

NBA Stats

```
library(ggplot2)

## Warning: package 'ggplot2' was built under R version 4.2.2

# Using Stats from NBA reference
nba <- read.csv(file.choose(), stringsAsFactors = T)
nba = nba[,-31]
head(nba)

##      Rk      Player Pos Age  Tm  G GS   MP  FG  FGA   FG. X3P
X3PA
## 1  1      Precious Achiuwa   C  23 TOR  55 12 20.7 3.6   7.3 0.485 0.5
2.0
## 2  2      Steven Adams    C  29 MEM  42 42 27.0 3.7   6.3 0.597 0.0
0.0
## 3  3      Bam Adebayo     C  25 MIA  75 75 34.6 8.0  14.9 0.540 0.0
0.2
## 4  4      Ochai Agbaji    SG  22 UTA  59 22 20.5 2.8   6.5 0.427 1.4
3.9
## 5  5      Santi Aldama    PF  22 MEM  77 20 21.8 3.2   6.8 0.470 1.2
3.5
## 6  6 Nickeil Alexander-Walker SG  24 TOT  59  3 15.0 2.2   5.0 0.444 1.0
2.7
##      X3P. X2P X2PA  X2P.  eFG.  FT FTA   FT. ORB DRB  TRB AST STL BLK TOV
PF
## 1 0.269 3.0  5.4 0.564 0.521 1.6 2.3 0.702 1.8 4.1  6.0 0.9 0.6 0.5 1.1
1.9
## 2 0.000 3.7  6.2 0.599 0.597 1.1 3.1 0.364 5.1 6.5 11.5 2.3 0.9 1.1 1.9
2.3
## 3 0.083 8.0 14.7 0.545 0.541 4.3 5.4 0.806 2.5 6.7  9.2 3.2 1.2 0.8 2.5
2.8
## 4 0.355 1.4  2.7 0.532 0.532 0.9 1.2 0.812 0.7 1.3  2.1 1.1 0.3 0.3 0.7
1.7
## 5 0.353 2.0  3.4 0.591 0.560 1.4 1.9 0.750 1.1 3.7  4.8 1.3 0.6 0.6 0.8
1.9
## 6 0.384 1.2  2.3 0.515 0.547 0.7 1.0 0.667 0.3 1.5  1.7 1.8 0.5 0.4 0.9
1.5
##      PTS
## 1  9.2
## 2  8.6
## 3 20.4
## 4  7.9
## 5  9.0
## 6  6.2

# Stats of nba players in 2022-2023 season
```

```
names(nba)
```

```
## [1] "Rk"      "Player" "Pos"    "Age"    "Tm"      "G"       "GS"     "MP"
## [9] "FG"      "FGA"    "FG."    "X3P"    "X3PA"    "X3P."    "X2P"    "X2PA"
## [17] "X2P."    "eFG."   "FT"     "FTA"    "FT."     "ORB"     "DRB"    "TRB"
## [25] "AST"     "STL"    "BLK"    "TOV"    "PF"      "PTS"
```

Rk = rank via alphabetical order, Player = First and Last name of player, Pos = the position that player plays, Age = age of player, Tm = City abbreviation that the player plays for, G = Total Games played, GS = Games started, MP = Minutes per game, FG = Average Field goals made per game, FGA = Average field goals attempted per game, FG. = Field goal percentage, X3P = Average 3 pointers made per game, X3PA = Average 3 pointers attempted per game, X3P. = 3 Point field goal percentage, X2P = Average 2 point field goals made per game, X2PA = Average 2 pointers attempted per game, X2P. = 2 point field goal percentage, eFG. = Effective field goal percentage, FT = average free throws made per game, FTA = free throws attempted per game, FT. = free throw percentage, ORB = Offensive rebounds per game, DRB = defensive rebounds per game, TRB = Total rebounds per game, AST = assists per game, STL = Steals per game, BLK = Blocks per game, TOV = Turnovers per game, PF = Personal fouls per game, PTS = Points per game.

```
nba.lm <- lm(PTS ~ MP + FGA + X2PA + X3PA + FTA, nba)
nba.lm
```

```
##
## Call:
## lm(formula = PTS ~ MP + FGA + X2PA + X3PA + FTA, data = nba)
##
## Coefficients:
## (Intercept)          MP          FGA          X2PA          X3PA
FTA
##   -0.46382      0.03739      0.32181      0.67865      0.69129
0.92461
```

```
summary(nba.lm)
```

```
##
## Call:
## lm(formula = PTS ~ MP + FGA + X2PA + X3PA + FTA, data = nba)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.5006 -0.4693  0.0088  0.4816  5.3477
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.463817   0.084704  -5.476 6.16e-08 ***
## MP           0.037393   0.007841   4.769 2.27e-06 ***
## FGA           0.321812   0.733558   0.439  0.661
## X2PA          0.678654   0.732899   0.926  0.355
```

```
## X3PA          0.691290    0.732997    0.943    0.346
## FTA           0.924614    0.041658   22.195   < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8998 on 673 degrees of freedom
## Multiple R-squared:  0.9817, Adjusted R-squared:  0.9816
## F-statistic: 7229 on 5 and 673 DF,  p-value: < 2.2e-16

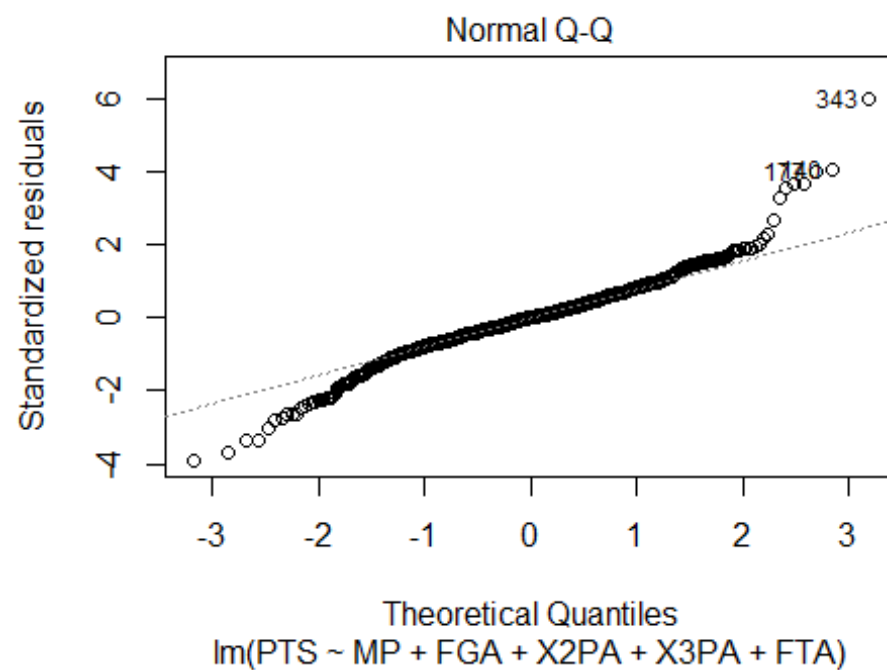
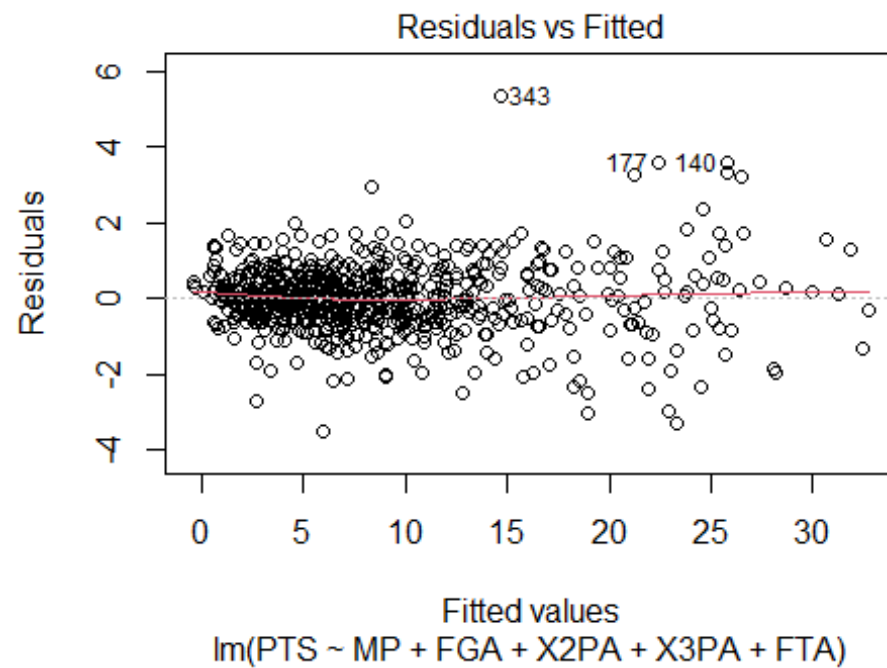
# Using Minutes played, field goal attempts, 2 point field goal attempts, 3
point field
# goal attempts, and free throw attempts as predictor variables for the
outcome points variable.
# Minutes played and free throw attempts are more significant than other 3
variables.
# High R squared at 0.98 which shows that these stats are a good fit for
predicting the outcome of points per game.

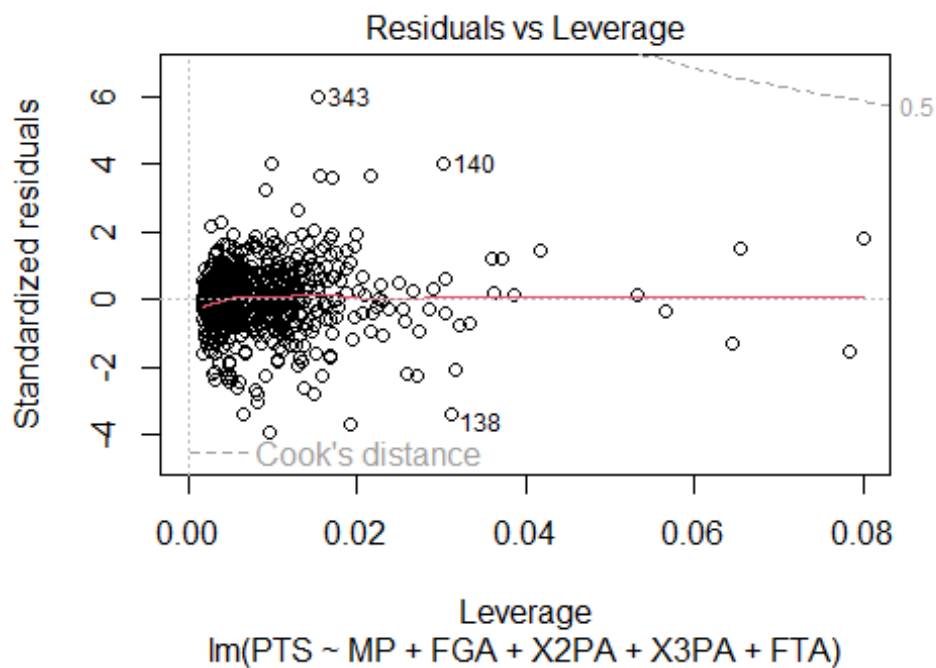
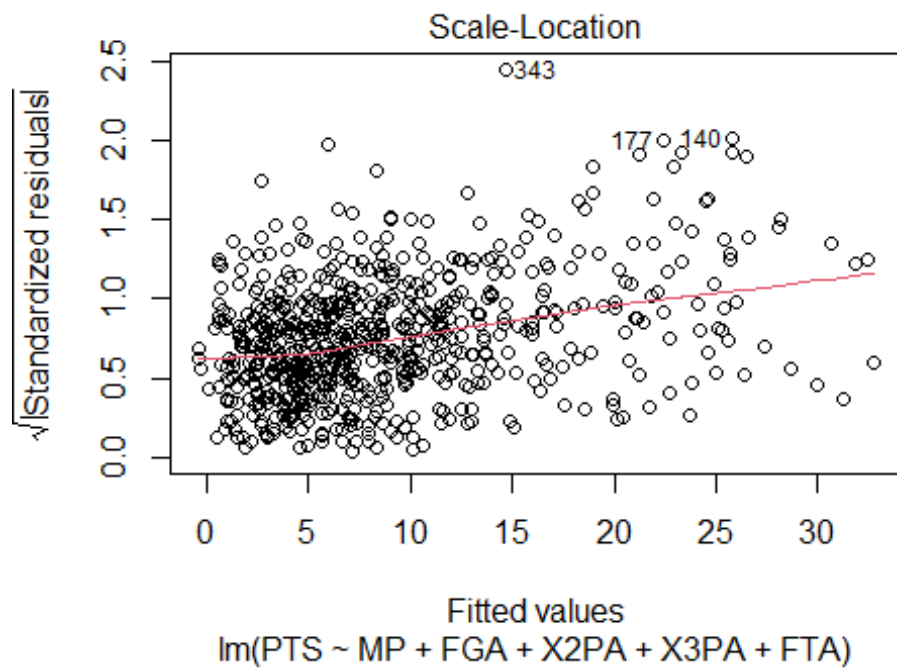
nba.lm2 <- lm(PTS ~ MP + FTA, nba)
summary(nba.lm2)

##
## Call:
## lm(formula = PTS ~ MP + FTA, data = nba)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -9.6758 -1.1487 -0.1078  1.0315  9.4218
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1.34898    0.18643  -7.236 1.26e-12 ***
## MP           0.34207    0.01178  29.038 < 2e-16 ***
## FTA          2.00718    0.06183  32.461 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.022 on 676 degrees of freedom
## Multiple R-squared:  0.9073, Adjusted R-squared:  0.907
## F-statistic: 3306 on 2 and 676 DF,  p-value: < 2.2e-16

# Doing another model with just Minutes played and Free throw attempts. Both
have equal significance.
# R squared goes down significantly compared to model with more fields.

plot(nba.lm)
```





```
nbaAdv <- read.csv(file.choose(), stringsAsFactors = T)
head(nbaAdv)
```

```
##      Rk      Player Pos Age  Tm  G   MP  PER   TS. X3PAR  FTr
ORB.
## 1  1      Precious Achiuwa  C  23 TOR 55 1140 15.2 0.554 0.267 0.307
9.3
## 2  2      Steven Adams  C  29 MEM 42 1133 17.5 0.564 0.004 0.490
20.1
## 3  3      Bam Adebayo  C  25 MIA 75 2598 20.1 0.592 0.011 0.361
8.0
## 4  4      Ochai Agbaji  SG  22 UTA 59 1209 9.5 0.561 0.591 0.179
3.9
## 5  5      Santi Aldama  PF  22 MEM 77 1682 13.9 0.591 0.507 0.274
5.4
## 6  6 Nickeil Alexander-Walker  SG  24 TOT 59 884 11.6 0.565 0.539 0.203
1.9
##      DRB. TRB. AST. STL. BLK. TOV. USG. OWS DWS  WS WS.48 OBPM DBPM  BPM VORP
## 1 24.4 16.3 6.3 1.3 2.6 11.4 19.4 0.8 1.4 2.2 0.093 -1.4 -0.8 -2.3 -0.1
## 2 25.3 22.7 11.2 1.5 3.7 19.8 14.6 1.3 2.1 3.4 0.144 -0.3 0.9 0.6 0.7
## 3 23.6 15.5 15.9 1.7 2.4 12.7 25.2 3.6 3.8 7.4 0.137 0.8 0.8 1.5 2.3
## 4 6.9 5.4 7.5 0.6 1.0 9.0 15.8 0.9 0.4 1.3 0.053 -1.7 -1.4 -3.0 -0.3
## 5 18.0 11.7 7.6 1.3 2.6 9.3 16.0 2.1 2.4 4.6 0.130 -0.3 0.8 0.5 1.1
## 6 10.5 6.3 16.7 1.7 2.0 14.6 17.9 0.3 0.8 1.1 0.062 -1.4 0.4 -0.9 0.2
```

Advanced stats of NBA players from 2022-2023 season.

```
names(nbaAdv)
```

```
## [1] "Rk"      "Player" "Pos"     "Age"     "Tm"      "G"       "MP"      "PER"
## [9] "TS."     "X3PAR"  "FTr"     "ORB."    "DRB."    "TRB."    "AST."    "STL."
## [17] "BLK."   "TOV."   "USG."    "OWS"     "DWS"     "WS"      "WS.48"   "OBPM"
## [25] "DBPM"   "BPM"    "VORP"
```

*# Rk, Player, Pos, Age, Tm, and G are all the same as the regular stats used.
 # MP (MPT) = Total minutes played, PER = Player Efficiency Rating, TS. = True Shooting Percentage, X3PAR = 3 point attempt rate, FTr = Free throw attempt rate, ORB. = offensive rebound percentage, DRB. = Defensive rebound percentage, TRB. = Total Rebound Percentage, AST. = Assist Percentage, STL. = Steal percentage, BLK. = Block Percentage, TOV. = Turnover Percentage, USG. = Usage Percentage, OWS = Offensive Win Shares, DWS = Defensive Win Shares, WS = Win Shares, WS.48 = Win Shares per 48 minutes, OBPM = Offensive box plus minus, DBPM = Defensive box plus minus, BPM = Box score plus minus, VORP = Value over replacement player.*

```
nbaAdv2 = nbaAdv[, -c(1,2,3,4,5)]
```

*# Removing fields in Advanced stats that are the same as regular stats.
 (Rank, Name, Position, Team, Games)*

```
head(nbaAdv2)
```

```
##      G   MP  PER   TS. X3PAR  FTr ORB. DRB. TRB. AST. STL. BLK. TOV. USG.
OWS
## 1 55 1140 15.2 0.554 0.267 0.307 9.3 24.4 16.3 6.3 1.3 2.6 11.4 19.4
0.8
```

```
## 2 42 1133 17.5 0.564 0.004 0.490 20.1 25.3 22.7 11.2 1.5 3.7 19.8 14.6
1.3
## 3 75 2598 20.1 0.592 0.011 0.361 8.0 23.6 15.5 15.9 1.7 2.4 12.7 25.2
3.6
## 4 59 1209 9.5 0.561 0.591 0.179 3.9 6.9 5.4 7.5 0.6 1.0 9.0 15.8
0.9
## 5 77 1682 13.9 0.591 0.507 0.274 5.4 18.0 11.7 7.6 1.3 2.6 9.3 16.0
2.1
## 6 59 884 11.6 0.565 0.539 0.203 1.9 10.5 6.3 16.7 1.7 2.0 14.6 17.9
0.3
## DWS WS WS.48 OBPM DBPM BPM VORP
## 1 1.4 2.2 0.093 -1.4 -0.8 -2.3 -0.1
## 2 2.1 3.4 0.144 -0.3 0.9 0.6 0.7
## 3 3.8 7.4 0.137 0.8 0.8 1.5 2.3
## 4 0.4 1.3 0.053 -1.7 -1.4 -3.0 -0.3
## 5 2.4 4.6 0.130 -0.3 0.8 0.5 1.1
## 6 0.8 1.1 0.062 -1.4 0.4 -0.9 0.2
```

```
newNba = cbind(nba, nbaAdv2)
head(newNba)
```

```
## Rk Player Pos Age Tm G GS MP FG FGA FG. X3P
X3PA
## 1 1 Precious Achiuwa C 23 TOR 55 12 20.7 3.6 7.3 0.485 0.5
2.0
## 2 2 Steven Adams C 29 MEM 42 42 27.0 3.7 6.3 0.597 0.0
0.0
## 3 3 Bam Adebayo C 25 MIA 75 75 34.6 8.0 14.9 0.540 0.0
0.2
## 4 4 Ochai Agbaji SG 22 UTA 59 22 20.5 2.8 6.5 0.427 1.4
3.9
## 5 5 Santi Aldama PF 22 MEM 77 20 21.8 3.2 6.8 0.470 1.2
3.5
## 6 6 Nickeil Alexander-Walker SG 24 TOT 59 3 15.0 2.2 5.0 0.444 1.0
2.7
## X3P. X2P X2PA X2P. eFG. FT FTA FT. ORB DRB TRB AST STL BLK TOV
PF
## 1 0.269 3.0 5.4 0.564 0.521 1.6 2.3 0.702 1.8 4.1 6.0 0.9 0.6 0.5 1.1
1.9
## 2 0.000 3.7 6.2 0.599 0.597 1.1 3.1 0.364 5.1 6.5 11.5 2.3 0.9 1.1 1.9
2.3
## 3 0.083 8.0 14.7 0.545 0.541 4.3 5.4 0.806 2.5 6.7 9.2 3.2 1.2 0.8 2.5
2.8
## 4 0.355 1.4 2.7 0.532 0.532 0.9 1.2 0.812 0.7 1.3 2.1 1.1 0.3 0.3 0.7
1.7
## 5 0.353 2.0 3.4 0.591 0.560 1.4 1.9 0.750 1.1 3.7 4.8 1.3 0.6 0.6 0.8
1.9
## 6 0.384 1.2 2.3 0.515 0.547 0.7 1.0 0.667 0.3 1.5 1.7 1.8 0.5 0.4 0.9
1.5
## PTS G MP PER TS. X3PAr FTr ORB. DRB. TRB. AST. STL. BLK. TOV.
```

```

USG.
## 1  9.2 55 1140 15.2 0.554 0.267 0.307  9.3 24.4 16.3  6.3  1.3  2.6 11.4
19.4
## 2  8.6 42 1133 17.5 0.564 0.004 0.490 20.1 25.3 22.7 11.2  1.5  3.7 19.8
14.6
## 3 20.4 75 2598 20.1 0.592 0.011 0.361  8.0 23.6 15.5 15.9  1.7  2.4 12.7
25.2
## 4  7.9 59 1209  9.5 0.561 0.591 0.179  3.9  6.9  5.4  7.5  0.6  1.0  9.0
15.8
## 5  9.0 77 1682 13.9 0.591 0.507 0.274  5.4 18.0 11.7  7.6  1.3  2.6  9.3
16.0
## 6  6.2 59  884 11.6 0.565 0.539 0.203  1.9 10.5  6.3 16.7  1.7  2.0 14.6
17.9
##   OWS DWS  WS WS.48 OBPM DBPM  BPM VORP
## 1 0.8 1.4 2.2 0.093 -1.4 -0.8 -2.3 -0.1
## 2 1.3 2.1 3.4 0.144 -0.3  0.9  0.6  0.7
## 3 3.6 3.8 7.4 0.137  0.8  0.8  1.5  2.3
## 4 0.9 0.4 1.3 0.053 -1.7 -1.4 -3.0 -0.3
## 5 2.1 2.4 4.6 0.130 -0.3  0.8  0.5  1.1
## 6 0.3 0.8 1.1 0.062 -1.4  0.4 -0.9  0.2

```

Combining players regular and advanced stats.

```
colnames(newNba)[31] = "MPT"
```

Changing the MP in the advanced stats to MPT so that there is no duplicates.

```
head(newNba)
```

```

##   Rk                                     Player Pos Age  Tm  G GS   MP  FG  FGA   FG. X3P
X3PA
## 1  1          Precious Achiuwa      C   23 TOR  55 12 20.7 3.6   7.3 0.485 0.5
2.0
## 2  2          Steven Adams      C   29 MEM  42 42 27.0 3.7   6.3 0.597 0.0
0.0
## 3  3          Bam Adebayo      C   25 MIA  75 75 34.6 8.0  14.9 0.540 0.0
0.2
## 4  4          Ochai Agbaji     SG   22 UTA  59 22 20.5 2.8   6.5 0.427 1.4
3.9
## 5  5          Santi Aldama     PF   22 MEM  77 20 21.8 3.2   6.8 0.470 1.2
3.5
## 6  6 Nickeil Alexander-Walker SG   24 TOT  59  3 15.0 2.2   5.0 0.444 1.0
2.7
##   X3P. X2P X2PA  X2P.  eFG.  FT FTA   FT. ORB DRB  TRB AST STL BLK TOV
PF
## 1 0.269 3.0  5.4 0.564 0.521 1.6 2.3 0.702 1.8 4.1  6.0 0.9 0.6 0.5 1.1
1.9
## 2 0.000 3.7  6.2 0.599 0.597 1.1 3.1 0.364 5.1 6.5 11.5 2.3 0.9 1.1 1.9
2.3
## 3 0.083 8.0 14.7 0.545 0.541 4.3 5.4 0.806 2.5 6.7  9.2 3.2 1.2 0.8 2.5
2.8

```



```

## 4 0.355 1.4 2.7 0.532 0.532 0.9 1.2 0.812 0.7 1.3 2.1 1.1 0.3 0.3 0.7
1.7
## 5 0.353 2.0 3.4 0.591 0.560 1.4 1.9 0.750 1.1 3.7 4.8 1.3 0.6 0.6 0.8
1.9
## 6 0.384 1.2 2.3 0.515 0.547 0.7 1.0 0.667 0.3 1.5 1.7 1.8 0.5 0.4 0.9
1.5
## PTS MPT MP PER TS. X3PAr FTr ORB. DRB. TRB. AST. STL. BLK. TOV.
USG.
## 1 9.2 55 1140 15.2 0.554 0.267 0.307 9.3 24.4 16.3 6.3 1.3 2.6 11.4
19.4
## 2 8.6 42 1133 17.5 0.564 0.004 0.490 20.1 25.3 22.7 11.2 1.5 3.7 19.8
14.6
## 3 20.4 75 2598 20.1 0.592 0.011 0.361 8.0 23.6 15.5 15.9 1.7 2.4 12.7
25.2
## 4 7.9 59 1209 9.5 0.561 0.591 0.179 3.9 6.9 5.4 7.5 0.6 1.0 9.0
15.8
## 5 9.0 77 1682 13.9 0.591 0.507 0.274 5.4 18.0 11.7 7.6 1.3 2.6 9.3
16.0
## 6 6.2 59 884 11.6 0.565 0.539 0.203 1.9 10.5 6.3 16.7 1.7 2.0 14.6
17.9
## OWS DWS WS WS.48 OBPM DBPM BPM VORP
## 1 0.8 1.4 2.2 0.093 -1.4 -0.8 -2.3 -0.1
## 2 1.3 2.1 3.4 0.144 -0.3 0.9 0.6 0.7
## 3 3.6 3.8 7.4 0.137 0.8 0.8 1.5 2.3
## 4 0.9 0.4 1.3 0.053 -1.7 -1.4 -3.0 -0.3
## 5 2.1 2.4 4.6 0.130 -0.3 0.8 0.5 1.1
## 6 0.3 0.8 1.1 0.062 -1.4 0.4 -0.9 0.2

nba2.lm <- lm(PTS ~ MP + FGA + X2PA + X3PA + FTA + PER + TS. + USG. + FTr +
X3PAr + MPT + OWS + OBPM + VORP, newNba)
summary(nba2.lm)

##
## Call:
## lm(formula = PTS ~ MP + FGA + X2PA + X3PA + FTA + PER + TS. +
## USG. + FTr + X3PAr + MPT + OWS + OBPM + VORP, data = newNba)
##
## Residuals:
## Min 1Q Median 3Q Max
## -2.3519 -0.2097 0.0150 0.2192 3.8860
##
## Coefficients:
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.494982 0.282124 -8.844 < 2e-16 ***
## MP -0.008909 0.007643 -1.166 0.2441
## FGA 0.547349 0.442195 1.238 0.2162
## X2PA 0.553216 0.441442 1.253 0.2106
## X3PA 0.575245 0.443018 1.298 0.1946
## FTA 0.656684 0.035224 18.643 < 2e-16 ***
## PER 0.013372 0.011921 1.122 0.2624

```

```

## TS.          5.026860    0.297945   16.872   < 2e-16 ***
## USG.         -0.015742    0.008554   -1.840    0.0662 .
## FTr          -0.555289    0.175209   -3.169    0.0016 **
## X3PAr         0.178989    0.186671    0.959    0.3380
## MPT          -0.008444    0.001173   -7.197  1.68e-12 ***
## OWS           0.374950    0.035922   10.438   < 2e-16 ***
## OBPM          -0.005900    0.019985   -0.295    0.7679
## VORP          -0.019049    0.051681   -0.369    0.7126
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5407 on 661 degrees of freedom
## (3 observations deleted due to missingness)
## Multiple R-squared:  0.9935, Adjusted R-squared:  0.9933
## F-statistic: 7179 on 14 and 661 DF, p-value: < 2.2e-16

# Using other advanced statistics for a linear regression on Points.
# Free throw attempts, True shooting percentage, Free throw rate, Minutes
# played total, and Offensive win shares are the most significant.
# R squared value of 0.99, most likely because there are so many variables
# being used to predict the outcome of Points per game.
# Two least significant stats are VORP and Offensive box plus minus. Remove
# those 2 in next model.

nba3.lm <- lm(PTS ~ MP + FGA + X2PA + X3PA + FTA + PER + TS. + USG. + FTr +
X3PAr + MPT + OWS, newNba)
summary(nba3.lm)

##
## Call:
## lm(formula = PTS ~ MP + FGA + X2PA + X3PA + FTA + PER + TS. +
##      USG. + FTr + X3PAr + MPT + OWS, data = newNba)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.3373 -0.2102  0.0119  0.2224  3.8989
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.444732    0.213076 -11.473   < 2e-16 ***
## MP          -0.007877    0.007291  -1.080   0.28037
## FGA           0.548167    0.441577   1.241   0.21490
## X2PA           0.548537    0.440730   1.245   0.21372
## X3PA           0.570683    0.442314   1.290   0.19742
## FTA           0.655651    0.035104  18.678   < 2e-16 ***
## PER           0.010078    0.006589   1.530   0.12660
## TS.           5.024211    0.290179  17.314   < 2e-16 ***
## USG.          -0.014637    0.007897  -1.853   0.06426 .
## FTr           -0.546564    0.173938  -3.142   0.00175 **
## X3PAr          0.153004    0.172151   0.889   0.37445

```

```

## MPT          -0.008399    0.001130   -7.433 3.29e-13 ***
## OWS           0.363973    0.021246   17.131 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.54 on 663 degrees of freedom
## (3 observations deleted due to missingness)
## Multiple R-squared:  0.9935, Adjusted R-squared:  0.9933
## F-statistic: 8398 on 12 and 663 DF, p-value: < 2.2e-16

# FTA, TS., FTr, MPT, and OWS are still the most significant. R squared has
# stayed the same because there were no major changes to the model besides
# removing the 2 least significant.
# PER is the least significant, remove in next model.

nba4.lm <- lm(PTS ~ MP + FGA + X2PA + X3PA + FTA + TS. + USG. + FTr + X3PAr +
MPT + OWS, newNba)
summary(nba4.lm)

##
## Call:
## lm(formula = PTS ~ MP + FGA + X2PA + X3PA + FTA + TS. + USG. +
##      FTr + X3PAr + MPT + OWS, data = newNba)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.3655 -0.2010  0.0144  0.2220  3.9235
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.540617    0.203852 -12.463 < 2e-16 ***
## MP           -0.008523    0.007286  -1.170  0.24254
## FGA           0.561723    0.441933   1.271  0.20415
## X2PA          0.541783    0.441153   1.228  0.21984
## X3PA          0.556035    0.442656   1.256  0.20951
## FTA           0.649291    0.034892  18.609 < 2e-16 ***
## TS.           5.298894    0.228164  23.224 < 2e-16 ***
## USG.         -0.011838    0.007690  -1.539  0.12419
## FTr          -0.480705    0.168694  -2.850  0.00451 **
## X3PAr         0.167560    0.172061   0.974  0.33049
## MPT          -0.008628    0.001121  -7.695 5.13e-14 ***
## OWS           0.373928    0.020245  18.470 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5405 on 664 degrees of freedom
## (3 observations deleted due to missingness)
## Multiple R-squared:  0.9934, Adjusted R-squared:  0.9933
## F-statistic: 9143 on 11 and 664 DF, p-value: < 2.2e-16

```

FTA, TS., MPT, and OWS are still the most significant. FTr is still significant, but not as much as before.
MP and X3PA are the least significant, remove in next model.

```
nba5.lm <- lm(PTS ~ FGA + X2PA + X3PA + FTA + TS. + USG. + FTr + MPT + OWS,  
newNba)  
summary(nba5.lm)
```

```
##  
## Call:  
## lm(formula = PTS ~ FGA + X2PA + X3PA + FTA + TS. + USG. + FTr +  
##     MPT + OWS, data = newNba)  
##  
## Residuals:  
##      Min       1Q   Median       3Q      Max   
## -2.3831 -0.2186  0.0233  0.2221  3.8978   
##  
## Coefficients:  
##              Estimate Std. Error t value Pr(>|t|)      
## (Intercept) -2.553371   0.147951 -17.258 < 2e-16 ***  
## FGA          0.514740   0.440834   1.168  0.24337      
## X2PA          0.559580   0.440915   1.269  0.20484      
## X3PA          0.596186   0.440925   1.352  0.17679      
## FTA           0.657846   0.034157  19.259 < 2e-16 ***  
## TS.           5.230341   0.223154  23.438 < 2e-16 ***  
## USG.         -0.005861   0.005663  -1.035  0.30105      
## FTr          -0.538261   0.163970  -3.283  0.00108 **   
## MPT          -0.008986   0.001090  -8.247 8.66e-16 ***  
## OWS           0.372940   0.020208  18.455 < 2e-16 ***  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
##  
## Residual standard error: 0.5406 on 666 degrees of freedom  
## (3 observations deleted due to missingness)  
## Multiple R-squared:  0.9934, Adjusted R-squared:  0.9933   
## F-statistic: 1.117e+04 on 9 and 666 DF,  p-value: < 2.2e-16
```

Variables from past models are still significant, but now USG. (Usage percentage) is also significant in this model. Removing FGA in next model.

```
nba6.lm <- lm(PTS ~ X2PA + X3PA + FTA + TS. + USG. + FTr + MPT + OWS,  
newNba)  
summary(nba6.lm)
```

```
##  
## Call:  
## lm(formula = PTS ~ X2PA + X3PA + FTA + TS. + USG. + FTr + MPT +  
##     OWS, data = newNba)  
##  
## Residuals:  
##      Min       1Q   Median       3Q      Max   
##
```

```
## -2.3797 -0.2190 0.0275 0.2222 3.9001
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.549126  0.147947 -17.230  < 2e-16 ***
## X2PA         1.074100  0.015434  69.592  < 2e-16 ***
## X3PA         1.110817  0.012781  86.911  < 2e-16 ***
## FTA          0.659475  0.034138  19.318  < 2e-16 ***
## TS.          5.232620  0.223206  23.443  < 2e-16 ***
## USG.         -0.006173  0.005658  -1.091  0.275688
## FTr          -0.543901  0.163943  -3.318  0.000957 ***
## MPT          -0.008982  0.001090  -8.241  9.07e-16 ***
## OWS          0.372448  0.020209  18.430  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5408 on 667 degrees of freedom
## (3 observations deleted due to missingness)
## Multiple R-squared:  0.9934, Adjusted R-squared:  0.9933
## F-statistic: 1.256e+04 on 8 and 667 DF,  p-value: < 2.2e-16

# ALL variables are now significant in this model.

sigma(nba6.lm)

## [1] 0.540773

sigma(nba6.lm)/mean(newNba$PTS)

## [1] 0.06104183

# Error rate is about 5.9% which is really good for this model. Can mix and
# match more stats and models to try and find the best error rate.

nba7.lm <- lm(PTS ~ X2PA * X3PA * FTA * TS. * USG. * FTr * MPT * OWS,
newNba)
summary(nba7.lm)

##
## Call:
## lm(formula = PTS ~ X2PA * X3PA * FTA * TS. * USG. * FTr * MPT *
##     OWS, data = newNba)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.141867 -0.024740 -0.000814  0.025193  0.136813
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.701e-01  2.708e-01   0.997   0.3192
## X2PA        -3.725e-01  2.549e-01  -1.461   0.1447
## X3PA        -2.095e-01  2.557e-01  -0.819   0.4130
```

## FTA	-1.564e+01	8.006e+00	-1.954	0.0514
.				
## TS.	-4.106e-01	4.715e-01	-0.871	0.3843
## USG.	-9.664e-03	1.595e-02	-0.606	0.5449
## FTr	-6.128e+00	3.172e+00	-1.932	0.0541
.				
## MPT	-2.580e-02	3.552e-02	-0.726	0.4680
## OWS	-8.246e-01	3.211e+00	-0.257	0.7974
## X2PA:X3PA	2.703e-01	1.868e-01	1.447	0.1487
## X2PA:FTA	-1.241e-01	7.712e-01	-0.161	0.8722
## X3PA:FTA	6.891e-01	9.254e-01	0.745	0.4569
## X2PA:TS.	2.657e+00	4.868e-01	5.459	8.19e-08

## X3PA:TS.	2.403e+00	4.729e-01	5.081	5.65e-07

## FTA:TS.	3.057e+01	1.415e+01	2.160	0.0314
*				
## X2PA:USG.	1.595e-02	1.249e-02	1.277	0.2024
## X3PA:USG.	2.538e-03	1.418e-02	0.179	0.8581
## FTA:USG.	8.783e-01	4.901e-01	1.792	0.0739
.				
## TS.:USG.	1.446e-02	2.497e-02	0.579	0.5628
## X2PA:FTr	1.659e+01	8.176e+00	2.029	0.0431
*				
## X3PA:FTr	1.797e+01	7.865e+00	2.285	0.0228
*				
## FTA:FTr	8.857e+00	3.933e+00	2.252	0.0248
*				
## TS.:FTr	9.888e+00	5.327e+00	1.856	0.0641
.				
## USG.:FTr	3.271e-01	1.754e-01	1.865	0.0629
.				
## X2PA:MPT	2.456e-02	2.499e-02	0.983	0.3263
## X3PA:MPT	3.992e-03	1.760e-02	0.227	0.8207
## FTA:MPT	4.693e-01	2.454e-01	1.912	0.0566
.				
## TS.:MPT	4.293e-02	6.286e-02	0.683	0.4951
## USG.:MPT	1.801e-03	2.592e-03	0.695	0.4876
## FTr:MPT	3.254e-01	1.825e-01	1.782	0.0754
.				
## X2PA:OWS	-1.016e-01	2.385e+00	-0.043	0.9660
## X3PA:OWS	-4.868e-01	1.630e+00	-0.299	0.7654
## FTA:OWS	5.714e+00	1.832e+01	0.312	0.7553
## TS.:OWS	1.317e+00	5.155e+00	0.255	0.7985
## USG.:OWS	1.046e-01	1.907e-01	0.549	0.5836
## FTr:OWS	-1.855e+01	1.466e+01	-1.265	0.2064
## MPT:OWS	1.443e-02	5.952e-02	0.242	0.8086
## X2PA:X3PA:FTA	-2.281e-01	1.680e-01	-1.358	0.1753
## X2PA:X3PA:TS.	-4.898e-01	3.503e-01	-1.398	0.1628
## X2PA:FTA:TS.	1.919e-01	1.435e+00	0.134	0.8937

## X3PA:FTA:TS.	-1.101e+00	1.690e+00	-0.652	0.5148
## X2PA:X3PA:USG.	-9.510e-03	8.838e-03	-1.076	0.2825
## X2PA:FTA:USG.	8.910e-03	4.158e-02	0.214	0.8304
## X3PA:FTA:USG.	-3.939e-02	5.209e-02	-0.756	0.4500
## X2PA:TS.:USG.	-2.582e-02	2.310e-02	-1.118	0.2643
## X3PA:TS.:USG.	-7.119e-03	2.451e-02	-0.291	0.7716
## FTA:TS.:USG.	-1.615e+00	8.676e-01	-1.862	0.0633
.				
## X2PA:X3PA:FTr	-4.022e-02	2.065e+00	-0.019	0.9845
## X2PA:FTA:FTr	-1.044e+00	1.736e+00	-0.601	0.5479
## X3PA:FTA:FTr	-7.635e+00	3.122e+00	-2.445	0.0149
*				
## X2PA:TS.:FTr	-3.076e+01	1.458e+01	-2.110	0.0355
*				
## X3PA:TS.:FTr	-3.453e+01	1.390e+01	-2.484	0.0134
*				
## FTA:TS.:FTr	-1.453e+01	7.042e+00	-2.063	0.0398
*				
## X2PA:USG.:FTr	-9.198e-01	5.087e-01	-1.808	0.0713
.				
## X3PA:USG.:FTr	-9.356e-01	4.834e-01	-1.935	0.0536
.				
## FTA:USG.:FTr	-4.276e-01	2.090e-01	-2.046	0.0414
*				
## TS.:USG.:FTr	-5.305e-01	2.972e-01	-1.785	0.0750
.				
## X2PA:X3PA:MPT	-6.926e-03	8.388e-03	-0.826	0.4095
## X2PA:FTA:MPT	5.523e-03	1.947e-02	0.284	0.7768
## X3PA:FTA:MPT	-1.167e-02	2.795e-02	-0.418	0.6764
## X2PA:TS.:MPT	-4.388e-02	4.431e-02	-0.990	0.3225
## X3PA:TS.:MPT	-6.822e-03	3.156e-02	-0.216	0.8289
## FTA:TS.:MPT	-8.986e-01	4.376e-01	-2.053	0.0407
*				
## X2PA:USG.:MPT	-1.397e-03	1.465e-03	-0.953	0.3409
## X3PA:USG.:MPT	-8.426e-05	1.122e-03	-0.075	0.9402
## FTA:USG.:MPT	-2.659e-02	1.429e-02	-1.861	0.0635
.				
## TS.:USG.:MPT	-3.326e-03	4.543e-03	-0.732	0.4645
## X2PA:FTr:MPT	-5.823e-01	2.606e-01	-2.234	0.0260
*				
## X3PA:FTr:MPT	-5.737e-01	2.443e-01	-2.348	0.0193
*				
## FTA:FTr:MPT	-1.995e-01	2.456e-01	-0.812	0.4171
## TS.:FTr:MPT	-5.607e-01	3.161e-01	-1.774	0.0768
.				
## USG.:FTr:MPT	-1.982e-02	1.221e-02	-1.623	0.1054
## X2PA:X3PA:OWS	6.209e-01	7.379e-01	0.841	0.4006
## X2PA:FTA:OWS	-7.546e-01	1.334e+00	-0.566	0.5720
## X3PA:FTA:OWS	5.924e-03	1.899e+00	0.003	0.9975
## X2PA:TS.:OWS	-3.225e-01	3.827e+00	-0.084	0.9329

## X3PA:TS.:OWS	8.195e-01	2.741e+00	0.299	0.7651
## FTA:TS.:OWS	-1.288e+01	3.041e+01	-0.424	0.6721
## X2PA:USG.:OWS	-6.421e-03	1.339e-01	-0.048	0.9618
## X3PA:USG.:OWS	-1.798e-02	1.018e-01	-0.177	0.8599
## FTA:USG.:OWS	-3.525e-01	1.061e+00	-0.332	0.7399
## TS.:USG.:OWS	-1.838e-01	3.040e-01	-0.605	0.5458
## X2PA:FTr:OWS	5.553e+00	2.002e+01	0.277	0.7817
## X3PA:FTr:OWS	2.895e-01	1.859e+01	0.016	0.9876
## FTA:FTr:OWS	-8.063e+00	1.533e+01	-0.526	0.5992
## TS.:FTr:OWS	3.273e+01	2.366e+01	1.383	0.1673
## USG.:FTr:OWS	1.046e+00	9.136e-01	1.145	0.2527
## X2PA:MPT:OWS	-8.644e-04	3.980e-02	-0.022	0.9827
## X3PA:MPT:OWS	8.566e-03	2.814e-02	0.304	0.7609
## FTA:MPT:OWS	7.678e-02	3.102e-01	0.248	0.8046
## TS.:MPT:OWS	-2.540e-02	9.814e-02	-0.259	0.7959
## USG.:MPT:OWS	-2.562e-03	3.768e-03	-0.680	0.4970
## FTr:MPT:OWS	1.450e-01	2.905e-01	0.499	0.6181
## X2PA:X3PA:FTA:TS.	3.941e-01	3.042e-01	1.296	0.1958
## X2PA:X3PA:FTA:USG.	9.378e-03	7.483e-03	1.253	0.2108
## X2PA:X3PA:TS.:USG.	1.664e-02	1.605e-02	1.037	0.3005
## X2PA:FTA:TS.:USG.	-1.472e-02	7.715e-02	-0.191	0.8488
## X3PA:FTA:TS.:USG.	6.716e-02	9.561e-02	0.702	0.4828
## X2PA:X3PA:FTA:FTr	1.190e+00	6.697e-01	1.777	0.0762
.				
## X2PA:X3PA:TS.:FTr	-2.052e-01	3.617e+00	-0.057	0.9548
## X2PA:FTA:TS.:FTr	1.597e+00	3.249e+00	0.491	0.6233
## X3PA:FTA:TS.:FTr	1.385e+01	5.573e+00	2.486	0.0133
*				
## X2PA:X3PA:USG.:FTr	-6.970e-03	1.153e-01	-0.060	0.9518
## X2PA:FTA:USG.:FTr	3.148e-02	9.567e-02	0.329	0.7423
## X3PA:FTA:USG.:FTr	3.709e-01	1.709e-01	2.170	0.0306
*				
## X2PA:TS.:USG.:FTr	1.639e+00	9.093e-01	1.802	0.0722
.				
## X3PA:TS.:USG.:FTr	1.743e+00	8.570e-01	2.034	0.0426
*				
## FTA:TS.:USG.:FTr	7.298e-01	3.815e-01	1.913	0.0564
.				
## X2PA:X3PA:FTA:MPT	5.343e-03	3.934e-03	1.358	0.1752
## X2PA:X3PA:TS.:MPT	1.323e-02	1.484e-02	0.891	0.3734
## X2PA:FTA:TS.:MPT	-1.017e-02	3.509e-02	-0.290	0.7722
## X3PA:FTA:TS.:MPT	1.604e-02	5.035e-02	0.319	0.7502
## X2PA:X3PA:USG.:MPT	3.052e-04	4.479e-04	0.681	0.4960
## X2PA:FTA:USG.:MPT	-3.247e-04	1.035e-03	-0.314	0.7538
## X3PA:FTA:USG.:MPT	5.089e-04	1.483e-03	0.343	0.7317
## X2PA:TS.:USG.:MPT	2.530e-03	2.576e-03	0.982	0.3266
## X3PA:TS.:USG.:MPT	2.050e-04	2.003e-03	0.102	0.9185
## FTA:TS.:USG.:MPT	4.953e-02	2.544e-02	1.947	0.0522
.				
## X2PA:X3PA:FTr:MPT	1.315e-03	5.775e-02	0.023	0.9818

## X2PA:FTA:FTr:MPT	1.681e-02	4.654e-02	0.361	0.7181
## X3PA:FTA:FTr:MPT	1.689e-01	9.658e-02	1.748	0.0811
.				
## X2PA:TS.:FTr:MPT	1.099e+00	4.650e-01	2.363	0.0186
*				
## X3PA:TS.:FTr:MPT	1.104e+00	4.330e-01	2.549	0.0112
*				
## FTA:TS.:FTr:MPT	2.802e-01	4.362e-01	0.642	0.5210
## X2PA:USG.:FTr:MPT	3.303e-02	1.539e-02	2.146	0.0324
*				
## X3PA:USG.:FTr:MPT	3.107e-02	1.473e-02	2.109	0.0355
*				
## FTA:USG.:FTr:MPT	1.067e-02	1.372e-02	0.778	0.4371
## TS.:USG.:FTr:MPT	3.579e-02	2.105e-02	1.700	0.0899
.				
## X2PA:X3PA:FTA:OWS	-3.863e-01	2.637e-01	-1.465	0.1437
## X2PA:X3PA:TS.:OWS	-9.375e-01	1.191e+00	-0.787	0.4317
## X2PA:FTA:TS.:OWS	1.299e+00	2.206e+00	0.589	0.5563
## X3PA:FTA:TS.:OWS	-3.045e-01	3.075e+00	-0.099	0.9212
## X2PA:X3PA:USG.:OWS	-1.440e-02	3.841e-02	-0.375	0.7079
## X2PA:FTA:USG.:OWS	5.962e-02	6.933e-02	0.860	0.3903
## X3PA:FTA:USG.:OWS	4.235e-03	1.094e-01	0.039	0.9691
## X2PA:TS.:USG.:OWS	4.697e-02	2.179e-01	0.216	0.8294
## X3PA:TS.:USG.:OWS	3.322e-02	1.732e-01	0.192	0.8480
## FTA:TS.:USG.:OWS	7.014e-01	1.762e+00	0.398	0.6909
## X2PA:X3PA:FTr:OWS	-1.358e-01	4.035e+00	-0.034	0.9732
## X2PA:FTA:FTr:OWS	6.985e-01	2.847e+00	0.245	0.8063
## X3PA:FTA:FTr:OWS	-3.019e+00	6.576e+00	-0.459	0.6464
## X2PA:TS.:FTr:OWS	-3.195e+00	3.306e+01	-0.097	0.9231
## X3PA:TS.:FTr:OWS	3.256e+00	3.064e+01	0.106	0.9154
## FTA:TS.:FTr:OWS	9.458e+00	2.406e+01	0.393	0.6945
## X2PA:USG.:FTr:OWS	-4.156e-01	1.125e+00	-0.370	0.7119
## X3PA:USG.:FTr:OWS	2.166e-01	1.100e+00	0.197	0.8440
## FTA:USG.:FTr:OWS	4.864e-01	8.943e-01	0.544	0.5868
## TS.:USG.:FTr:OWS	-1.842e+00	1.486e+00	-1.240	0.2158
## X2PA:X3PA:MPT:OWS	-1.053e-02	1.166e-02	-0.903	0.3669
## X2PA:FTA:MPT:OWS	7.987e-03	1.951e-02	0.409	0.6824
## X3PA:FTA:MPT:OWS	4.646e-03	3.299e-02	0.141	0.8881
## X2PA:TS.:MPT:OWS	1.038e-02	6.410e-02	0.162	0.8714
## X3PA:TS.:MPT:OWS	-1.492e-02	4.795e-02	-0.311	0.7558
## FTA:TS.:MPT:OWS	-5.989e-02	5.134e-01	-0.117	0.9072
## X2PA:USG.:MPT:OWS	4.128e-04	2.202e-03	0.187	0.8514
## X3PA:USG.:MPT:OWS	2.295e-05	1.811e-03	0.013	0.9899
## FTA:USG.:MPT:OWS	-4.686e-03	1.844e-02	-0.254	0.7995
## TS.:USG.:MPT:OWS	4.812e-03	6.201e-03	0.776	0.4382
## X2PA:FTr:MPT:OWS	-2.143e-01	3.258e-01	-0.658	0.5110
## X3PA:FTr:MPT:OWS	-1.044e-01	3.249e-01	-0.321	0.7482
## FTA:FTr:MPT:OWS	1.608e-01	2.609e-01	0.616	0.5380
## TS.:FTr:MPT:OWS	-2.478e-01	4.703e-01	-0.527	0.5986
## USG.:FTr:MPT:OWS	-1.619e-03	2.089e-02	-0.077	0.9383

## X2PA:X3PA:FTA:TS.:USG.	-1.667e-02	1.380e-02	-1.208	0.2279
## X2PA:X3PA:FTA:TS.:FTr	-2.054e+00	1.176e+00	-1.746	0.0815
.				
## X2PA:X3PA:FTA:USG.:FTr	-4.985e-02	2.899e-02	-1.720	0.0862
.				
## X2PA:X3PA:TS.:USG.:FTr	3.584e-02	2.026e-01	0.177	0.8597
## X2PA:FTA:TS.:USG.:FTr	-4.524e-02	1.750e-01	-0.259	0.7961
## X3PA:FTA:TS.:USG.:FTr	-6.884e-01	3.139e-01	-2.193	0.0289
*				
## X2PA:X3PA:FTA:TS.:MPT	-8.969e-03	7.075e-03	-1.268	0.2056
## X2PA:X3PA:FTA:USG.:MPT	-2.046e-04	1.732e-04	-1.181	0.2381
## X2PA:X3PA:TS.:USG.:MPT	-5.868e-04	7.810e-04	-0.751	0.4529
## X2PA:FTA:TS.:USG.:MPT	5.643e-04	1.871e-03	0.302	0.7631
## X3PA:FTA:TS.:USG.:MPT	-7.306e-04	2.674e-03	-0.273	0.7848
## X2PA:X3PA:FTA:FTr:MPT	-2.639e-02	1.438e-02	-1.835	0.0672
.				
## X2PA:X3PA:TS.:FTr:MPT	-6.850e-03	1.001e-01	-0.068	0.9455
## X2PA:FTA:TS.:FTr:MPT	-1.724e-02	8.260e-02	-0.209	0.8348
## X3PA:FTA:TS.:FTr:MPT	-2.823e-01	1.712e-01	-1.649	0.0999
.				
## X2PA:X3PA:USG.:FTr:MPT	-3.868e-05	3.080e-03	-0.013	0.9900
## X2PA:FTA:USG.:FTr:MPT	-6.005e-04	2.496e-03	-0.241	0.8100
## X3PA:FTA:USG.:FTr:MPT	-7.945e-03	4.803e-03	-1.654	0.0988
.				
## X2PA:TS.:USG.:FTr:MPT	-6.079e-02	2.736e-02	-2.222	0.0268
*				
## X3PA:TS.:USG.:FTr:MPT	-5.855e-02	2.603e-02	-2.249	0.0250
*				
## FTA:TS.:USG.:FTr:MPT	-1.646e-02	2.437e-02	-0.676	0.4996
## X2PA:X3PA:FTA:TS.:OWS	6.467e-01	4.346e-01	1.488	0.1375
## X2PA:X3PA:FTA:USG.:OWS	1.328e-02	1.080e-02	1.230	0.2193
## X2PA:X3PA:TS.:USG.:OWS	1.718e-02	6.270e-02	0.274	0.7842
## X2PA:FTA:TS.:USG.:OWS	-1.041e-01	1.151e-01	-0.905	0.3662
## X3PA:FTA:TS.:USG.:OWS	3.795e-03	1.775e-01	0.021	0.9829
## X2PA:X3PA:FTA:FTr:OWS	1.158e+00	7.416e-01	1.561	0.1192
## X2PA:X3PA:TS.:FTr:OWS	-7.572e-03	6.469e+00	-0.001	0.9991
## X2PA:FTA:TS.:FTr:OWS	-1.224e+00	4.607e+00	-0.266	0.7906
## X3PA:FTA:TS.:FTr:OWS	5.542e+00	1.044e+01	0.531	0.5960
## X2PA:X3PA:USG.:FTr:OWS	-6.167e-02	2.158e-01	-0.286	0.7752
## X2PA:FTA:USG.:FTr:OWS	-3.264e-02	1.486e-01	-0.220	0.8263
## X3PA:FTA:USG.:FTr:OWS	1.572e-01	3.650e-01	0.431	0.6669
## X2PA:TS.:USG.:FTr:OWS	4.120e-01	1.864e+00	0.221	0.8252
## X3PA:TS.:USG.:FTr:OWS	-4.695e-01	1.824e+00	-0.257	0.7970
## FTA:TS.:USG.:FTr:OWS	-6.058e-01	1.434e+00	-0.422	0.6729
## X2PA:X3PA:FTA:MPT:OWS	5.145e-03	4.069e-03	1.264	0.2068
## X2PA:X3PA:TS.:MPT:OWS	1.583e-02	1.896e-02	0.835	0.4042
## X2PA:FTA:TS.:MPT:OWS	-1.304e-02	3.231e-02	-0.403	0.6868
## X3PA:FTA:TS.:MPT:OWS	-3.602e-04	5.357e-02	-0.007	0.9946
## X2PA:X3PA:USG.:MPT:OWS	3.020e-04	6.018e-04	0.502	0.6160
## X2PA:FTA:USG.:MPT:OWS	-6.804e-04	1.026e-03	-0.663	0.5076

## X3PA:FTA:USG.:MPT:OWS	5.492e-06	1.892e-03	0.003	0.9977
## X2PA:TS.:USG.:MPT:OWS	-1.354e-03	3.594e-03	-0.377	0.7066
## X3PA:TS.:USG.:MPT:OWS	-1.382e-04	3.103e-03	-0.045	0.9645
## FTA:TS.:USG.:MPT:OWS	5.013e-03	3.066e-02	0.163	0.8702
## X2PA:X3PA:FTr:MPT:OWS	5.239e-03	6.243e-02	0.084	0.9332
## X2PA:FTA:FTr:MPT:OWS	-8.427e-03	4.195e-02	-0.201	0.8409
## X3PA:FTA:FTr:MPT:OWS	4.186e-03	1.110e-01	0.038	0.9699
## X2PA:TS.:FTr:MPT:OWS	2.325e-01	5.346e-01	0.435	0.6638
## X3PA:TS.:FTr:MPT:OWS	8.790e-02	5.337e-01	0.165	0.8693
## FTA:TS.:FTr:MPT:OWS	-1.814e-01	4.002e-01	-0.453	0.6505
## X2PA:USG.:FTr:MPT:OWS	1.277e-02	1.851e-02	0.690	0.4906
## X3PA:USG.:FTr:MPT:OWS	2.183e-03	1.961e-02	0.111	0.9114
## FTA:USG.:FTr:MPT:OWS	-9.359e-03	1.564e-02	-0.598	0.5499
## TS.:USG.:FTr:MPT:OWS	2.550e-03	3.407e-02	0.075	0.9404
## X2PA:X3PA:FTA:TS.:USG.:FTr	8.691e-02	5.111e-02	1.700	0.0898
.				
## X2PA:X3PA:FTA:TS.:USG.:MPT	3.530e-04	3.142e-04	1.123	0.2619
## X2PA:X3PA:FTA:TS.:FTr:MPT	4.433e-02	2.531e-02	1.752	0.0806
.				
## X2PA:X3PA:FTA:USG.:FTr:MPT	1.095e-03	6.351e-04	1.724	0.0854
.				
## X2PA:X3PA:TS.:USG.:FTr:MPT	1.302e-04	5.332e-03	0.024	0.9805
## X2PA:FTA:TS.:USG.:FTr:MPT	6.346e-04	4.487e-03	0.141	0.8876
## X3PA:FTA:TS.:USG.:FTr:MPT	1.366e-02	8.598e-03	1.589	0.1128
## X2PA:X3PA:FTA:TS.:USG.:OWS	-2.150e-02	1.800e-02	-1.194	0.2331
## X2PA:X3PA:FTA:TS.:FTr:OWS	-1.925e+00	1.196e+00	-1.610	0.1082
## X2PA:X3PA:FTA:USG.:FTr:OWS	-4.579e-02	3.073e-02	-1.490	0.1370
## X2PA:X3PA:TS.:USG.:FTr:OWS	1.169e-01	3.498e-01	0.334	0.7384
## X2PA:FTA:TS.:USG.:FTr:OWS	6.622e-02	2.435e-01	0.272	0.7858
## X3PA:FTA:TS.:USG.:FTr:OWS	-2.839e-01	5.900e-01	-0.481	0.6307
## X2PA:X3PA:FTA:TS.:MPT:OWS	-8.953e-03	6.738e-03	-1.329	0.1846
## X2PA:X3PA:FTA:USG.:MPT:OWS	-2.155e-04	1.716e-04	-1.256	0.2099
## X2PA:X3PA:TS.:USG.:MPT:OWS	-3.775e-04	9.872e-04	-0.382	0.7023
## X2PA:FTA:TS.:USG.:MPT:OWS	1.187e-03	1.703e-03	0.697	0.4862
## X3PA:FTA:TS.:USG.:MPT:OWS	-2.751e-04	3.104e-03	-0.089	0.9294
## X2PA:X3PA:FTA:FTr:MPT:OWS	-1.414e-02	1.117e-02	-1.266	0.2062
## X2PA:X3PA:TS.:FTr:MPT:OWS	-2.011e-03	1.007e-01	-0.020	0.9841
## X2PA:FTA:TS.:FTr:MPT:OWS	1.183e-02	6.771e-02	0.175	0.8614
## X3PA:FTA:TS.:FTr:MPT:OWS	-2.563e-02	1.783e-01	-0.144	0.8858
## X2PA:X3PA:USG.:FTr:MPT:OWS	1.001e-03	3.303e-03	0.303	0.7621
## X2PA:FTA:USG.:FTr:MPT:OWS	4.634e-04	2.178e-03	0.213	0.8316
## X3PA:FTA:USG.:FTr:MPT:OWS	-8.259e-04	6.215e-03	-0.133	0.8943
## X2PA:TS.:USG.:FTr:MPT:OWS	-1.531e-02	3.054e-02	-0.501	0.6166
## X3PA:TS.:USG.:FTr:MPT:OWS	-3.681e-04	3.244e-02	-0.011	0.9910
## FTA:TS.:USG.:FTr:MPT:OWS	1.171e-02	2.477e-02	0.473	0.6366
## X2PA:X3PA:FTA:TS.:USG.:FTr:MPT	-1.868e-03	1.126e-03	-1.659	0.0979
.				
## X2PA:X3PA:FTA:TS.:USG.:FTr:OWS	7.420e-02	5.042e-02	1.471	0.1419
## X2PA:X3PA:FTA:TS.:USG.:MPT:OWS	3.590e-04	2.872e-04	1.250	0.2119
## X2PA:X3PA:FTA:TS.:FTr:MPT:OWS	2.440e-02	1.811e-02	1.347	0.1786

```

## X2PA:X3PA:FTA:USG.:FTr:MPT:OWS      5.927e-04  4.660e-04   1.272   0.2041
## X2PA:X3PA:TS.:USG.:FTr:MPT:OWS      -2.028e-03  5.368e-03  -0.378   0.7058
## X2PA:FTA:TS.:USG.:FTr:MPT:OWS      -8.655e-04  3.551e-03  -0.244   0.8076
## X3PA:FTA:TS.:USG.:FTr:MPT:OWS       2.096e-03  1.019e-02   0.206   0.8371
## X2PA:X3PA:FTA:TS.:USG.:FTr:MPT:OWS  -9.832e-04  7.706e-04  -1.276   0.2027
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.05576 on 420 degrees of freedom
## (3 observations deleted due to missingness)
## Multiple R-squared:  1, Adjusted R-squared:  0.9999
## F-statistic: 3.73e+04 on 255 and 420 DF, p-value: < 2.2e-16

# Using a relation between all of the significant variables to create a huge
# linear model.
# The relation of X2PA and TS. as well as X3PA and TS. are the most
# significant.

nba8.lm <- lm(PTS ~ X2PA * X3PA * TS., newNba)
summary(nba8.lm)

##
## Call:
## lm(formula = PTS ~ X2PA * X3PA * TS., data = newNba)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.48109 -0.19347 -0.03563  0.15904  2.27559
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   0.17159    0.16116   1.065 0.287392
## X2PA          -0.25058    0.07256  -3.453 0.000588 ***
## X3PA           0.12959    0.10412   1.245 0.213722
## TS.           -0.32740    0.27074  -1.209 0.226989
## X2PA:X3PA     -0.04793    0.02020  -2.373 0.017938 *
## X2PA:TS.       2.78031    0.11841  23.481 < 2e-16 ***
## X3PA:TS.       1.77501    0.17793   9.976 < 2e-16 ***
## X2PA:X3PA:TS.  0.09337    0.03383   2.760 0.005944 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4026 on 668 degrees of freedom
## (3 observations deleted due to missingness)
## Multiple R-squared:  0.9963, Adjusted R-squared:  0.9963
## F-statistic: 2.596e+04 on 7 and 668 DF, p-value: < 2.2e-16

```