Exploratory Data Analysis and Model Building to Predict NBA Points

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```r
# Load necessary libraries
library(readxl)

# Load the dataset
df <- read_excel("Dataset1.xlsx")
```

```
## Warning: Expecting numeric in O2370 / R2370C15: got '-'
```

```r
# View the first few rows of the dataset
head(df)
```

```
## # A tibble: 6 x 24
##    Team  `Match Up`  `Game Date` `W/L`   MIN   PTS   FGM   FGA `FG%` `3PM` `3PA`
##    <chr> <chr>       <chr>       <chr> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 GSW    GSW vs. PHX 10/24/2023  L       240   104    36   101  35.6    10    43
## 2 PHX    PHX @ GSW   10/24/2023  W       240   108    42    95  44.2    11    33
## 3 LAL    LAL @ DEN   10/24/2023  L       240   107    41    90  45.6    10    29
## 4 DEN    DEN vs. LAL 10/24/2023  W       240   119    48    91  52.7    14    34
## 5 MEM    MEM vs. NOP 10/25/2023  L       240   104    38    91  41.8    12    43
## 6 IND    IND vs. WAS 10/25/2023  W       240   143    56   107  52.3    20    43
## # i 13 more variables: `3P%` <dbl>, FTM <dbl>, FTA <dbl>, `FT%` <dbl>,
## #   OREB <dbl>, DREB <dbl>, REB <dbl>, AST <dbl>, STL <dbl>, BLK <dbl>,
## #   TOV <dbl>, PF <dbl>, `+/-` <dbl>
```

```r
# Summarize the dataset to understand basic statistics and data structure
summary(df)
```

```
##      Team              Match Up           Game Date             W/L
##  Length:2460        Length:2460        Length:2460        Length:2460
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##
##       MIN             PTS             FGM             FGA
##  Min.   :240.0   Min.   : 73.0   Min.   :26.00   Min.   : 67.0
##  1st Qu.:240.0   1st Qu.:105.0   1st Qu.:38.00   1st Qu.: 84.0
##  Median :240.0   Median :114.0   Median :42.00   Median : 89.0
##  Mean   :241.4   Mean   :114.2   Mean   :42.17   Mean   : 88.9
##  3rd Qu.:240.0   3rd Qu.:123.0   3rd Qu.:46.00   3rd Qu.: 93.0
##  Max.   :290.0   Max.   :157.0   Max.   :65.00   Max.   :119.0
##
```

```
##       FG%            3PM             3PA             3P%             FTM
##  Min.   :27.70   Min.   : 2.00   Min.   :12.0   Min.   : 6.90   Min.   : 0.00
##  1st Qu.:43.80   1st Qu.:10.00   1st Qu.:30.0   1st Qu.:31.00   1st Qu.:13.00
##  Median :47.50   Median :13.00   Median :35.0   Median :36.55   Median :17.00
##  Mean   :47.52   Mean   :12.84   Mean   :35.1   Mean   :36.49   Mean   :17.03
##  3rd Qu.:51.20   3rd Qu.:15.00   3rd Qu.:39.0   3rd Qu.:41.70   3rd Qu.:21.00
##  Max.   :67.10   Max.   :27.00   Max.   :63.0   Max.   :64.50   Max.   :44.00
##
##       FTA             FT%             OREB            DREB
##  Min.   : 0.00   Min.   : 33.30   Min.   : 0.00   Min.   :16.00
##  1st Qu.:17.00   1st Qu.: 72.00   1st Qu.: 8.00   1st Qu.:29.00
##  Median :21.00   Median : 78.90   Median :10.00   Median :33.00
##  Mean   :21.72   Mean   : 78.33   Mean   :10.55   Mean   :32.99
##  3rd Qu.:26.00   3rd Qu.: 85.20   3rd Qu.:13.00   3rd Qu.:36.00
##  Max.   :52.00   Max.   :100.00   Max.   :28.00   Max.   :55.00
##                  NA's   :1
##       REB             AST             STL             BLK
##  Min.   :25.00   Min.   :11.00   Min.   : 0.000   Min.   : 0.000
##  1st Qu.:39.00   1st Qu.:23.00   1st Qu.: 6.000   1st Qu.: 3.000
##  Median :43.00   Median :27.00   Median : 7.000   Median : 5.000
##  Mean   :43.54   Mean   :26.67   Mean   : 7.474   Mean   : 5.142
##  3rd Qu.:48.00   3rd Qu.:30.00   3rd Qu.: 9.000   3rd Qu.: 7.000
##  Max.   :74.00   Max.   :50.00   Max.   :20.000   Max.   :17.000
##
##       TOV             PF             +/-
##  Min.   : 3.0   Min.   : 4.00   Min.   :-62
##  1st Qu.:11.0   1st Qu.:16.00   1st Qu.:-10
##  Median :14.0   Median :19.00   Median :  0
##  Mean   :13.6   Mean   :18.73   Mean   :  0
##  3rd Qu.:16.0   3rd Qu.:21.00   3rd Qu.: 10
##  Max.   :29.0   Max.   :34.00   Max.   : 62
##
```

```r
# Remove rows where FT% is recorded as "-"
df <- df[df$'FT%' != "-", ]

# Convert FT% column to numeric
df$'FT%' <- as.numeric(df$'FT%')

# Summarize the dataset again after cleaning
summary(df)
```

```
##     Team              Match Up          Game Date             W/L
##  Length:2460        Length:2460        Length:2460        Length:2460
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##
##       MIN             PTS             FGM             FGA
##  Min.   :240.0   Min.   : 73.0   Min.   :26.00   Min.   : 67.0
##  1st Qu.:240.0   1st Qu.:105.0   1st Qu.:38.00   1st Qu.: 84.0
##  Median :240.0   Median :114.0   Median :42.00   Median : 89.0
##  Mean   :241.4   Mean   :114.2   Mean   :42.17   Mean   : 88.9
```

```
##   3rd Qu.:240.0    3rd Qu.:123.0    3rd Qu.:46.00    3rd Qu.: 93.0
##   Max.   :290.0    Max.   :157.0    Max.   :65.00    Max.   :119.0
##   NA's   :1        NA's   :1        NA's   :1        NA's   :1
##        FG%              3PM              3PA              3P%             FTM
##   Min.   :27.70    Min.   : 2.00    Min.   :12.0    Min.   : 6.9    Min.   : 1.00
##   1st Qu.:43.80    1st Qu.:10.00    1st Qu.:30.0    1st Qu.:31.0    1st Qu.:13.00
##   Median :47.50    Median :13.00    Median :35.0    Median :36.6    Median :17.00
##   Mean   :47.52    Mean   :12.84    Mean   :35.1    Mean   :36.5    Mean   :17.04
##   3rd Qu.:51.20    3rd Qu.:15.00    3rd Qu.:39.0    3rd Qu.:41.7    3rd Qu.:21.00
##   Max.   :67.10    Max.   :27.00    Max.   :63.0    Max.   :64.5    Max.   :44.00
##   NA's   :1        NA's   :1        NA's   :1       NA's   :1       NA's   :1
##        FTA              FT%              OREB             DREB
##   Min.   : 2.00    Min.   : 33.30    Min.   : 0.00    Min.   :16.00
##   1st Qu.:17.00    1st Qu.: 72.00    1st Qu.: 8.00    1st Qu.:29.00
##   Median :21.00    Median : 78.90    Median :10.00    Median :33.00
##   Mean   :21.73    Mean   : 78.33    Mean   :10.55    Mean   :32.99
##   3rd Qu.:26.00    3rd Qu.: 85.20    3rd Qu.:13.00    3rd Qu.:36.00
##   Max.   :52.00    Max.   :100.00    Max.   :28.00    Max.   :55.00
##   NA's   :1        NA's   :1         NA's   :1        NA's   :1
##        REB              AST              STL              BLK
##   Min.   :25.00    Min.   :11.00    Min.   : 0.000    Min.   : 0.000
##   1st Qu.:39.00    1st Qu.:23.00    1st Qu.: 6.000    1st Qu.: 3.000
##   Median :43.00    Median :27.00    Median : 7.000    Median : 5.000
##   Mean   :43.54    Mean   :26.67    Mean   : 7.473    Mean   : 5.142
##   3rd Qu.:48.00    3rd Qu.:30.00    3rd Qu.: 9.000    3rd Qu.: 7.000
##   Max.   :74.00    Max.   :50.00    Max.   :20.000    Max.   :17.000
##   NA's   :1        NA's   :1        NA's   :1         NA's   :1
##        TOV              PF               +/-
##   Min.   : 3.00    Min.   : 4.00    Min.   :-62.00000
##   1st Qu.:11.00    1st Qu.:16.00    1st Qu.:-10.00000
##   Median :14.00    Median :19.00    Median : 1.00000
##   Mean   :13.61    Mean   :18.73    Mean   : 0.00529
##   3rd Qu.:16.00    3rd Qu.:21.00    3rd Qu.: 10.00000
##   Max.   :29.00    Max.   :34.00    Max.   : 62.00000
##   NA's   :1        NA's   :1        NA's   :1
```

```r
# Fit an initial multiple linear regression (MLR) model
# Exclude non-numeric predictors and highly collinear variables
model <- lm(PTS ~. -Team -`Match Up` -`Game Date` -`W/L` -FGM -FGA -`3PM` -`3PA` -FTM -FTA, data = df)

# View the model summary
summary(model)
```

```
##
## Call:
## lm(formula = PTS ~ . - Team - `Match Up` - `Game Date` - `W/L` -
##     FGM - FGA - `3PM` - `3PA` - FTM - FTA, data = df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -22.5561  -3.7035  -0.1289   3.5637  20.7164
##
## Coefficients: (1 not defined because of singularities)
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -94.46062    4.80467 -19.660   <2e-16 ***
```

3

```
## MIN              0.33000    0.01853  17.810   <2e-16 ***
## `FG%`            1.58155    0.03527  44.843   <2e-16 ***
## `3P%`            0.31297    0.01739  17.997   <2e-16 ***
## `FT%`            0.19252    0.01131  17.021   <2e-16 ***
## OREB             0.93540    0.03372  27.741   <2e-16 ***
## DREB             0.28687    0.03004   9.550   <2e-16 ***
## REB                   NA         NA      NA       NA
## AST              0.32214    0.02802  11.498   <2e-16 ***
## STL              0.37875    0.04581   8.269   <2e-16 ***
## BLK              0.07163    0.04462   1.605   0.1085
## TOV             -0.85829    0.03281 -26.162   <2e-16 ***
## PF               0.42271    0.02759  15.324   <2e-16 ***
## `+/-`           -0.03311    0.01345  -2.461   0.0139 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.555 on 2446 degrees of freedom
##   (1 observation deleted due to missingness)
## Multiple R-squared:  0.8137, Adjusted R-squared:  0.8128
## F-statistic: 890.3 on 12 and 2446 DF,  p-value: < 2.2e-16
```

```r
# Perform ANOVA to assess predictor significance
anova(model)
```

```
## Analysis of Variance Table
##
## Response: PTS
##             Df Sum Sq Mean Sq   F value    Pr(>F)
## MIN          1  13717   13717  444.4378 < 2.2e-16 ***
## `FG%`        1 230920  230920 7482.0038 < 2.2e-16 ***
## `3P%`        1  11476   11476  371.8181 < 2.2e-16 ***
## `FT%`        1   6884    6884  223.0521 < 2.2e-16 ***
## OREB         1  28336   28336  918.1075 < 2.2e-16 ***
## DREB         1   1318    1318   42.6903 7.776e-11 ***
## AST          1   7282    7282  235.9283 < 2.2e-16 ***
## STL          1   1280    1280   41.4608 1.443e-10 ***
## BLK          1      4       4    0.1145   0.73508
## TOV          1  21132   21132  684.6928 < 2.2e-16 ***
## PF           1   7212    7212  233.6741 < 2.2e-16 ***
## `+/-`        1    187     187    6.0542   0.01394 *
## Residuals 2446  75492      31
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
# Remove statistically insignificant predictors to create a reduced model
reduced_model <- update(model, ~. -BLK -REB)

# View the reduced model summary
summary(reduced_model)
```

```
##
## Call:
## lm(formula = PTS ~ MIN + `FG%` + `3P%` + `FT%` + OREB + DREB +
##     AST + STL + TOV + PF + `+/-`, data = df)
##
## Residuals:
```

```
##      Min      1Q   Median      3Q     Max
## -22.4054  -3.6856  -0.0981   3.5382  21.1849
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -94.51114    4.80612 -19.665  < 2e-16 ***
## MIN           0.33182    0.01850  17.936  < 2e-16 ***
## `FG%`         1.57999    0.03527  44.801  < 2e-16 ***
## `3P%`         0.31181    0.01738  17.940  < 2e-16 ***
## `FT%`         0.19253    0.01131  17.016  < 2e-16 ***
## OREB          0.93425    0.03372  27.704  < 2e-16 ***
## DREB          0.28922    0.03001   9.637  < 2e-16 ***
## AST           0.32327    0.02802  11.538  < 2e-16 ***
## STL           0.37675    0.04580   8.225 3.12e-16 ***
## TOV          -0.85404    0.03271 -26.109  < 2e-16 ***
## PF            0.42039    0.02756  15.256  < 2e-16 ***
## `+/-`        -0.03056    0.01337  -2.287   0.0223 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.557 on 2447 degrees of freedom
##   (1 observation deleted due to missingness)
## Multiple R-squared:  0.8135, Adjusted R-squared:  0.8127
## F-statistic: 970.4 on 11 and 2447 DF,  p-value: < 2.2e-16
```

```r
# Load the 'car' package for calculating Variance Inflation Factor (VIF)
library(car)
```

```
## Loading required package: carData
```

```r
# Calculate VIF values to check for multicollinearity (threshold: VIF > 5 indicates concern)
vif(reduced_model)
```

```
##      MIN     `FG%`     `3P%`     `FT%`      OREB      DREB       AST       STL
## 1.099206 2.991048 1.673378 1.050744 1.319250 2.097086 1.626274 1.329328
##      TOV        PF     `+/-`
## 1.237588 1.037889 3.543332
```

```r
# Perform stepwise regression (backward elimination based on AIC)
stepwise_model <- step(reduced_model, direction = "backward")
```

```
## Start:  AIC=8446.87
## PTS ~ MIN + `FG%` + `3P%` + `FT%` + OREB + DREB + AST + STL +
##     TOV + PF + `+/-`
##
##          Df Sum of Sq   RSS    AIC
## <none>                 75571 8446.9
## - `+/-`   1       161 75733 8450.1
## - STL     1      2089 77661 8511.9
## - DREB    1      2868 78439 8536.5
## - AST     1      4112 79683 8575.1
## - PF      1      7188 82759 8668.3
## - `FT%`   1      8942 84513 8719.9
## - MIN     1      9935 85507 8748.6
## - `3P%`   1      9939 85511 8748.7
## - TOV     1     21053 96624 9049.2
```

```
## - OREB    1     23704  99275 9115.7
## - `FG%`   1     61988 137559 9917.8
```

```r
# View the stepwise selected model summary
summary(stepwise_model)
```

```
##
## Call:
## lm(formula = PTS ~ MIN + `FG%` + `3P%` + `FT%` + OREB + DREB +
##     AST + STL + TOV + PF + `+/-`, data = df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -22.4054  -3.6856  -0.0981   3.5382  21.1849
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -94.51114    4.80612 -19.665  < 2e-16 ***
## MIN           0.33182    0.01850  17.936  < 2e-16 ***
## `FG%`         1.57999    0.03527  44.801  < 2e-16 ***
## `3P%`         0.31181    0.01738  17.940  < 2e-16 ***
## `FT%`         0.19253    0.01131  17.016  < 2e-16 ***
## OREB          0.93425    0.03372  27.704  < 2e-16 ***
## DREB          0.28922    0.03001   9.637  < 2e-16 ***
## AST           0.32327    0.02802  11.538  < 2e-16 ***
## STL           0.37675    0.04580   8.225 3.12e-16 ***
## TOV          -0.85404    0.03271 -26.109  < 2e-16 ***
## PF            0.42039    0.02756  15.256  < 2e-16 ***
## `+/-`        -0.03056    0.01337  -2.287   0.0223 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.557 on 2447 degrees of freedom
##   (1 observation deleted due to missingness)
## Multiple R-squared:  0.8135, Adjusted R-squared:  0.8127
## F-statistic: 970.4 on 11 and 2447 DF,  p-value: < 2.2e-16
```

```r
# Set up 2x2 plotting space for diagnostic plots
par(mfrow = c(2,2))

# Generate the four diagnostic plots for the reduced model
plot(reduced_model, which = 1)  # Residuals vs Fitted
plot(reduced_model, which = 2)  # Normal Q-Q plot
plot(reduced_model, which = 3)  # Scale-Location plot
plot(reduced_model, which = 5)  # Residuals vs Leverage
```
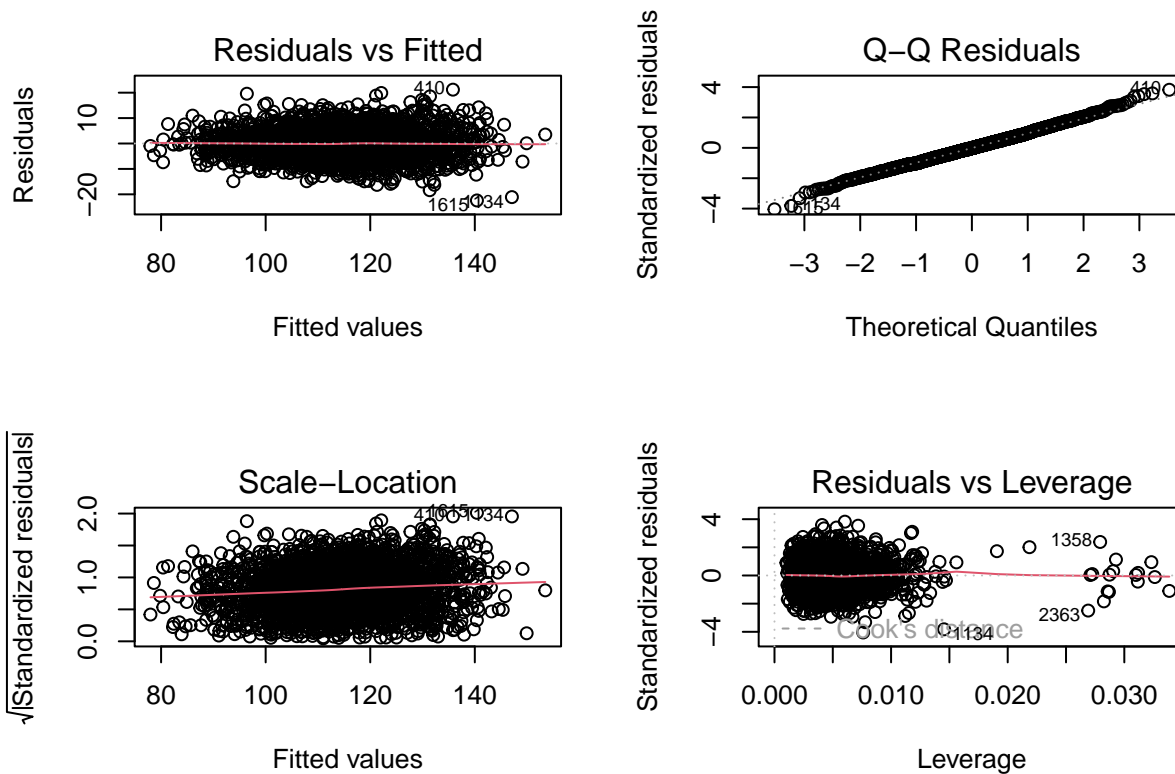
```r
# Load 'lmtest' package for additional model testing
library(lmtest)
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##      as.Date, as.Date.numeric
```

```r
# Perform Breusch-Pagan (BP) test to check for heteroscedasticity
bptest(reduced_model)
```

```
##
##   studentized Breusch-Pagan test
##
## data:  reduced_model
## BP = 79.923, df = 11, p-value = 1.527e-12
```

```r
# Transform the response variable to address heteroscedasticity detected by BP test
df$PTS_transformed <- df$PTS^2

# Prepare the dataset by removing unnecessary columns
df_reduced1 <- df[, !(names(df) %in% c("PTS", "Team", "Match Up", "Game Date", "W/L", "FGM", "FGA", "3PI

# Fit a model using the transformed response
model_transformed <- lm(PTS_transformed ~., data = df_reduced1)

# View the transformed model summary
summary(model_transformed)
```

```
## 
## Call:
## lm(formula = PTS_transformed ~ ., data = df_reduced1)
## 
## Residuals:
##     Min      1Q  Median      3Q     Max
## -5235.0  -893.2   -30.2   784.9  6501.2
## 
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -35101.538   1143.265 -30.703  < 2e-16 ***
## MIN             78.299      4.401  17.792  < 2e-16 ***
## `FG%`          358.683      8.389  42.756  < 2e-16 ***
## `3P%`           71.660      4.135  17.332  < 2e-16 ***
## `FT%`           44.363      2.691  16.483  < 2e-16 ***
## OREB           212.329      8.022  26.469  < 2e-16 ***
## DREB            65.996      7.139   9.244  < 2e-16 ***
## AST             77.107      6.665  11.570  < 2e-16 ***
## STL             85.099     10.895   7.811 8.38e-15 ***
## TOV           -193.327      7.781 -24.846  < 2e-16 ***
## PF              95.952      6.555  14.638  < 2e-16 ***
## `+/-`           -7.000      3.179  -2.202   0.0278 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 1322 on 2447 degrees of freedom
##   (1 observation deleted due to missingness)
## Multiple R-squared:  0.8015, Adjusted R-squared:  0.8006
## F-statistic: 898.4 on 11 and 2447 DF,  p-value: < 2.2e-16
```

```
# Perform BP test again on the transformed model
bptest(model_transformed)
```

```
## 
##  studentized Breusch-Pagan test
## 
## data:  model_transformed
## BP = 169.59, df = 11, p-value < 2.2e-16
```

```
# Define weights based on the fitted values to apply Weighted Least Squares (WLS)
weights <- 1 / fitted(model_transformed)^2  # Assign lower weights to large residuals
weights <- weights[1:nrow(df_reduced1)]   # Match the number of rows

# Fit a WLS model
wls_model <- lm(PTS_transformed ~ ., data = df_reduced1, weights = weights)

# View the WSL model
summary(wls_model)
```

```
## 
## Call:
## lm(formula = PTS_transformed ~ ., data = df_reduced1, weights = weights)
## 
## Weighted Residuals:
##      Min      1Q   Median      3Q      Max
```

```
## -0.41863 -0.06806 -0.00294  0.06112  0.45344
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -33029.361   1225.895 -26.943  < 2e-16 ***
## MIN             73.465      4.852  15.141  < 2e-16 ***
## `FG%`          346.014      7.624  45.387  < 2e-16 ***
## `3P%`           72.178      3.823  18.880  < 2e-16 ***
## `FT%`           41.439      2.455  16.878  < 2e-16 ***
## OREB           199.262      7.288  27.340  < 2e-16 ***
## DREB            68.483      6.428  10.653  < 2e-16 ***
## AST             75.986      6.371  11.928  < 2e-16 ***
## STL             90.022     10.000   9.003  < 2e-16 ***
## TOV           -185.496      6.972 -26.607  < 2e-16 ***
## PF              86.895      6.017  14.441  < 2e-16 ***
## `+/-`          -10.171      2.829  -3.596  0.00033 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.09873 on 2446 degrees of freedom
##   (2 observations deleted due to missingness)
## Multiple R-squared:  0.827,  Adjusted R-squared:  0.8262
## F-statistic:  1063 on 11 and 2446 DF,  p-value: < 2.2e-16
```

```
# Perform BP test on the WSL model to confirm improvement
bptest(wls_model)
```

```
##
##  studentized Breusch-Pagan test
##
## data:  wls_model
## BP = 3.4603e-06, df = 11, p-value = 1
```

```
# Perform stepwise regression again on the WLS model
stepwise_model <- step(wls_model, direction = "both")
```

```
## Start:  AIC=-11370.22
## PTS_transformed ~ MIN + `FG%` + `3P%` + `FT%` + OREB + DREB +
##     AST + STL + TOV + PF + `+/-`
##
##          Df Sum of Sq    RSS      AIC
## <none>                 23.844 -11370.2
## - `+/-`   1    0.1260 23.970 -11359.3
## - STL     1    0.7901 24.634 -11292.1
## - DREB    1    1.1064 24.951 -11260.7
## - AST     1    1.3869 25.231 -11233.3
## - PF      1    2.0329 25.877 -11171.1
## - MIN     1    2.2346 26.079 -11152.0
## - `FT%`   1    2.7768 26.621 -11101.4
## - `3P%`   1    3.4747 27.319 -11037.8
## - TOV     1    6.9013 30.745 -10747.4
## - OREB    1    7.2867 31.131 -10716.8
## - `FG%`   1   20.0808 43.925  -9870.5
```

```
# View the final selected WSL model summary
summary(stepwise_model)
```

```
## 
## Call:
## lm(formula = PTS_transformed ~ MIN + `FG%` + `3P%` + `FT%` +
##     OREB + DREB + AST + STL + TOV + PF + `+/-`, data = df_reduced1,
##     weights = weights)
## 
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -0.41863 -0.06806 -0.00294  0.06112  0.45344
## 
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -33029.361   1225.895 -26.943  < 2e-16 ***
## MIN             73.465      4.852  15.141  < 2e-16 ***
## `FG%`          346.014      7.624  45.387  < 2e-16 ***
## `3P%`           72.178      3.823  18.880  < 2e-16 ***
## `FT%`           41.439      2.455  16.878  < 2e-16 ***
## OREB           199.262      7.288  27.340  < 2e-16 ***
## DREB            68.483      6.428  10.653  < 2e-16 ***
## AST             75.986      6.371  11.928  < 2e-16 ***
## STL             90.022     10.000   9.003  < 2e-16 ***
## TOV           -185.496      6.972 -26.607  < 2e-16 ***
## PF              86.895      6.017  14.441  < 2e-16 ***
## `+/-`          -10.171      2.829  -3.596  0.00033 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 0.09873 on 2446 degrees of freedom
##   (2 observations deleted due to missingness)
## Multiple R-squared:  0.827,  Adjusted R-squared:  0.8262
## F-statistic:  1063 on 11 and 2446 DF,  p-value: < 2.2e-16
```

```r
# Set up 2x2 plotting space again for final WSL diagnostic plots
par(mfrow = c(2,2))

# Generate diagnostic plots for the final WSL model
plot(wls_model, which = 1)  # Residuals vs Fitted
plot(wls_model, which = 2)  # Normal Q-Q plot
plot(wls_model, which = 3)  # Scale-Location plot
plot(wls_model, which = 5)  # Residuals vs Leverage
```