2.843e-15 -9.483e+00 < 2e-16 \*\*\*  
## Away\_pts:Right\_oreb NA NA NA NA   
## Away\_pts:Left\_3Pct -3.709e-12 7.055e-13 -5.257e+00 1.93e-07 \*\*\*  
## Away\_pts:Right\_3Pct NA NA NA NA   
## Away\_pts:Left\_TPG -4.661e-16 2.864e-16 -1.627e+00 0.104074   
## Away\_pts:Right\_TPG NA NA NA NA   
## Away\_pts:Left\_TSG -1.877e-14 2.705e-15 -6.939e+00 8.78e-12 \*\*\*  
## Away\_pts:Right\_TSG NA NA NA NA   
## Away\_pts:Left\_TOG -2.840e-15 1.410e-15 -2.013e+00 0.044443 \*   
## Away\_pts:Right\_TOG NA NA NA NA   
## Away\_pts:Left\_PPG 5.542e-14 6.407e-15 8.649e+00 < 2e-16 \*\*\*  
## Away\_pts:Right\_PPG NA NA NA NA   
## Away\_pts:Left\_SPG -3.513e-13 8.179e-14 -4.295e+00 1.98e-05 \*\*\*  
## Away\_pts:Right\_SPG NA NA NA NA   
## Away\_pts:Left\_OPG -2.399e-13 4.372e-14 -5.487e+00 5.65e-08 \*\*\*  
## Away\_pts:Right\_OPG NA NA NA NA   
## Home\_oreb:Away\_oreb 5.295e-14 1.730e-14 3.061e+00 0.002291 \*\*   
## Home\_oreb:Home\_FGPct 1.116e-15 1.301e-14 8.600e-02 0.931696   
## Home\_oreb:Away\_FGPct 7.940e-12 2.589e-12 3.067e+00 0.002246 \*\*   
## Home\_oreb:Home\_3Pct -5.547e-15 4.952e-15 -1.120e+00 0.263042   
## Home\_oreb:Away\_3Pct -4.167e-12 3.748e-13 -1.112e+01 < 2e-16 \*\*\*  
## Home\_oreb:Home\_TPG -3.384e-21 1.311e-18 -3.000e-03 0.997942   
## Home\_oreb:Away\_TPG 1.379e-15 5.845e-16 2.359e+00 0.018584 \*   
## Home\_oreb:Home\_TSG 2.845e-18 1.044e-17 2.720e-01 0.785420   
## Home\_oreb:Away\_TSG 5.487e-15 1.484e-15 3.699e+00 0.000233 \*\*\*  
## Home\_oreb:Home\_TOG 5.976e-18 6.077e-18 9.830e-01 0.325732   
## Home\_oreb:Away\_TOG 6.428e-15 1.899e-15 3.385e+00 0.000749 \*\*\*  
## Home\_oreb:Home\_PPG -1.817e-16 4.976e-17 -3.652e+00 0.000279 \*\*\*  
## Home\_oreb:Away\_PPG 1.277e-13 1.774e-14 7.198e+00 1.54e-12 \*\*\*  
## Home\_oreb:Home\_SPG -8.195e-16 3.732e-16 -2.196e+00 0.028429 \*   
## Home\_oreb:Away\_SPG 3.769e-13 4.724e-14 7.980e+00 5.77e-15 \*\*\*  
## Home\_oreb:Home\_OPG 2.156e-16 2.187e-16 9.860e-01 0.324695   
## Home\_oreb:Away\_OPG 1.788e-13 3.698e-14 4.834e+00 1.64e-06 \*\*\*  
## Home\_oreb:Left\_pts -6.314e-14 2.455e-15 -2.573e+01 < 2e-16 \*\*\*  
## Home\_oreb:Right\_pts NA NA NA NA   
## Home\_oreb:Left\_FGPct -7.931e-12 2.589e-12 -3.063e+00 0.002272 \*\*   
## Home\_oreb:Right\_FGPct NA NA NA NA   
## Home\_oreb:Left\_oreb -9.722e-14 2.367e-14 -4.107e+00 4.47e-05 \*\*\*  
## Home\_oreb:Right\_oreb -1.101e-16 7.310e-17 -1.506e+00 0.132577   
## Home\_oreb:Left\_3Pct 4.164e-12 3.750e-13 1.110e+01 < 2e-16 \*\*\*  
## Home\_oreb:Right\_3Pct NA NA NA NA   
## Home\_oreb:Left\_TPG -1.379e-15 5.844e-16 -2.359e+00 0.018580 \*   
## Home\_oreb:Right\_TPG NA NA NA NA   
## Home\_oreb:Left\_TSG -5.492e-15 1.483e-15 -3.702e+00 0.000230 \*\*\*  
## Home\_oreb:Right\_TSG NA NA NA NA   
## Home\_oreb:Left\_TOG -6.427e-15 1.899e-15 -3.385e+00 0.000751 \*\*\*  
## Home\_oreb:Right\_TOG NA NA NA NA   
## Home\_oreb:Left\_PPG -1.277e-13 1.774e-14 -7.199e+00 1.53e-12 \*\*\*  
## Home\_oreb:Right\_PPG NA NA NA NA   
## Home\_oreb:Left\_SPG -3.774e-13 4.723e-14 -7.991e+00 5.28e-15 \*\*\*  
## Home\_oreb:Right\_SPG NA NA NA NA   
## Home\_oreb:Left\_OPG -1.788e-13 3.698e-14 -4.835e+00 1.63e-06 \*\*\*  
## Home\_oreb:Right\_OPG NA NA NA NA   
## Away\_oreb:Home\_FGPct 1.527e-11 4.222e-12 3.618e+00 0.000318 \*\*\*  
## Away\_oreb:Away\_FGPct -6.341e-12 7.024e-13 -9.028e+00 < 2e-16 \*\*\*  
## Away\_oreb:Home\_3Pct 6.130e-15 4.600e-15 1.333e+00 0.183073   
## Away\_oreb:Away\_3Pct -4.240e-12 9.526e-13 -4.451e+00 9.90e-06 \*\*\*  
## Away\_oreb:Home\_TPG 6.009e-19 1.189e-18 5.060e-01 0.613338   
## Away\_oreb:Away\_TPG 1.561e-15 1.044e-16 1.494e+01 < 2e-16 \*\*\*  
## Away\_oreb:Home\_TSG 3.240e-18 1.020e-17 3.180e-01 0.750852   
## Away\_oreb:Away\_TSG -2.421e-14 2.569e-15 -9.424e+00 < 2e-16 \*\*\*  
## Away\_oreb:Home\_TOG -1.412e-18 6.085e-18 -2.320e-01 0.816544   
## Away\_oreb:Away\_TOG 3.654e-15 4.921e-16 7.425e+00 3.19e-13 \*\*\*  
## Away\_oreb:Home\_PPG 1.035e-16 5.234e-17 1.978e+00 0.048285 \*   
## Away\_oreb:Away\_PPG 1.143e-13 9.041e-15 1.264e+01 < 2e-16 \*\*\*  
## Away\_oreb:Home\_SPG 6.791e-16 3.951e-16 1.719e+00 0.086055 .   
## Away\_oreb:Away\_SPG -4.441e-13 8.898e-14 -4.991e+00 7.54e-07 \*\*\*  
## Away\_oreb:Home\_OPG -1.030e-16 2.083e-16 -4.950e-01 0.621057   
## Away\_oreb:Away\_OPG -4.975e-13 8.599e-14 -5.785e+00 1.08e-08 \*\*\*  
## Away\_oreb:Left\_pts NA NA NA NA   
## Away\_oreb:Right\_pts NA NA NA NA   
## Away\_oreb:Left\_FGPct 6.338e-12 7.024e-13 9.024e+00 < 2e-16 \*\*\*  
## Away\_oreb:Right\_FGPct NA NA NA NA   
## Away\_oreb:Left\_oreb -2.808e-17 6.325e-17 -4.440e-01 0.657181   
## Away\_oreb:Right\_oreb 4.432e-14 6.426e-15 6.898e+00 1.16e-11 \*\*\*  
## Away\_oreb:Left\_3Pct 4.246e-12 9.527e-13 4.457e+00 9.62e-06 \*\*\*  
## Away\_oreb:Right\_3Pct NA NA NA NA   
## Away\_oreb:Left\_TPG -1.562e-15 1.045e-16 -1.495e+01 < 2e-16 \*\*\*  
## Away\_oreb:Right\_TPG NA NA NA NA   
## Away\_oreb:Left\_TSG 2.421e-14 2.569e-15 9.424e+00 < 2e-16 \*\*\*  
## Away\_oreb:Right\_TSG NA NA NA NA   
## Away\_oreb:Left\_TOG -3.649e-15 4.922e-16 -7.415e+00 3.43e-13 \*\*\*  
## Away\_oreb:Right\_TOG NA NA NA NA   
## Away\_oreb:Left\_PPG -1.143e-13 9.041e-15 -1.264e+01 < 2e-16 \*\*\*  
## Away\_oreb:Right\_PPG NA NA NA NA   
## Away\_oreb:Left\_SPG 4.440e-13 8.897e-14 4.990e+00 7.56e-07 \*\*\*  
## Away\_oreb:Right\_SPG NA NA NA NA   
## Away\_oreb:Left\_OPG 4.973e-13 8.600e-14 5.783e+00 1.09e-08 \*\*\*  
## Away\_oreb:Right\_OPG NA NA NA NA   
## Home\_FGPct:Away\_FGPct 3.365e-09 7.054e-10 4.770e+00 2.23e-06 \*\*\*  
## Home\_FGPct:Home\_3Pct 6.833e-13 4.948e-13 1.381e+00 0.167733   
## Home\_FGPct:Away\_3Pct 1.757e-10 7.785e-12 2.257e+01 < 2e-16 \*\*\*  
## Home\_FGPct:Home\_TPG 1.663e-17 1.062e-16 1.570e-01 0.875602   
## Home\_FGPct:Away\_TPG 1.422e-13 1.781e-14 7.984e+00 5.58e-15 \*\*\*  
## Home\_FGPct:Home\_TSG 6.699e-17 1.016e-15 6.600e-02 0.947443   
## Home\_FGPct:Away\_TSG 2.559e-12 2.472e-13 1.035e+01 < 2e-16 \*\*\*  
## Home\_FGPct:Home\_TOG 3.808e-16 6.380e-16 5.970e-01 0.550749   
## Home\_FGPct:Away\_TOG 2.895e-13 4.987e-14 5.805e+00 9.66e-09 \*\*\*  
## Home\_FGPct:Home\_PPG 4.240e-15 5.028e-15 8.430e-01 0.399331   
## Home\_FGPct:Away\_PPG -1.150e-11 2.060e-12 -5.581e+00 3.38e-08 \*\*\*  
## Home\_FGPct:Home\_SPG -6.458e-14 4.060e-14 -1.591e+00 0.112139   
## Home\_FGPct:Away\_SPG 2.286e-11 6.551e-12 3.489e+00 0.000514 \*\*\*  
## Home\_FGPct:Home\_OPG 2.635e-14 2.378e-14 1.108e+00 0.268311   
## Home\_FGPct:Away\_OPG 3.741e-11 6.379e-12 5.864e+00 6.87e-09 \*\*\*  
## Home\_FGPct:Left\_pts 7.593e-12 1.446e-12 5.251e+00 1.99e-07 \*\*\*  
## Home\_FGPct:Right\_pts NA NA NA NA   
## Home\_FGPct:Left\_FGPct -2.975e-09 6.513e-10 -4.568e+00 5.80e-06 \*\*\*  
## Home\_FGPct:Right\_FGPct 9.457e-14 7.611e-13 1.240e-01 0.901149   
## Home\_FGPct:Left\_oreb -1.528e-11 4.222e-12 -3.618e+00 0.000317 \*\*\*  
## Home\_FGPct:Right\_oreb NA NA NA NA   
## Home\_FGPct:Left\_3Pct -1.756e-10 7.782e-12 -2.256e+01 < 2e-16 \*\*\*  
## Home\_FGPct:Right\_3Pct NA NA NA NA   
## Home\_FGPct:Left\_TPG -1.422e-13 1.781e-14 -7.989e+00 5.39e-15 \*\*\*  
## Home\_FGPct:Right\_TPG NA NA NA NA   
## Home\_FGPct:Left\_TSG -2.560e-12 2.472e-13 -1.035e+01 < 2e-16 \*\*\*  
## Home\_FGPct:Right\_TSG NA NA NA NA   
## Home\_FGPct:Left\_TOG -2.894e-13 4.988e-14 -5.801e+00 9.88e-09 \*\*\*  
## Home\_FGPct:Right\_TOG NA NA NA NA   
## Home\_FGPct:Left\_PPG 1.150e-11 2.060e-12 5.585e+00 3.32e-08 \*\*\*  
## Home\_FGPct:Right\_PPG NA NA NA NA   
## Home\_FGPct:Left\_SPG -2.286e-11 6.551e-12 -3.490e+00 0.000513 \*\*\*  
## Home\_FGPct:Right\_SPG NA NA NA NA   
## Home\_FGPct:Left\_OPG -3.739e-11 6.379e-12 -5.861e+00 6.99e-09 \*\*\*  
## Home\_FGPct:Right\_OPG NA NA NA NA   
## Away\_FGPct:Home\_3Pct -8.400e-10 1.504e-10 -5.586e+00 3.29e-08 \*\*\*  
## Away\_FGPct:Away\_3Pct -3.846e-10 1.291e-10 -2.978e+00 0.002999 \*\*   
## Away\_FGPct:Home\_TPG 2.531e-17 1.218e-16 2.080e-01 0.835475   
## Away\_FGPct:Away\_TPG 8.744e-14 2.665e-14 3.281e+00 0.001084 \*\*   
## Away\_FGPct:Home\_TSG 1.590e-16 1.005e-15 1.580e-01 0.874355   
## Away\_FGPct:Away\_TSG -2.976e-12 4.680e-13 -6.358e+00 3.61e-10 \*\*\*  
## Away\_FGPct:Home\_TOG 3.196e-16 6.008e-16 5.320e-01 0.594936   
## Away\_FGPct:Away\_TOG -1.907e-15 1.931e-13 -1.000e-02 0.992121   
## Away\_FGPct:Home\_PPG -2.299e-15 5.430e-15 -4.230e-01 0.672129   
## Away\_FGPct:Away\_PPG 1.305e-11 1.484e-12 8.792e+00 < 2e-16 \*\*\*  
## Away\_FGPct:Home\_SPG 2.247e-14 4.040e-14 5.560e-01 0.578246   
## Away\_FGPct:Away\_SPG -6.031e-11 1.757e-11 -3.433e+00 0.000631 \*\*\*  
## Away\_FGPct:Home\_OPG -3.626e-15 2.216e-14 -1.640e-01 0.870108   
## Away\_FGPct:Away\_OPG -6.919e-11 1.464e-11 -4.725e+00 2.77e-06 \*\*\*  
## Away\_FGPct:Left\_pts NA NA NA NA   
## Away\_FGPct:Right\_pts NA NA NA NA   
## Away\_FGPct:Left\_FGPct 3.874e-13 7.567e-13 5.120e-01 0.608862   
## Away\_FGPct:Right\_FGPct -3.899e-10 5.644e-11 -6.909e+00 1.07e-11 \*\*\*  
## Away\_FGPct:Left\_oreb NA NA NA NA   
## Away\_FGPct:Right\_oreb NA NA NA NA   
## Away\_FGPct:Left\_3Pct 3.840e-10 1.291e-10 2.973e+00 0.003043 \*\*   
## Away\_FGPct:Right\_3Pct NA NA NA NA   
## Away\_FGPct:Left\_TPG -8.749e-14 2.664e-14 -3.284e+00 0.001074 \*\*   
## Away\_FGPct:Right\_TPG NA NA NA NA   
## Away\_FGPct:Left\_TSG 2.975e-12 4.680e-13 6.357e+00 3.65e-10 \*\*\*  
## Away\_FGPct:Right\_TSG NA NA NA NA   
## Away\_FGPct:Left\_TOG 2.102e-15 1.931e-13 1.100e-02 0.991317   
## Away\_FGPct:Right\_TOG NA NA NA NA   
## Away\_FGPct:Left\_PPG -1.304e-11 1.484e-12 -8.789e+00 < 2e-16 \*\*\*  
## Away\_FGPct:Right\_PPG NA NA NA NA   
## Away\_FGPct:Left\_SPG 6.033e-11 1.757e-11 3.434e+00 0.000628 \*\*\*  
## Away\_FGPct:Right\_SPG NA NA NA NA   
## Away\_FGPct:Left\_OPG 6.917e-11 1.464e-11 4.724e+00 2.78e-06 \*\*\*  
## Away\_FGPct:Right\_OPG NA NA NA NA   
## Home\_3Pct:Away\_3Pct -2.059e-13 2.229e-13 -9.240e-01 0.355958   
## Home\_3Pct:Home\_TPG -3.234e-17 5.087e-17 -6.360e-01 0.525221   
## Home\_3Pct:Away\_TPG 5.934e-17 5.104e-17 1.163e+00 0.245336   
## Home\_3Pct:Home\_TSG 1.406e-16 4.746e-16 2.960e-01 0.767193   
## Home\_3Pct:Away\_TSG -1.540e-16 4.783e-16 -3.220e-01 0.747596   
## Home\_3Pct:Home\_TOG 7.062e-17 2.879e-16 2.450e-01 0.806276   
## Home\_3Pct:Away\_TOG -3.308e-17 2.696e-16 -1.230e-01 0.902393   
## Home\_3Pct:Home\_PPG -9.825e-15 2.071e-15 -4.743e+00 2.54e-06 \*\*\*  
## Home\_3Pct:Away\_PPG -3.942e-15 2.117e-15 -1.862e+00 0.063033 .   
## Home\_3Pct:Home\_SPG -1.578e-14 1.631e-14 -9.680e-01 0.333471   
## Home\_3Pct:Away\_SPG -5.395e-15 1.731e-14 -3.120e-01 0.755340   
## Home\_3Pct:Home\_OPG 8.935e-15 1.004e-14 8.900e-01 0.373994   
## Home\_3Pct:Away\_OPG 2.809e-15 9.914e-15 2.830e-01 0.776989   
## Home\_3Pct:Left\_pts -4.153e-12 6.605e-13 -6.288e+00 5.56e-10 \*\*\*  
## Home\_3Pct:Right\_pts NA NA NA NA   
## Home\_3Pct:Left\_FGPct 8.404e-10 1.504e-10 5.588e+00 3.26e-08 \*\*\*  
## Home\_3Pct:Right\_FGPct NA NA NA NA   
## Home\_3Pct:Left\_oreb NA NA NA NA   
## Home\_3Pct:Right\_oreb NA NA NA NA   
## Home\_3Pct:Left\_3Pct NA NA NA NA   
## Home\_3Pct:Right\_3Pct -2.384e-13 1.440e-13 -1.655e+00 0.098336 .   
## Home\_3Pct:Left\_TPG NA NA NA NA   
## Home\_3Pct:Right\_TPG NA NA NA NA   
## Home\_3Pct:Left\_TSG NA NA NA NA   
## Home\_3Pct:Right\_TSG NA NA NA NA   
## Home\_3Pct:Left\_TOG NA NA NA NA   
## Home\_3Pct:Right\_TOG NA NA NA NA   
## Home\_3Pct:Left\_PPG NA NA NA NA   
## Home\_3Pct:Right\_PPG NA NA NA NA   
## Home\_3Pct:Left\_SPG NA NA NA NA   
## Home\_3Pct:Right\_SPG NA NA NA NA   
## Home\_3Pct:Left\_OPG NA NA NA NA   
## Home\_3Pct:Right\_OPG NA NA NA NA   
## Away\_3Pct:Home\_TPG 2.851e-17 5.540e-17 5.150e-01 0.606930   
## Away\_3Pct:Away\_TPG 2.351e-17 5.566e-17 4.220e-01 0.672840   
## Away\_3Pct:Home\_TSG -3.545e-17 5.071e-16 -7.000e-02 0.944283   
## Away\_3Pct:Away\_TSG -3.208e-16 5.003e-16 -6.410e-01 0.521574   
## Away\_3Pct:Home\_TOG -5.581e-17 2.931e-16 -1.900e-01 0.849029   
## Away\_3Pct:Away\_TOG -4.369e-17 2.865e-16 -1.520e-01 0.878859   
## Away\_3Pct:Home\_PPG -3.071e-16 2.623e-15 -1.170e-01 0.906833   
## Away\_3Pct:Away\_PPG -6.494e-15 2.709e-15 -2.397e+00 0.016793 \*   
## Away\_3Pct:Home\_SPG 1.117e-14 1.683e-14 6.640e-01 0.507205   
## Away\_3Pct:Away\_SPG -2.568e-14 1.874e-14 -1.371e+00 0.170922   
## Away\_3Pct:Home\_OPG 1.935e-15 9.956e-15 1.940e-01 0.845911   
## Away\_3Pct:Away\_OPG -8.521e-15 1.035e-14 -8.240e-01 0.410442   
## Away\_3Pct:Left\_pts NA NA NA NA   
## Away\_3Pct:Right\_pts NA NA NA NA   
## Away\_3Pct:Left\_FGPct NA NA NA NA   
## Away\_3Pct:Right\_FGPct NA NA NA NA   
## Away\_3Pct:Left\_oreb NA NA NA NA   
## Away\_3Pct:Right\_oreb NA NA NA NA   
## Away\_3Pct:Left\_3Pct 2.196e-14 1.597e-13 1.380e-01 0.890642   
## Away\_3Pct:Right\_3Pct NA NA NA NA   
## Away\_3Pct:Left\_TPG NA NA NA NA   
## Away\_3Pct:Right\_TPG NA NA NA NA   
## Away\_3Pct:Left\_TSG NA NA NA NA   
## Away\_3Pct:Right\_TSG NA NA NA NA   
## Away\_3Pct:Left\_TOG NA NA NA NA   
## Away\_3Pct:Right\_TOG NA NA NA NA   
## Away\_3Pct:Left\_PPG NA NA NA NA   
## Away\_3Pct:Right\_PPG NA NA NA NA   
## Away\_3Pct:Left\_SPG NA NA NA NA   
## Away\_3Pct:Right\_SPG NA NA NA NA   
## Away\_3Pct:Left\_OPG NA NA NA NA   
## Away\_3Pct:Right\_OPG NA NA NA NA   
## Home\_TPG:Away\_TPG -4.233e-21 1.113e-20 -3.800e-01 0.703874   
## Home\_TPG:Home\_TSG 7.176e-21 1.088e-19 6.600e-02 0.947435   
## Home\_TPG:Away\_TSG 4.388e-20 1.092e-19 4.020e-01 0.687849   
## Home\_TPG:Home\_TOG -3.027e-20 6.702e-20 -4.520e-01 0.651611   
## Home\_TPG:Away\_TOG -3.132e-21 6.043e-20 -5.200e-02 0.958682   
## Home\_TPG:Home\_PPG 3.492e-19 1.058e-18 3.300e-01 0.741495   
## Home\_TPG:Away\_PPG -2.612e-18 8.863e-19 -2.948e+00 0.003306 \*\*   
## Home\_TPG:Home\_SPG 3.548e-19 4.206e-18 8.400e-02 0.932802   
## Home\_TPG:Away\_SPG -3.689e-18 5.539e-18 -6.660e-01 0.505570   
## Home\_TPG:Home\_OPG -6.993e-19 2.419e-18 -2.890e-01 0.772583   
## Home\_TPG:Away\_OPG -2.411e-18 2.853e-18 -8.450e-01 0.398316   
## Home\_TPG:Left\_pts NA NA NA NA   
## Home\_TPG:Right\_pts NA NA NA NA   
## Home\_TPG:Left\_FGPct NA NA NA NA   
## Home\_TPG:Right\_FGPct NA NA NA NA   
## Home\_TPG:Left\_oreb NA NA NA NA   
## Home\_TPG:Right\_oreb NA NA NA NA   
## Home\_TPG:Left\_3Pct NA NA NA NA   
## Home\_TPG:Right\_3Pct NA NA NA NA   
## Home\_TPG:Left\_TPG NA NA NA NA   
## Home\_TPG:Right\_TPG 4.134e-21 9.537e-21 4.340e-01 0.664777   
## Home\_TPG:Left\_TSG NA NA NA NA   
## Home\_TPG:Right\_TSG NA NA NA NA   
## Home\_TPG:Left\_TOG NA NA NA NA   
## Home\_TPG:Right\_TOG NA NA NA NA   
## Home\_TPG:Left\_PPG NA NA NA NA   
## Home\_TPG:Right\_PPG NA NA NA NA   
## Home\_TPG:Left\_SPG NA NA NA NA   
## Home\_TPG:Right\_SPG NA NA NA NA   
## Home\_TPG:Left\_OPG NA NA NA NA   
## Home\_TPG:Right\_OPG NA NA NA NA   
## Away\_TPG:Home\_TSG -2.780e-20 1.126e-19 -2.470e-01 0.805124   
## Away\_TPG:Away\_TSG -7.812e-20 9.225e-20 -8.470e-01 0.397362   
## Away\_TPG:Home\_TOG 2.105e-20 6.286e-20 3.350e-01 0.737866   
## Away\_TPG:Away\_TOG 3.948e-20 6.446e-20 6.120e-01 0.540432   
## Away\_TPG:Home\_PPG -3.853e-20 7.667e-19 -5.000e-02 0.959939   
## Away\_TPG:Away\_PPG 2.250e-18 8.086e-19 2.782e+00 0.005542 \*\*   
## Away\_TPG:Home\_SPG -1.818e-18 4.314e-18 -4.210e-01 0.673642   
## Away\_TPG:Away\_SPG 3.657e-18 5.262e-18 6.950e-01 0.487279   
## Away\_TPG:Home\_OPG 1.739e-18 2.425e-18 7.170e-01 0.473639   
## Away\_TPG:Away\_OPG 3.008e-18 2.891e-18 1.040e+00 0.298479   
## Away\_TPG:Left\_pts NA NA NA NA   
## Away\_TPG:Right\_pts NA NA NA NA   
## Away\_TPG:Left\_FGPct NA NA NA NA   
## Away\_TPG:Right\_FGPct NA NA NA NA   
## Away\_TPG:Left\_oreb NA NA NA NA   
## Away\_TPG:Right\_oreb NA NA NA NA   
## Away\_TPG:Left\_3Pct NA NA NA NA   
## Away\_TPG:Right\_3Pct NA NA NA NA   
## Away\_TPG:Left\_TPG 6.135e-22 5.611e-22 1.093e+00 0.274592   
## Away\_TPG:Right\_TPG NA NA NA NA   
## Away\_TPG:Left\_TSG NA NA NA NA   
## Away\_TPG:Right\_TSG NA NA NA NA   
## Away\_TPG:Left\_TOG NA NA NA NA   
## Away\_TPG:Right\_TOG NA NA NA NA   
## Away\_TPG:Left\_PPG NA NA NA NA   
## Away\_TPG:Right\_PPG NA NA NA NA   
## Away\_TPG:Left\_SPG NA NA NA NA   
## Away\_TPG:Right\_SPG NA NA NA NA   
## Away\_TPG:Left\_OPG NA NA NA NA   
## Away\_TPG:Right\_OPG NA NA NA NA   
## Home\_TSG:Away\_TSG 2.994e-19 7.835e-19 3.820e-01 0.702528   
## Home\_TSG:Home\_TOG -9.329e-20 4.804e-19 -1.940e-01 0.846059   
## Home\_TSG:Away\_TOG 6.482e-20 4.809e-19 1.350e-01 0.892834   
## Home\_TSG:Home\_PPG -5.033e-18 6.167e-18 -8.160e-01 0.414720   
## Home\_TSG:Away\_PPG 5.262e-19 5.932e-18 8.900e-02 0.929337   
## Home\_TSG:Home\_SPG 1.278e-18 4.222e-17 3.000e-02 0.975866   
## Home\_TSG:Away\_SPG -8.490e-19 4.409e-17 -1.900e-02 0.984644   
## Home\_TSG:Home\_OPG -1.796e-17 2.476e-17 -7.250e-01 0.468410   
## Home\_TSG:Away\_OPG -9.225e-18 2.370e-17 -3.890e-01 0.697230   
## Home\_TSG:Left\_pts NA NA NA NA   
## Home\_TSG:Right\_pts NA NA NA NA   
## Home\_TSG:Left\_FGPct NA NA NA NA   
## Home\_TSG:Right\_FGPct NA NA NA NA   
## Home\_TSG:Left\_oreb NA NA NA NA   
## Home\_TSG:Right\_oreb NA NA NA NA   
## Home\_TSG:Left\_3Pct NA NA NA NA   
## Home\_TSG:Right\_3Pct NA NA NA NA   
## Home\_TSG:Left\_TPG NA NA NA NA   
## Home\_TSG:Right\_TPG NA NA NA NA   
## Home\_TSG:Left\_TSG NA NA NA NA   
## Home\_TSG:Right\_TSG 4.919e-21 7.262e-19 7.000e-03 0.994598   
## Home\_TSG:Left\_TOG NA NA NA NA   
## Home\_TSG:Right\_TOG NA NA NA NA   
## Home\_TSG:Left\_PPG NA NA NA NA   
## Home\_TSG:Right\_PPG NA NA NA NA   
## Home\_TSG:Left\_SPG NA NA NA NA   
## Home\_TSG:Right\_SPG NA NA NA NA   
## Home\_TSG:Left\_OPG NA NA NA NA   
## Home\_TSG:Right\_OPG NA NA NA NA   
## Away\_TSG:Home\_TOG 1.541e-21 4.605e-19 3.000e-03 0.997331   
## Away\_TSG:Away\_TOG 9.049e-20 4.546e-19 1.990e-01 0.842271   
## Away\_TSG:Home\_PPG 2.175e-18 8.411e-18 2.590e-01 0.796046   
## Away\_TSG:Away\_PPG -4.534e-18 4.705e-18 -9.640e-01 0.335582   
## Away\_TSG:Home\_SPG 2.551e-17 4.258e-17 5.990e-01 0.549253   
## Away\_TSG:Away\_SPG 6.238e-18 3.878e-17 1.610e-01 0.872246   
## Away\_TSG:Home\_OPG -4.797e-18 2.352e-17 -2.040e-01 0.838459   
## Away\_TSG:Away\_OPG -1.666e-17 2.342e-17 -7.110e-01 0.477302   
## Away\_TSG:Left\_pts NA NA NA NA   
## Away\_TSG:Right\_pts NA NA NA NA   
## Away\_TSG:Left\_FGPct NA NA NA NA   
## Away\_TSG:Right\_FGPct NA NA NA NA   
## Away\_TSG:Left\_oreb NA NA NA NA   
## Away\_TSG:Right\_oreb NA NA NA NA   
## Away\_TSG:Left\_3Pct NA NA NA NA   
## Away\_TSG:Right\_3Pct NA NA NA NA   
## Away\_TSG:Left\_TPG NA NA NA NA   
## Away\_TSG:Right\_TPG NA NA NA NA   
## Away\_TSG:Left\_TSG 9.211e-20 7.923e-19 1.160e-01 0.907484   
## Away\_TSG:Right\_TSG NA NA NA NA   
## Away\_TSG:Left\_TOG NA NA NA NA   
## Away\_TSG:Right\_TOG NA NA NA NA   
## Away\_TSG:Left\_PPG NA NA NA NA   
## Away\_TSG:Right\_PPG NA NA NA NA   
## Away\_TSG:Left\_SPG NA NA NA NA   
## Away\_TSG:Right\_SPG NA NA NA NA   
## Away\_TSG:Left\_OPG NA NA NA NA   
## Away\_TSG:Right\_OPG NA NA NA NA   
## Home\_TOG:Away\_TOG -6.721e-20 2.834e-19 -2.370e-01 0.812590   
## Home\_TOG:Home\_PPG 4.827e-18 4.659e-18 1.036e+00 0.300498   
## Home\_TOG:Away\_PPG 7.289e-18 3.368e-18 2.164e+00 0.030796 \*   
## Home\_TOG:Home\_SPG -1.909e-18 2.434e-17 -7.800e-02 0.937495   
## Home\_TOG:Away\_SPG 8.557e-18 2.374e-17 3.610e-01 0.718571   
## Home\_TOG:Home\_OPG 1.777e-18 1.440e-17 1.230e-01 0.901788   
## Home\_TOG:Away\_OPG 4.201e-18 1.430e-17 2.940e-01 0.769023   
## Home\_TOG:Left\_pts NA NA NA NA   
## Home\_TOG:Right\_pts NA NA NA NA   
## Home\_TOG:Left\_FGPct NA NA NA NA   
## Home\_TOG:Right\_FGPct NA NA NA NA   
## Home\_TOG:Left\_oreb NA NA NA NA   
## Home\_TOG:Right\_oreb NA NA NA NA   
## Home\_TOG:Left\_3Pct NA NA NA NA   
## Home\_TOG:Right\_3Pct NA NA NA NA   
## Home\_TOG:Left\_TPG NA NA NA NA   
## Home\_TOG:Right\_TPG NA NA NA NA   
## Home\_TOG:Left\_TSG NA NA NA NA   
## Home\_TOG:Right\_TSG NA NA NA NA   
## Home\_TOG:Left\_TOG NA NA NA NA   
## Home\_TOG:Right\_TOG 3.740e-20 2.365e-19 1.580e-01 0.874410   
## Home\_TOG:Left\_PPG NA NA NA NA   
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## Home\_TOG:Left\_SPG NA NA NA NA   
## Home\_TOG:Right\_SPG NA NA NA NA   
## Home\_TOG:Left\_OPG NA NA NA NA   
## Home\_TOG:Right\_OPG NA NA NA NA   
## Away\_TOG:Home\_PPG -6.863e-18 4.948e-18 -1.387e+00 0.165828   
## Away\_TOG:Away\_PPG 1.543e-19 2.613e-18 5.900e-02 0.952940   
## Away\_TOG:Home\_SPG -1.129e-17 2.506e-17 -4.500e-01 0.652625   
## Away\_TOG:Away\_SPG -4.500e-18 2.400e-17 -1.880e-01 0.851291   
## Away\_TOG:Home\_OPG 3.992e-18 1.379e-17 2.890e-01 0.772348   
## Away\_TOG:Away\_OPG 2.619e-18 1.322e-17 1.980e-01 0.842991   
## Away\_TOG:Left\_pts NA NA NA NA   
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## Away\_TOG:Left\_FGPct NA NA NA NA   
## Away\_TOG:Right\_FGPct NA NA NA NA   
## Away\_TOG:Left\_oreb NA NA NA NA   
## Away\_TOG:Right\_oreb NA NA NA NA   
## Away\_TOG:Left\_3Pct NA NA NA NA   
## Away\_TOG:Right\_3Pct NA NA NA NA   
## Away\_TOG:Left\_TPG NA NA NA NA   
## Away\_TOG:Right\_TPG NA NA NA NA   
## Away\_TOG:Left\_TSG NA NA NA NA   
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## Away\_TOG:Left\_TOG -1.294e-19 2.316e-19 -5.590e-01 0.576634   
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## Away\_TOG:Left\_SPG NA NA NA NA   
## Away\_TOG:Right\_SPG NA NA NA NA   
## Away\_TOG:Left\_OPG NA NA NA NA   
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## Home\_PPG:Away\_PPG 3.176e-18 2.030e-17 1.560e-01 0.875741   
## Home\_PPG:Home\_SPG 1.246e-16 2.132e-16 5.840e-01 0.559272   
## Home\_PPG:Away\_SPG -4.150e-16 1.679e-16 -2.472e+00 0.013655 \*   
## Home\_PPG:Home\_OPG 7.706e-17 1.275e-16 6.040e-01 0.545821   
## Home\_PPG:Away\_OPG 1.492e-16 1.143e-16 1.305e+00 0.192204   
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## Home\_PPG:Left\_oreb NA NA NA NA   
## Home\_PPG:Right\_oreb NA NA NA NA   
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## Home\_PPG:Right\_PPG -1.935e-17 1.686e-17 -1.148e+00 0.251484   
## Home\_PPG:Left\_SPG NA NA NA NA   
## Home\_PPG:Right\_SPG NA NA NA NA   
## Home\_PPG:Left\_OPG NA NA NA NA   
## Home\_PPG:Right\_OPG NA NA NA NA   
## Away\_PPG:Home\_SPG 2.945e-17 1.943e-16 1.520e-01 0.879537   
## Away\_PPG:Away\_SPG 2.052e-16 1.407e-16 1.458e+00 0.145161   
## Away\_PPG:Home\_OPG -7.444e-17 9.437e-17 -7.890e-01 0.430479   
## Away\_PPG:Away\_OPG 8.427e-18 9.556e-17 8.800e-02 0.929759   
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## Away\_PPG:Right\_FGPct NA NA NA NA   
## Away\_PPG:Left\_oreb NA NA NA NA   
## Away\_PPG:Right\_oreb NA NA NA NA   
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## Home\_SPG:Away\_SPG 8.319e-16 1.267e-15 6.560e-01 0.511760   
## Home\_SPG:Home\_OPG -1.033e-15 7.782e-16 -1.327e+00 0.184967   
## Home\_SPG:Away\_OPG -6.027e-16 7.352e-16 -8.200e-01 0.412654   
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## Home\_SPG:Right\_oreb NA NA NA NA   
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## Home\_SPG:Right\_3Pct NA NA NA NA   
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## Home\_SPG:Right\_SPG 1.574e-15 9.973e-16 1.578e+00 0.114944   
## Home\_SPG:Left\_OPG NA NA NA NA   
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## Away\_SPG:Home\_OPG -5.882e-17 7.561e-16 -7.800e-02 0.938017   
## Away\_SPG:Away\_OPG -8.308e-16 8.229e-16 -1.010e+00 0.312996   
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## Away\_SPG:Right\_oreb NA NA NA NA   
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## Away\_SPG:Right\_3Pct NA NA NA NA   
## Away\_SPG:Left\_TPG NA NA NA NA   
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## Away\_SPG:Left\_TOG NA NA NA NA   
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## Away\_SPG:Left\_SPG -1.812e-16 9.677e-16 -1.870e-01 0.851545   
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## Home\_OPG:Away\_OPG -1.150e-16 4.580e-16 -2.510e-01 0.801822   
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## Home\_OPG:Right\_SPG NA NA NA NA   
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## Away\_OPG:Left\_oreb NA NA NA NA   
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## Left\_pts:Right\_3Pct NA NA NA NA   
## Left\_pts:Left\_TPG NA NA NA NA   
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## Left\_FGPct:Right\_oreb NA NA NA NA   
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## Right\_SPG:Left\_OPG NA NA NA NA   
## Right\_SPG:Right\_OPG NA NA NA NA   
## Left\_OPG:Right\_OPG NA NA NA NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 2.609e-14 on 722 degrees of freedom  
## Multiple R-squared: 1, Adjusted R-squared: 1   
## F-statistic: 8.726e+29 on 299 and 722 DF, p-value: < 2.2e-16

new\_other\_mod = lm(Spread~(Home\_pts+Away\_pts+Home\_oreb+Away\_oreb+Home\_FGPct+Away\_FGPct+Home\_3Pct+Away\_3Pct+Away\_TPG+Away\_TSG+Home\_TOG+Away\_TOG+ Away\_PPG+Away\_SPG+Away\_OPG)^2, data = cut\_data2)  
summary(new\_other\_mod)

##   
## Call:  
## lm(formula = Spread ~ (Home\_pts + Away\_pts + Home\_oreb + Away\_oreb +   
## Home\_FGPct + Away\_FGPct + Home\_3Pct + Away\_3Pct + Away\_TPG +   
## Away\_TSG + Home\_TOG + Away\_TOG + Away\_PPG + Away\_SPG + Away\_OPG)^2,   
## data = cut\_data2)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -8.050e-13 -1.134e-14 1.820e-15 1.328e-14 1.413e-12   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -2.276e-12 3.842e-13 -5.924e+00 4.48e-09 \*\*\*  
## Home\_pts 1.000e+00 5.146e-15 1.943e+14 < 2e-16 \*\*\*  
## Away\_pts -1.000e+00 5.466e-15 -1.830e+14 < 2e-16 \*\*\*  
## Home\_oreb 5.742e-14 1.128e-14 5.092e+00 4.32e-07 \*\*\*  
## Away\_oreb -5.714e-14 1.089e-14 -5.248e+00 1.92e-07 \*\*\*  
## Home\_FGPct 3.822e-12 1.025e-12 3.729e+00 0.000204 \*\*\*  
## Away\_FGPct -2.602e-12 1.025e-12 -2.538e+00 0.011301 \*   
## Home\_3Pct -1.475e-12 5.432e-13 -2.715e+00 0.006747 \*\*   
## Away\_3Pct -2.198e-13 5.898e-13 -3.730e-01 0.709516   
## Away\_TPG -3.125e-16 1.094e-16 -2.857e+00 0.004376 \*\*   
## Away\_TSG 4.591e-16 1.293e-15 3.550e-01 0.722685   
## Home\_TOG 1.728e-15 6.748e-16 2.561e+00 0.010598 \*   
## Away\_TOG 1.083e-16 7.260e-16 1.490e-01 0.881472   
## Away\_PPG 1.305e-14 3.627e-15 3.598e+00 0.000338 \*\*\*  
## Away\_SPG 1.234e-14 4.365e-14 2.830e-01 0.777469   
## Away\_OPG -7.490e-15 2.701e-14 -2.770e-01 0.781592   
## Home\_pts:Away\_pts -1.321e-17 3.456e-17 -3.820e-01 0.702289   
## Home\_pts:Home\_oreb -3.242e-17 8.697e-17 -3.730e-01 0.709385   
## Home\_pts:Away\_oreb -9.992e-17 1.104e-16 -9.050e-01 0.365509   
## Home\_pts:Home\_FGPct 2.620e-15 4.832e-15 5.420e-01 0.587875   
## Home\_pts:Away\_FGPct -1.548e-15 9.703e-15 -1.600e-01 0.873274   
## Home\_pts:Home\_3Pct -4.197e-15 4.278e-15 -9.810e-01 0.326867   
## Home\_pts:Away\_3Pct 1.483e-15 5.618e-15 2.640e-01 0.791803   
## Home\_pts:Away\_TPG 6.400e-21 8.504e-19 8.000e-03 0.993997   
## Home\_pts:Away\_TSG 8.631e-19 1.090e-17 7.900e-02 0.936927   
## Home\_pts:Home\_TOG -2.682e-18 4.243e-18 -6.320e-01 0.527519   
## Home\_pts:Away\_TOG 1.693e-18 6.106e-18 2.770e-01 0.781673   
## Home\_pts:Away\_PPG 4.374e-17 4.253e-17 1.028e+00 0.304075   
## Home\_pts:Away\_SPG 1.468e-17 4.217e-16 3.500e-02 0.972244   
## Home\_pts:Away\_OPG 9.534e-18 2.588e-16 3.700e-02 0.970623   
## Away\_pts:Home\_oreb -5.233e-17 1.119e-16 -4.670e-01 0.640269   
## Away\_pts:Away\_oreb -2.155e-18 8.457e-17 -2.500e-02 0.979672   
## Away\_pts:Home\_FGPct 3.518e-15 9.896e-15 3.550e-01 0.722333   
## Away\_pts:Away\_FGPct 3.614e-15 5.054e-15 7.150e-01 0.474729   
## Away\_pts:Home\_3Pct 4.129e-15 5.125e-15 8.060e-01 0.420662   
## Away\_pts:Away\_3Pct -4.669e-15 4.636e-15 -1.007e+00 0.314180   
## Away\_pts:Away\_TPG -4.512e-19 7.853e-19 -5.750e-01 0.565758   
## Away\_pts:Away\_TSG 4.158e-18 1.141e-17 3.640e-01 0.715696   
## Away\_pts:Home\_TOG 5.772e-18 5.048e-18 1.143e+00 0.253175   
## Away\_pts:Away\_TOG 6.779e-19 6.702e-18 1.010e-01 0.919463   
## Away\_pts:Away\_PPG -2.349e-16 4.295e-17 -5.469e+00 5.85e-08 \*\*\*  
## Away\_pts:Away\_SPG -1.731e-16 4.159e-16 -4.160e-01 0.677404   
## Away\_pts:Away\_OPG -5.602e-17 2.549e-16 -2.200e-01 0.826082   
## Home\_oreb:Away\_oreb 2.813e-16 2.317e-16 1.214e+00 0.224969   
## Home\_oreb:Home\_FGPct -1.466e-14 1.464e-14 -1.001e+00 0.317111   
## Home\_oreb:Away\_FGPct 7.022e-15 2.271e-14 3.090e-01 0.757271   
## Home\_oreb:Home\_3Pct 1.072e-14 1.025e-14 1.046e+00 0.295853   
## Home\_oreb:Away\_3Pct -1.049e-14 1.145e-14 -9.160e-01 0.359853   
## Home\_oreb:Away\_TPG 1.005e-19 1.957e-18 5.100e-02 0.959076   
## Home\_oreb:Away\_TSG 5.116e-18 2.327e-17 2.200e-01 0.826009   
## Home\_oreb:Home\_TOG 9.619e-18 8.885e-18 1.083e+00 0.279250   
## Home\_oreb:Away\_TOG -1.271e-18 1.303e-17 -9.800e-02 0.922335   
## Home\_oreb:Away\_PPG -4.004e-16 7.974e-17 -5.021e+00 6.20e-07 \*\*\*  
## Home\_oreb:Away\_SPG -9.158e-16 8.346e-16 -1.097e+00 0.272770   
## Home\_oreb:Away\_OPG -2.574e-16 5.179e-16 -4.970e-01 0.619387   
## Away\_oreb:Home\_FGPct -3.755e-14 2.294e-14 -1.637e+00 0.101921   
## Away\_oreb:Away\_FGPct -1.721e-14 1.570e-14 -1.096e+00 0.273246   
## Away\_oreb:Home\_3Pct 2.021e-14 1.028e-14 1.967e+00 0.049519 \*   
## Away\_oreb:Away\_3Pct 1.201e-14 1.060e-14 1.133e+00 0.257393   
## Away\_oreb:Away\_TPG -8.540e-19 1.648e-18 -5.180e-01 0.604403   
## Away\_oreb:Away\_TSG 4.735e-18 2.183e-17 2.170e-01 0.828345   
## Away\_oreb:Home\_TOG -7.413e-18 1.086e-17 -6.820e-01 0.495105   
## Away\_oreb:Away\_TOG 2.986e-18 1.208e-17 2.470e-01 0.804758   
## Away\_oreb:Away\_PPG 7.216e-16 7.454e-17 9.679e+00 < 2e-16 \*\*\*  
## Away\_oreb:Away\_SPG 6.991e-16 8.038e-16 8.700e-01 0.384618   
## Away\_oreb:Away\_OPG 1.641e-16 4.917e-16 3.340e-01 0.738622   
## Home\_FGPct:Away\_FGPct -1.196e-12 2.190e-12 -5.460e-01 0.585179   
## Home\_FGPct:Home\_3Pct 1.139e-12 9.509e-13 1.198e+00 0.231403   
## Home\_FGPct:Away\_3Pct 7.397e-14 1.162e-12 6.400e-02 0.949280   
## Home\_FGPct:Away\_TPG -1.487e-16 1.812e-16 -8.210e-01 0.411954   
## Home\_FGPct:Away\_TSG -1.872e-16 2.247e-15 -8.300e-02 0.933600   
## Home\_FGPct:Home\_TOG 7.275e-16 9.071e-16 8.020e-01 0.422732   
## Home\_FGPct:Away\_TOG 1.250e-15 1.302e-15 9.610e-01 0.337016   
## Home\_FGPct:Away\_PPG -3.253e-14 8.674e-15 -3.750e+00 0.000188 \*\*\*  
## Home\_FGPct:Away\_SPG -3.150e-14 8.951e-14 -3.520e-01 0.724973   
## Home\_FGPct:Away\_OPG -2.542e-14 5.413e-14 -4.700e-01 0.638755   
## Away\_FGPct:Home\_3Pct 3.770e-14 1.045e-12 3.600e-02 0.971232   
## Away\_FGPct:Away\_3Pct -5.163e-14 1.035e-12 -5.000e-02 0.960223   
## Away\_FGPct:Away\_TPG 1.641e-17 1.619e-16 1.010e-01 0.919278   
## Away\_FGPct:Away\_TSG -9.393e-16 2.263e-15 -4.150e-01 0.678139   
## Away\_FGPct:Home\_TOG -4.132e-16 1.074e-15 -3.850e-01 0.700584   
## Away\_FGPct:Away\_TOG 3.421e-16 1.287e-15 2.660e-01 0.790550   
## Away\_FGPct:Away\_PPG 2.764e-14 8.051e-15 3.433e+00 0.000623 \*\*\*  
## Away\_FGPct:Away\_SPG 5.249e-14 8.338e-14 6.300e-01 0.529173   
## Away\_FGPct:Away\_OPG -5.836e-15 5.246e-14 -1.110e-01 0.911453   
## Home\_3Pct:Away\_3Pct -4.778e-13 5.095e-13 -9.380e-01 0.348684   
## Home\_3Pct:Away\_TPG 1.180e-17 8.580e-17 1.370e-01 0.890666   
## Home\_3Pct:Away\_TSG 5.070e-16 1.078e-15 4.700e-01 0.638374   
## Home\_3Pct:Home\_TOG -1.275e-16 4.782e-16 -2.670e-01 0.789820   
## Home\_3Pct:Away\_TOG -4.627e-16 6.080e-16 -7.610e-01 0.446848   
## Home\_3Pct:Away\_PPG 6.876e-15 3.772e-15 1.823e+00 0.068647 .   
## Home\_3Pct:Away\_SPG -1.105e-14 3.926e-14 -2.810e-01 0.778453   
## Home\_3Pct:Away\_OPG 1.413e-14 2.254e-14 6.270e-01 0.530811   
## Away\_3Pct:Away\_TPG 4.295e-17 9.393e-17 4.570e-01 0.647581   
## Away\_3Pct:Away\_TSG -4.102e-16 1.138e-15 -3.610e-01 0.718487   
## Away\_3Pct:Home\_TOG -2.519e-16 4.849e-16 -5.190e-01 0.603581   
## Away\_3Pct:Away\_TOG -8.735e-17 6.624e-16 -1.320e-01 0.895126   
## Away\_3Pct:Away\_PPG 4.116e-15 4.108e-15 1.002e+00 0.316595   
## Away\_3Pct:Away\_SPG 3.453e-14 4.130e-14 8.360e-01 0.403400   
## Away\_3Pct:Away\_OPG 7.820e-15 2.331e-14 3.360e-01 0.737316   
## Away\_TPG:Away\_TSG 2.658e-21 7.662e-20 3.500e-02 0.972338   
## Away\_TPG:Home\_TOG -1.264e-20 4.742e-20 -2.660e-01 0.789943   
## Away\_TPG:Away\_TOG -1.457e-20 4.919e-20 -2.960e-01 0.767137   
## Away\_TPG:Away\_PPG 3.687e-18 7.807e-19 4.723e+00 2.69e-06 \*\*\*  
## Away\_TPG:Away\_SPG 2.482e-19 7.635e-18 3.300e-02 0.974075   
## Away\_TPG:Away\_OPG 1.672e-18 4.079e-18 4.100e-01 0.681955   
## Away\_TSG:Home\_TOG -2.546e-20 7.885e-19 -3.200e-02 0.974254   
## Away\_TSG:Away\_TOG 1.920e-19 7.260e-19 2.650e-01 0.791445   
## Away\_TSG:Away\_PPG -8.609e-18 9.196e-18 -9.360e-01 0.349469   
## Away\_TSG:Away\_SPG 1.939e-17 8.959e-17 2.160e-01 0.828691   
## Away\_TSG:Away\_OPG 6.030e-18 5.312e-17 1.140e-01 0.909648   
## Home\_TOG:Away\_TOG 7.401e-20 5.060e-19 1.460e-01 0.883762   
## Home\_TOG:Away\_PPG -1.637e-17 4.780e-18 -3.425e+00 0.000642 \*\*\*  
## Home\_TOG:Away\_SPG -2.829e-18 4.378e-17 -6.500e-02 0.948490   
## Home\_TOG:Away\_OPG -2.349e-17 2.570e-17 -9.140e-01 0.360995   
## Away\_TOG:Away\_PPG -8.389e-18 5.188e-18 -1.617e+00 0.106203   
## Away\_TOG:Away\_SPG -9.697e-18 5.373e-17 -1.800e-01 0.856824   
## Away\_TOG:Away\_OPG -1.553e-18 2.795e-17 -5.600e-02 0.955697   
## Away\_PPG:Away\_SPG 6.855e-17 1.866e-16 3.670e-01 0.713456   
## Away\_PPG:Away\_OPG 3.097e-16 1.472e-16 2.105e+00 0.035594 \*   
## Away\_SPG:Away\_OPG -1.573e-15 1.539e-15 -1.022e+00 0.307002   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 6.801e-14 on 901 degrees of freedom  
## Multiple R-squared: 1, Adjusted R-squared: 1   
## F-statistic: 3.201e+29 on 120 and 901 DF, p-value: < 2.2e-16

Model List: full\_mod - used cut\_data2 step\_mod - based on full\_mod other\_mod - cut\_data2, but included all interactions new\_other\_mod - cut\_data2, included limited variables (and all interactions of limited variables)

set.seed(400)  
  
sample = createDataPartition(cut\_data2$Spread, p = 0.8, list = FALSE)  
  
training = cut\_data2[sample, ]  
testing = cut\_data2[-sample, ]  
  
cv\_model = lm(Spread~., training)  
  
predictions = predict(cv\_model, testing)

## Warning in predict.lm(cv\_model, testing): prediction from a rank-deficient fit  
## may be misleading

data.frame( R2 = R2(predictions, testing$Spread),  
 RMSE = RMSE(predictions, testing$Spread),  
 MAE = MAE(predictions, testing$Spread))

## R2 RMSE MAE  
## 1 1 2.299469e-14 1.839563e-14

set.seed(400)  
  
train\_control = trainControl(method = "cv", number = 10)  
  
kcv\_model <- train(Spread ~., data = cut\_data2,  
 method = "lm",  
 trControl = train\_control)

## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading  
  
## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading  
  
## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading  
  
## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading  
  
## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading  
  
## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading  
  
## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading  
  
## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading  
  
## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading  
  
## Warning in predict.lm(modelFit, newdata): prediction from a rank-deficient fit  
## may be misleading

print(kcv\_model)

## Linear Regression   
##   
## 1022 samples  
## 43 predictor  
##   
## No pre-processing  
## Resampling: Cross-Validated (10 fold)   
## Summary of sample sizes: 921, 919, 919, 919, 921, 921, ...   
## Resampling results:  
##   
## RMSE Rsquared MAE   
## 1.070209e-13 1 9.955691e-14  
##   
## Tuning parameter 'intercept' was held constant at a value of TRUE

TOTAL PREDICTION

cut\_data2$Total = cut\_data2$Home\_pts + cut\_data2$Away\_pts  
head(cut\_data2)

## # A tibble: 6 × 45  
## Home\_…¹ Away\_…² Sprea…³ Spread Home\_…⁴ Away\_…⁵ Home\_…⁶ Away\_…⁷ Home\_…⁸ Away\_…⁹  
## <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1 126 117 4.5 9 6 4 0.561 0.5 0.343 0.382  
## 2 123 109 7.5 14 11 9 0.455 0.426 0.356 0.25   
## 3 117 107 15 10 4 15 0.5 0.429 0.28 0.257  
## 4 108 116 8.5 -8 8 12 0.463 0.441 0.429 0.361  
## 5 115 108 12.5 7 14 16 0.415 0.384 0.263 0.311  
## 6 108 130 4.5 -22 9 21 0.449 0.49 0.303 0.462  
## # … with 35 more variables: Home\_Steals <dbl>, Away\_Steals <dbl>,  
## # Home\_TPG <dbl>, Away\_TPG <dbl>, Home\_TSG <dbl>, Away\_TSG <dbl>,  
## # Home\_TOG <dbl>, Away\_TOG <dbl>, Home\_PPG <dbl>, Away\_PPG <dbl>,  
## # Home\_SPG <dbl>, Away\_SPG <dbl>, Home\_OPG <dbl>, Away\_OPG <dbl>,  
## # Left\_pts <dbl>, Right\_pts <dbl>, Left\_FGPct <dbl>, Right\_FGPct <dbl>,  
## # Left\_oreb <dbl>, Right\_oreb <dbl>, Left\_3Pct <dbl>, Right\_3Pct <dbl>,  
## # Left\_TPG <dbl>, Right\_TPG <dbl>, Left\_TSG <dbl>, Right\_TSG <dbl>, …

full\_glm\_mod = glm(Total~., family = quasi(), data = cut\_data2)  
summary(full\_glm\_mod)

##   
## Call:  
## glm(formula = Total ~ ., family = quasi(), data = cut\_data2)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -5.684e-14 2.842e-14 5.684e-14 8.527e-14 1.705e-13   
##   
## Coefficients: (11 not defined because of singularities)  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.134e-13 3.496e-14 6.104e+00 1.49e-09 \*\*\*  
## Home\_pts 1.000e+00 4.065e-16 2.460e+15 < 2e-16 \*\*\*  
## Away\_pts 1.000e+00 1.202e-15 8.320e+14 < 2e-16 \*\*\*  
## Spread\_Pred 3.014e-16 4.451e-16 6.770e-01 0.498   
## Spread NA NA NA NA   
## Home\_oreb -2.729e-16 7.325e-16 -3.730e-01 0.710   
## Away\_oreb 1.181e-15 1.954e-15 6.040e-01 0.546   
## Home\_FGPct 3.645e-15 7.576e-14 4.800e-02 0.962   
## Away\_FGPct 1.574e-13 2.328e-13 6.760e-01 0.499   
## Home\_3Pct -9.705e-15 3.336e-14 -2.910e-01 0.771   
## Away\_3Pct -8.776e-14 1.015e-13 -8.640e-01 0.388   
## Home\_Steals 4.231e-16 8.365e-16 5.060e-01 0.613   
## Away\_Steals -5.326e-16 8.231e-16 -6.470e-01 0.518   
## Home\_TPG 3.440e-19 5.929e-18 5.800e-02 0.954   
## Away\_TPG -4.093e-18 5.822e-17 -7.000e-02 0.944   
## Home\_TSG -8.643e-18 6.951e-17 -1.240e-01 0.901   
## Away\_TSG 1.797e-18 2.272e-16 8.000e-03 0.994   
## Home\_TOG 6.120e-18 4.104e-17 1.490e-01 0.881   
## Away\_TOG -2.910e-17 1.227e-16 -2.370e-01 0.813   
## Home\_PPG -7.697e-17 2.494e-16 -3.090e-01 0.758   
## Away\_PPG 2.053e-16 1.887e-15 1.090e-01 0.913   
## Home\_SPG 9.617e-17 2.512e-15 3.800e-02 0.969   
## Away\_SPG 1.745e-15 7.595e-15 2.300e-01 0.818   
## Home\_OPG -9.575e-17 1.471e-15 -6.500e-02 0.948   
## Away\_OPG 3.904e-18 4.296e-15 1.000e-03 0.999   
## Left\_pts -2.636e-16 1.219e-15 -2.160e-01 0.829   
## Right\_pts NA NA NA NA   
## Left\_FGPct -1.619e-13 2.357e-13 -6.870e-01 0.492   
## Right\_FGPct NA NA NA NA   
## Left\_oreb -7.926e-16 1.970e-15 -4.020e-01 0.688   
## Right\_oreb NA NA NA NA   
## Left\_3Pct 7.898e-14 1.012e-13 7.810e-01 0.435   
## Right\_3Pct NA NA NA NA   
## Left\_TPG 4.130e-18 5.820e-17 7.100e-02 0.943   
## Right\_TPG NA NA NA NA   
## Left\_TSG 9.685e-18 2.277e-16 4.300e-02 0.966   
## Right\_TSG NA NA NA NA   
## Left\_TOG 1.827e-17 1.226e-16 1.490e-01 0.882   
## Right\_TOG NA NA NA NA   
## Left\_PPG -2.038e-16 1.887e-15 -1.080e-01 0.914   
## Right\_PPG NA NA NA NA   
## Left\_SPG -2.096e-15 7.621e-15 -2.750e-01 0.783   
## Right\_SPG NA NA NA NA   
## Left\_OPG -3.080e-17 4.271e-15 -7.000e-03 0.994   
## Right\_OPG NA NA NA NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for quasi family taken to be 4.652989e-27)  
##   
## Null deviance: 3.8252e+05 on 1021 degrees of freedom  
## Residual deviance: 4.5972e-24 on 988 degrees of freedom  
## AIC: NA  
##   
## Number of Fisher Scoring iterations: 1

set.seed(400)  
  
train\_control2 = trainControl(method = "cv", number = 10)  
  
kcv\_model2 <- train(Total ~., data = cut\_data2,  
 method = "glm",  
 trControl = train\_control2)

## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading  
  
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading  
  
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading  
  
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading  
  
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading  
  
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading  
  
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading  
  
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading  
  
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading  
  
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :  
## prediction from a rank-deficient fit may be misleading

print(kcv\_model2)

## Generalized Linear Model   
##   
## 1022 samples  
## 44 predictor  
##   
## No pre-processing  
## Resampling: Cross-Validated (10 fold)   
## Summary of sample sizes: 919, 919, 920, 919, 920, 921, ...   
## Resampling results:  
##   
## RMSE Rsquared MAE   
## 2.22944e-13 1 2.05411e-13

set.seed(400)  
  
sample2 = createDataPartition(cut\_data2$Total, p = 0.8, list = FALSE)  
  
training2 = cut\_data2[sample2, ]  
testing2 = cut\_data2[-sample2, ]  
  
cv\_model2 = lm(Total~., training2)  
  
predictions2 = predict(cv\_model2, testing2)

## Warning in predict.lm(cv\_model2, testing2): prediction from a rank-deficient fit  
## may be misleading

data.frame( R2 = R2(predictions2, testing2$Total),  
 RMSE = RMSE(predictions2, testing2$Total),  
 MAE = MAE(predictions2, testing2$Total))

## R2 RMSE MAE  
## 1 1 1.19022e-13 1.061264e-13

summary(cv\_model2)

## Warning in summary.lm(cv\_model2): essentially perfect fit: summary may be  
## unreliable

##   
## Call:  
## lm(formula = Total ~ ., data = training2)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.030e-13 -4.870e-15 5.300e-16 5.350e-15 1.456e-12   
##   
## Coefficients: (11 not defined because of singularities)  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 1.589e-13 3.165e-14 5.020e+00 6.39e-07 \*\*\*  
## Home\_pts 1.000e+00 3.605e-16 2.774e+15 < 2e-16 \*\*\*  
## Away\_pts 1.000e+00 1.139e-15 8.782e+14 < 2e-16 \*\*\*  
## Spread\_Pred 1.648e-16 4.127e-16 3.990e-01 0.689648   
## Spread NA NA NA NA   
## Home\_oreb -2.827e-16 6.482e-16 -4.360e-01 0.662885   
## Away\_oreb -4.587e-15 1.840e-15 -2.494e+00 0.012850 \*   
## Home\_FGPct 5.764e-14 6.666e-14 8.650e-01 0.387479   
## Away\_FGPct -6.918e-13 2.166e-13 -3.194e+00 0.001457 \*\*   
## Home\_3Pct -1.921e-14 3.020e-14 -6.360e-01 0.524812   
## Away\_3Pct 3.461e-13 1.001e-13 3.457e+00 0.000575 \*\*\*  
## Home\_Steals -5.537e-16 7.659e-16 -7.230e-01 0.469955   
## Away\_Steals -9.119e-17 7.285e-16 -1.250e-01 0.900422   
## Home\_TPG 1.124e-18 5.306e-18 2.120e-01 0.832233   
## Away\_TPG 1.883e-17 6.124e-17 3.070e-01 0.758601   
## Home\_TSG -1.296e-17 6.421e-17 -2.020e-01 0.840085   
## Away\_TSG 1.822e-16 2.128e-16 8.560e-01 0.392322   
## Home\_TOG 9.449e-18 3.696e-17 2.560e-01 0.798276   
## Away\_TOG 9.520e-17 1.226e-16 7.760e-01 0.437740   
## Home\_PPG -6.685e-16 2.366e-16 -2.825e+00 0.004846 \*\*   
## Away\_PPG -1.596e-15 2.036e-15 -7.840e-01 0.433520   
## Home\_SPG -1.063e-15 2.297e-15 -4.630e-01 0.643633   
## Away\_SPG -8.257e-15 9.441e-15 -8.750e-01 0.382104   
## Home\_OPG 4.137e-16 1.336e-15 3.100e-01 0.756868   
## Away\_OPG 2.016e-15 4.260e-15 4.730e-01 0.636229   
## Left\_pts -1.517e-16 1.151e-15 -1.320e-01 0.895178   
## Right\_pts NA NA NA NA   
## Left\_FGPct 7.357e-13 2.181e-13 3.373e+00 0.000780 \*\*\*  
## Right\_FGPct NA NA NA NA   
## Left\_oreb 3.897e-15 1.861e-15 2.094e+00 0.036580 \*   
## Right\_oreb NA NA NA NA   
## Left\_3Pct -3.737e-13 1.002e-13 -3.731e+00 0.000204 \*\*\*  
## Right\_3Pct NA NA NA NA   
## Left\_TPG -1.868e-17 6.123e-17 -3.050e-01 0.760415   
## Right\_TPG NA NA NA NA   
## Left\_TSG -1.975e-16 2.133e-16 -9.260e-01 0.354873   
## Right\_TSG NA NA NA NA   
## Left\_TOG -8.158e-17 1.228e-16 -6.640e-01 0.506670   
## Right\_TOG NA NA NA NA   
## Left\_PPG 1.585e-15 2.036e-15 7.780e-01 0.436637   
## Right\_PPG NA NA NA NA   
## Left\_SPG 6.493e-15 9.486e-15 6.850e-01 0.493855   
## Right\_SPG NA NA NA NA   
## Left\_OPG -2.737e-15 4.215e-15 -6.490e-01 0.516252   
## Right\_OPG NA NA NA NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 5.489e-14 on 785 degrees of freedom  
## Multiple R-squared: 1, Adjusted R-squared: 1   
## F-statistic: 3.078e+30 on 33 and 785 DF, p-value: < 2.2e-16