Regressão Playoffs

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```
source("dados_playoffs.R")
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.1
## v lubridate 1.9.3     v tibble    3.2.1
## v purrr     1.0.2     v tidyr     1.3.1
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
## Loading required package: splines
##
## Loading required package: gamlss.data
##
##
## Attaching package: 'gamlss.data'
##
##
## The following object is masked from 'package:datasets':
##
##     sleep
##
##
## Loading required package: gamlss.dist
##
## Loading required package: nlme
##
##
## Attaching package: 'nlme'
##
##
## The following object is masked from 'package:dplyr':
##
##     collapse
##
##
## Loading required package: parallel
##
##  **********   GAMLSS Version 5.4-22  **********
##
## For more on GAMLSS look at https://www.gamlss.com/
##
```

```
## Type gamlssNews() to see new features/changes/bug fixes.
##
##
## Loading required package: carData
##
##
## Attaching package: 'car'
##
##
## The following object is masked from 'package:dplyr':
##
##     recode
##
##
## The following object is masked from 'package:purrr':
##
##     some
##
##
## Loading required package: zoo
##
##
## Attaching package: 'zoo'
##
##
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
##### Regressão com todos os dados do modelo #########
modelop1 <- lm(WINP ~ .,data = dados_regressaop)
modelop1
```

```
##
## Call:
## lm(formula = WINP ~ ., data = dados_regressaop)
##
## Coefficients:
##                 (Intercept)          TEAMBoston Celtics
##                   -4.1919753                   0.0144791
##           TEAMBrooklyn Nets       TEAMCharlotte Bobcats
##                   -0.0902612                  -0.1899634
##      TEAMCharlotte Hornets           TEAMChicago Bulls
##                    0.1880048                  -0.0406993
##    TEAMCleveland Cavaliers        TEAMDallas Mavericks
##                    0.0129796                  -0.0290254
##         TEAMDenver Nuggets         TEAMDetroit Pistons
##                   -0.0324792                  -0.1120277
##  TEAMGolden State Warriors         TEAMHouston Rockets
##                    0.0562513                   0.0126562
##         TEAMIndiana Pacers             TEAMLA Clippers
##                   -0.1327322                  -0.0772309
##   TEAMLos Angeles Clippers      TEAMLos Angeles Lakers
##                   -0.0279115                   0.0057702
##      TEAMMemphis Grizzlies              TEAMMiami Heat
```

```
##                 0.0301724                  0.0088091
##       TEAMMilwaukee Bucks TEAMMinnesota Timberwolves
##                -0.0303277                 -0.0554371
##   TEAMNew Orleans Hornets   TEAMNew Orleans Pelicans
##                 0.1765498                 -0.0963682
##       TEAMNew York Knicks  TEAMOklahoma City Thunder
##                -0.0740628                 -0.0315064
##         TEAMOrlando Magic     TEAMPhiladelphia 76ers
##                -0.0746230                 -0.0221161
##          TEAMPhoenix Suns TEAMPortland Trail Blazers
##                 0.0804244                 -0.0353439
##      TEAMSacramento Kings      TEAMSan Antonio Spurs
##                -0.0064064                 -0.0528235
##       TEAMToronto Raptors              TEAMUtah Jazz
##                 0.0518557                 -0.0643191
##    TEAMWashington Wizards                        PTS
##                 0.0323634                  0.2608978
##                       FGM                        FGA
##                -0.6268567                  0.0420247
##                       FGP                       `3PM`
##                 0.0907029                 -0.2511703
##                      `3PA`                       `3PP`
##                -0.0017515                 -0.0011207
##                       FTM                        FTA
##                -0.2953386                  0.0244539
##                       FTP                       OREB
##                 0.0101773                 -0.2531358
##                      DREB                        REB
##                -0.2533837                  0.2629635
##                       AST                        TOV
##                 0.0001122                 -0.0031138
##                       STL                        BLK
##                 0.0119496                 -0.0030451
##                      BLKA                         PF
##                -0.0060846                 -0.0084088
##                       PFD                   PlusMinus
##                 0.0050481                  0.0209355
##         Numero_temporada2          Numero_temporada3
##                -0.0119810                 -0.0336366
##         Numero_temporada4          Numero_temporada5
##                -0.0051483                 -0.0063949
##         Numero_temporada6          Numero_temporada7
##                -0.0152817                 -0.0484842
##         Numero_temporada8          Numero_temporada9
##                -0.0355406                 -0.0670718
##        Numero_temporada10         Numero_temporada11
##                -0.0595573                 -0.0349054
##        Numero_temporada12         Numero_temporada13
##                -0.0452540                 -0.0530468
##        Numero_temporada14         Numero_temporada15
##                -0.0616146                 -0.0600435
```

```
coef(modelop1)
```

```
##               (Intercept)        TEAMBoston Celtics
```

```
##              -4.1919753118              0.0144791311
##          TEAMBrooklyn Nets      TEAMCharlotte Bobcats
##              -0.0902611768             -0.1899634432
##      TEAMCharlotte Hornets          TEAMChicago Bulls
##               0.1880048349             -0.0406993204
##    TEAMCleveland Cavaliers       TEAMDallas Mavericks
##               0.0129796147             -0.0290253928
##         TEAMDenver Nuggets        TEAMDetroit Pistons
##              -0.0324791527             -0.1120276848
##  TEAMGolden State Warriors        TEAMHouston Rockets
##               0.0562512657              0.0126561741
##         TEAMIndiana Pacers            TEAMLA Clippers
##              -0.1327322069             -0.0772308782
##   TEAMLos Angeles Clippers     TEAMLos Angeles Lakers
##              -0.0279114641              0.0057702329
##      TEAMMemphis Grizzlies             TEAMMiami Heat
##               0.0301723853              0.0088090641
##        TEAMMilwaukee Bucks TEAMMinnesota Timberwolves
##              -0.0303277185             -0.0554370523
##    TEAMNew Orleans Hornets   TEAMNew Orleans Pelicans
##               0.1765497794             -0.0963681615
##        TEAMNew York Knicks  TEAMOklahoma City Thunder
##              -0.0740627768             -0.0315063715
##          TEAMOrlando Magic     TEAMPhiladelphia 76ers
##              -0.0746230335             -0.0221160686
##           TEAMPhoenix Suns TEAMPortland Trail Blazers
##               0.0804243829             -0.0353438881
##       TEAMSacramento Kings      TEAMSan Antonio Spurs
##              -0.0064064421             -0.0528234593
##        TEAMToronto Raptors              TEAMUtah Jazz
##               0.0518556834             -0.0643191302
##     TEAMWashington Wizards                       PTS
##               0.0323634283              0.2608977686
##                        FGM                       FGA
##              -0.6268566897              0.0420247067
##                        FGP                      `3PM`
##               0.0907028782             -0.2511703370
##                      `3PA`                      `3PP`
##              -0.0017515422             -0.0011206887
##                        FTM                       FTA
##              -0.2953385719              0.0244538561
##                        FTP                      OREB
##               0.0101773399             -0.2531358030
##                       DREB                       REB
##              -0.2533836545              0.2629635263
##                        AST                       TOV
##               0.0001121528             -0.0031137619
##                        STL                       BLK
##               0.0119495512             -0.0030451165
##                       BLKA                        PF
##              -0.0060846070             -0.0084088490
##                        PFD                  PlusMinus
##               0.0050481127              0.0209354752
##          Numero_temporada2         Numero_temporada3
```

```
##              -0.0119810239              -0.0336366391
##          Numero_temporada4          Numero_temporada5
##              -0.0051483338              -0.0063949493
##          Numero_temporada6          Numero_temporada7
##              -0.0152816553              -0.0484842220
##          Numero_temporada8          Numero_temporada9
##              -0.0355405634              -0.0670718453
##         Numero_temporada10         Numero_temporada11
##              -0.0595573284              -0.0349053787
##         Numero_temporada12         Numero_temporada13
##              -0.0452539890              -0.0530468091
##         Numero_temporada14         Numero_temporada15
##              -0.0616146473              -0.0600435193
```

```
anova(modelop1)
```

```
## Analysis of Variance Table
##
## Response: WINP
##                    Df  Sum Sq Mean Sq  F value    Pr(>F)
## TEAM               32 2.81335 0.08792   9.0131 < 2.2e-16 ***
## PTS                 1 0.52939 0.52939  54.2717 6.970e-12 ***
## FGM                 1 0.01069 0.01069   1.0960 0.2966107
## FGA                 1 1.13981 1.13981 116.8518 < 2.2e-16 ***
## FGP                 1 0.03164 0.03164   3.2435 0.0734572 .
## `3PM`               1 0.01446 0.01446   1.4821 0.2251088
## `3PA`               1 0.11141 0.11141  11.4220 0.0008980 ***
## `3PP`               1 0.00654 0.00654   0.6710 0.4138465
## FTM                 1 0.08912 0.08912   9.1363 0.0028891 **
## FTA                 1 0.04519 0.04519   4.6326 0.0327635 *
## FTP                 1 0.11666 0.11666  11.9603 0.0006851 ***
## OREB                1 0.15297 0.15297  15.6825 0.0001095 ***
## DREB                1 1.05362 1.05362 108.0152 < 2.2e-16 ***
## REB                 1 0.07969 0.07969   8.1697 0.0047861 **
## AST                 1 0.01018 0.01018   1.0438 0.3083650
## TOV                 1 0.53484 0.53484  54.8313 5.615e-12 ***
## STL                 1 0.55174 0.55174  56.5629 2.887e-12 ***
## BLK                 1 0.00343 0.00343   0.3521 0.5537148
## BLKA                1 0.00943 0.00943   0.9671 0.3267802
## PF                  1 0.01227 0.01227   1.2578 0.2636381
## PFD                 1 0.08231 0.08231   8.4387 0.0041559 **
## PlusMinus           1 0.87701 0.87701  89.9094 < 2.2e-16 ***
## Numero_temporada   14 0.04520 0.00323   0.3310 0.9892163
## Residuals         172 1.67775 0.00975
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(modelop1)
```

```
##
## Call:
## lm(formula = WINP ~ ., data = dados_regressaop)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

```
## -0.33869 -0.05276  0.00052  0.05875  0.22906
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 -4.1919753  2.0946594  -2.001  0.04694 *
## TEAMBoston Celtics           0.0144791  0.0416538   0.348  0.72856
## TEAMBrooklyn Nets           -0.0902612  0.0497068  -1.816  0.07113 .
## TEAMCharlotte Bobcats       -0.1899634  0.0872475  -2.177  0.03082 *
## TEAMCharlotte Hornets        0.1880048  0.1172776   1.603  0.11075
## TEAMChicago Bulls           -0.0406993  0.0471773  -0.863  0.38951
## TEAMCleveland Cavaliers      0.0129796  0.0517253   0.251  0.80217
## TEAMDallas Mavericks        -0.0290254  0.0468686  -0.619  0.53654
## TEAMDenver Nuggets          -0.0324792  0.0487664  -0.666  0.50629
## TEAMDetroit Pistons         -0.1120277  0.0744121  -1.506  0.13403
## TEAMGolden State Warriors    0.0562513  0.0507073   1.109  0.26883
## TEAMHouston Rockets          0.0126562  0.0517958   0.244  0.80725
## TEAMIndiana Pacers          -0.1327322  0.0476974  -2.783  0.00599 **
## TEAMLA Clippers             -0.0772309  0.0549940  -1.404  0.16202
## TEAMLos Angeles Clippers    -0.0279115  0.0641391  -0.435  0.66398
## TEAMLos Angeles Lakers       0.0057702  0.0492741   0.117  0.90691
## TEAMMemphis Grizzlies        0.0301724  0.0476622   0.633  0.52754
## TEAMMiami Heat               0.0088091  0.0445510   0.198  0.84349
## TEAMMilwaukee Bucks         -0.0303277  0.0467654  -0.649  0.51752
## TEAMMinnesota Timberwolves -0.0554371  0.0719598  -0.770  0.44213
## TEAMNew Orleans Hornets      0.1765498  0.0837956   2.107  0.03658 *
## TEAMNew Orleans Pelicans    -0.0963682  0.0708539  -1.360  0.17558
## TEAMNew York Knicks         -0.0740628  0.0588059  -1.259  0.20958
## TEAMOklahoma City Thunder   -0.0315064  0.0484435  -0.650  0.51632
## TEAMOrlando Magic           -0.0746230  0.0532734  -1.401  0.16309
## TEAMPhiladelphia 76ers      -0.0221161  0.0479122  -0.462  0.64495
## TEAMPhoenix Suns             0.0804244  0.0632920   1.271  0.20556
## TEAMPortland Trail Blazers -0.0353439  0.0459184  -0.770  0.44253
## TEAMSacramento Kings        -0.0064064  0.1129173  -0.057  0.95482
## TEAMSan Antonio Spurs       -0.0528235  0.0452225  -1.168  0.24439
## TEAMToronto Raptors          0.0518557  0.0488511   1.062  0.28995
## TEAMUtah Jazz               -0.0643191  0.0498230  -1.291  0.19845
## TEAMWashington Wizards       0.0323634  0.0570798   0.567  0.57146
## PTS                          0.2608978  0.1241062   2.102  0.03699 *
## FGM                         -0.6268567  0.2443804  -2.565  0.01117 *
## FGA                          0.0420247  0.0252374   1.665  0.09770 .
## FGP                          0.0907029  0.0453974   1.998  0.04730 *
## `3PM`                       -0.2511703  0.1246410  -2.015  0.04545 *
## `3PA`                       -0.0017515  0.0089518  -0.196  0.84510
## `3PP`                       -0.0011207  0.0062500  -0.179  0.85791
## FTM                         -0.2953386  0.1278933  -2.309  0.02212 *
## FTA                          0.0244539  0.0266277   0.918  0.35972
## FTP                          0.0101773  0.0083175   1.224  0.22278
## OREB                        -0.2531358  0.1735999  -1.458  0.14662
## DREB                        -0.2533837  0.1742211  -1.454  0.14766
## REB                          0.2629635  0.1745806   1.506  0.13384
## AST                          0.0001122  0.0044909   0.025  0.98011
## TOV                         -0.0031138  0.0068678  -0.453  0.65084
## STL                          0.0119496  0.0087616   1.364  0.17439
## BLK                         -0.0030451  0.0067883  -0.449  0.65430
```

```
## BLKA                       -0.0060846  0.0074676  -0.815  0.41631
## PF                         -0.0084088  0.0046691  -1.801  0.07346 .
## PFD                         0.0050481  0.0076542   0.660  0.51044
## PlusMinus                   0.0209355  0.0025724   8.139 7.73e-14 ***
## Numero_temporada2          -0.0119810  0.0369707  -0.324  0.74628
## Numero_temporada3          -0.0336366  0.0377131  -0.892  0.37369
## Numero_temporada4          -0.0051483  0.0404980  -0.127  0.89899
## Numero_temporada5          -0.0063949  0.0393208  -0.163  0.87100
## Numero_temporada6          -0.0152817  0.0397743  -0.384  0.70130
## Numero_temporada7          -0.0484842  0.0432747  -1.120  0.26411
## Numero_temporada8          -0.0355406  0.0422095  -0.842  0.40095
## Numero_temporada9          -0.0670718  0.0457498  -1.466  0.14446
## Numero_temporada10         -0.0595573  0.0479928  -1.241  0.21631
## Numero_temporada11         -0.0349054  0.0513012  -0.680  0.49717
## Numero_temporada12         -0.0452540  0.0588846  -0.769  0.44323
## Numero_temporada13         -0.0530468  0.0584874  -0.907  0.36569
## Numero_temporada14         -0.0616146  0.0540250  -1.140  0.25567
## Numero_temporada15         -0.0600435  0.0593339  -1.012  0.31298
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.09876 on 172 degrees of freedom
## Multiple R-squared:  0.8322, Adjusted R-squared:  0.7668
## F-statistic: 12.73 on 67 and 172 DF,  p-value: < 2.2e-16
```

```
###### Regressão com as variáveis que foram significaivas com alfa = 5% #####
modelop2 <- lm(WINP ~ PTS + FGM + `3PM` + FTM + PlusMinus,data = dados_regressaop)
modelop2
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS          FGM        `3PM`          FTM    PlusMinus
##     0.50100      0.30049     -0.60240     -0.29907     -0.29963      0.02587
```

```
coef(modelop2)
```

```
## (Intercept)         PTS         FGM       `3PM`         FTM   PlusMinus
##  0.50099740  0.30048884 -0.60240155 -0.29907374 -0.29963161  0.02587394
```

```
anova(modelop2) #FGM não foi significativo
```

```
## Analysis of Variance Table
##
## Response: WINP
##            Df Sum Sq Mean Sq  F value    Pr(>F)
## PTS         1 1.1235  1.1235 104.9912 < 2.2e-16 ***
## FGM         1 0.0017  0.0017   0.1581 0.6913099
## `3PM`       1 0.1373  0.1373  12.8317 0.0004145 ***
## FTM         1 0.2803  0.2803  26.1962 6.431e-07 ***
## PlusMinus   1 5.9520  5.9520 556.2338 < 2.2e-16 ***
## Residuals 234 2.5039  0.0107
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(modelop2) #Adjusted R-squared:  0.7442
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + PlusMinus, data = dados_regressaop)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.36997 -0.05051  0.00575  0.06999  0.33687
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.500997   0.104349   4.801 2.81e-06 ***
## PTS          0.300489   0.101080   2.973  0.00326 **
## FGM         -0.602402   0.202342  -2.977  0.00322 **
## `3PM`       -0.299074   0.101103  -2.958  0.00341 **
## FTM         -0.299632   0.100958  -2.968  0.00331 **
## PlusMinus    0.025874   0.001097  23.585  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1034 on 234 degrees of freedom
## Multiple R-squared:  0.7496, Adjusted R-squared:  0.7442
## F-statistic: 140.1 on 5 and 234 DF,  p-value: < 2.2e-16
```

```r
##### Regressão com as variáveis que foram significativas com alfa = 5% sem FGM #######
modelop3 <- lm(WINP ~ PTS + `3PM` + FTM + PlusMinus,data = dados_regressaop)
modelop3
```

```
##
## Call:
## lm(formula = WINP ~ PTS + `3PM` + FTM + PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS        `3PM`          FTM    PlusMinus
##   0.4856893   -0.0004137    0.0017246    0.0008315    0.0261724
```

```r
coef(modelop3)
```

```
##   (Intercept)           PTS         `3PM`           FTM     PlusMinus
##  0.4856892978 -0.0004136604  0.0017245730  0.0008314569  0.0261724144
```

```r
anova(modelop3) #FTM não foi significativo
```

```
## Analysis of Variance Table
##
## Response: WINP
##            Df Sum Sq Mean Sq  F value    Pr(>F)
## PTS         1 1.1235  1.1235 101.5918 < 2.2e-16 ***
## `3PM`       1 0.1172  0.1172  10.5941  0.001302 **
## FTM         1 0.0179  0.0179   1.6196  0.204402
## PlusMinus   1 6.1414  6.1414 555.3513 < 2.2e-16 ***
## Residuals 235 2.5988  0.0111
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(modelop3) #Adjusted R-squared:  0.7357
```

```
##
## Call:
## lm(formula = WINP ~ PTS + `3PM` + FTM + PlusMinus, data = dados_regressaop)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.36920 -0.05577  0.00960  0.07106  0.35337
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.4856893  0.1059516   4.584 7.41e-06 ***
## PTS         -0.0004137  0.0014134  -0.293    0.770
## `3PM`        0.0017246  0.0037427   0.461    0.645
## FTM          0.0008315  0.0026876   0.309    0.757
## PlusMinus    0.0261724  0.0011106  23.566  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1052 on 235 degrees of freedom
## Multiple R-squared:  0.7401, Adjusted R-squared:  0.7357
## F-statistic: 167.3 on 4 and 235 DF,  p-value: < 2.2e-16
```

```r
##### Regressão com as variáveis que foram significaivas com alfa = 10% ######
modelop4 <- lm(WINP ~ PTS + FGM + `3PM` + FTM + OREB + DREB + REB + PF + PlusMinus,data = dados_regressa
modelop4
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + OREB + DREB + REB +
##     PF + PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS          FGM        `3PM`          FTM         OREB
##    0.486164     0.280600    -0.562404    -0.280975    -0.277993    -0.265438
##        DREB          REB           PF    PlusMinus
##   -0.261270     0.264906    -0.005546     0.025106
```

```r
coef(modelop4)
```

```
##  (Intercept)          PTS          FGM        `3PM`          FTM         OREB
##  0.486164373  0.280599985 -0.562404106 -0.280974552 -0.277993047 -0.265438315
##         DREB          REB           PF    PlusMinus
## -0.261270031  0.264906445 -0.005545621  0.025106272
```

```r
anova(modelop4)
```

```
## Analysis of Variance Table
##
## Response: WINP
##            Df Sum Sq Mean Sq  F value    Pr(>F)
## PTS         1 1.1235  1.1235 106.7472 < 2.2e-16 ***
## FGM         1 0.0017  0.0017   0.1607 0.6888802
## `3PM`       1 0.1373  0.1373  13.0463 0.0003731 ***
## FTM         1 0.2803  0.2803  26.6344 5.311e-07 ***
```

```
## OREB        1 0.0633  0.0633   6.0136 0.0149404 *
## DREB        1 0.3479  0.3479  33.0581 2.829e-08 ***
## REB         1 0.0547  0.0547   5.2004 0.0234978 *
## PF          1 0.4352  0.4352  41.3512 7.275e-10 ***
## PlusMinus   1 5.1342  5.1342 487.8272 < 2.2e-16 ***
## Residuals 230 2.4206  0.0105
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(modelop4) #Adjusted R-squared: 0.7484 e PF não deu significante
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + OREB + DREB + REB +
##     PF + PlusMinus, data = dados_regressaop)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.32834 -0.05140  0.00564  0.06280  0.33955
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.486164   0.132256   3.676 0.000295 ***
## PTS          0.280600   0.101028   2.777 0.005931 **
## FGM         -0.562404   0.202192  -2.782 0.005859 **
## `3PM`       -0.280975   0.101057  -2.780 0.005880 **
## FTM         -0.277993   0.100853  -2.756 0.006313 **
## OREB        -0.265438   0.152384  -1.742 0.082862 .
## DREB        -0.261270   0.152570  -1.712 0.088159 .
## REB          0.264906   0.152596   1.736 0.083903 .
## PF          -0.005546   0.003541  -1.566 0.118725
## PlusMinus    0.025106   0.001137  22.087  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1026 on 230 degrees of freedom
## Multiple R-squared:  0.7579, Adjusted R-squared:  0.7484
## F-statistic:    80 on 9 and 230 DF,  p-value: < 2.2e-16
```

```
#### Regressão com as variáveis que foram significaivas com alfa = 10% sem PF ####
modelop5 <- lm(WINP ~ PTS + FGM + `3PM` + FTM + OREB + DREB + REB + PlusMinus,data = dados_regressaop)
modelop5
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + OREB + DREB + REB +
##     PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS          FGM        `3PM`          FTM         OREB
##     0.40027      0.27527     -0.55261     -0.27510     -0.27461     -0.25091
##        DREB          REB    PlusMinus
##    -0.24599      0.25051      0.02549
```

```
coef(modelop5)
```

```
## (Intercept)         PTS         FGM       `3PM`         FTM        OREB
##  0.40027409  0.27526734 -0.55261351 -0.27509760 -0.27461083 -0.25091284
##        DREB         REB   PlusMinus
## -0.24599192  0.25050521  0.02548637
```

```
anova(modelop5)
```

```
## Analysis of Variance Table
##
## Response: WINP
##            Df Sum Sq Mean Sq  F value    Pr(>F)
## PTS         1 1.1235  1.1235 106.0803 < 2.2e-16 ***
## FGM         1 0.0017  0.0017   0.1597 0.6898010
## `3PM`       1 0.1373  0.1373  12.9648 0.0003885 ***
## FTM         1 0.2803  0.2803  26.4680 5.719e-07 ***
## OREB        1 0.0633  0.0633   5.9761 0.0152502 *
## DREB        1 0.3479  0.3479  32.8516 3.090e-08 ***
## REB         1 0.0547  0.0547   5.1679 0.0239271 *
## PlusMinus   1 5.5435  5.5435 523.4352 < 2.2e-16 ***
## Residuals 231 2.4465  0.0106
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(modelop5) #Adjusted R-squared: 0.7468  e os que deram não significantes foram os que não estava
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + OREB + DREB + REB +
##     PlusMinus, data = dados_regressaop)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.33378 -0.05144  0.00543  0.06855  0.33671
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.400274   0.120725   3.316  0.00106 **
## PTS          0.275267   0.101287   2.718  0.00707 **
## FGM         -0.552614   0.202730  -2.726  0.00690 **
## `3PM`       -0.275098   0.101304  -2.716  0.00712 **
## FTM         -0.274611   0.101146  -2.715  0.00713 **
## OREB        -0.250913   0.152579  -1.644  0.10144
## DREB        -0.245992   0.152735  -1.611  0.10864
## REB          0.250505   0.152797   1.639  0.10248
## PlusMinus    0.025486   0.001114  22.879  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1029 on 231 degrees of freedom
## Multiple R-squared:  0.7553, Adjusted R-squared:  0.7468
## F-statistic: 89.14 on 8 and 231 DF,  p-value: < 2.2e-16
```

```
###### backward selection #####
#Selecão das variáveis para compor o modelo, mas precisa depois fazer os teste de resíduo
completop = lm(WINP ~ ., data = dados_regressaop)
vaziop = lm(WINP ~ 1, data = dados_regressaop)
```

```r
step(completop, scope=list(upper=completop, lower=vaziop), direction='backward', trace=TRUE)
```

```
## Start:  AIC=-1055.16
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + `3PA` + `3PP` +
##     FTM + FTA + FTP + OREB + DREB + REB + AST + TOV + STL + BLK +
##     BLKA + PF + PFD + PlusMinus + Numero_temporada
##
##                     Df Sum of Sq    RSS      AIC
## - Numero_temporada 14   0.04520 1.7229 -1076.78
## - AST               1   0.00001 1.6778 -1057.16
## - `3PP`             1   0.00031 1.6781 -1057.12
## - `3PA`             1   0.00037 1.6781 -1057.11
## - BLK               1   0.00196 1.6797 -1056.88
## - TOV               1   0.00201 1.6798 -1056.88
## - PFD               1   0.00424 1.6820 -1056.56
## - BLKA              1   0.00648 1.6842 -1056.24
## - FTA               1   0.00823 1.6860 -1055.99
## <none>                          1.6778 -1055.16
## - FTP               1   0.01460 1.6924 -1055.08
## - STL               1   0.01814 1.6959 -1054.58
## - DREB              1   0.02063 1.6984 -1054.23
## - OREB              1   0.02074 1.6985 -1054.22
## - REB               1   0.02213 1.6999 -1054.02
## - FGA               1   0.02705 1.7048 -1053.33
## - PF                1   0.03164 1.7094 -1052.68
## - FGP               1   0.03894 1.7167 -1051.66
## - `3PM`             1   0.03961 1.7174 -1051.56
## - PTS               1   0.04311 1.7209 -1051.08
## - FTM               1   0.05202 1.7298 -1049.84
## - FGM               1   0.06418 1.7419 -1048.15
## - TEAM             32   0.59730 2.2750 -1046.07
## - PlusMinus         1   0.64609 2.3238  -978.98
##
## Step:  AIC=-1076.78
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + `3PA` + `3PP` +
##     FTM + FTA + FTP + OREB + DREB + REB + AST + TOV + STL + BLK +
##     BLKA + PF + PFD + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## - AST        1   0.00003 1.7230 -1078.78
## - TOV        1   0.00069 1.7236 -1078.69
## - `3PP`      1   0.00100 1.7240 -1078.64
## - BLK        1   0.00277 1.7257 -1078.40
## - `3PA`      1   0.00369 1.7266 -1078.27
## - FTA        1   0.00395 1.7269 -1078.23
## - BLKA       1   0.00865 1.7316 -1077.58
## - FTP        1   0.00914 1.7321 -1077.51
## - PFD        1   0.01042 1.7334 -1077.34
## - STL        1   0.01421 1.7372 -1076.81
## <none>                   1.7229 -1076.78
## - OREB       1   0.02271 1.7457 -1075.64
## - DREB       1   0.02272 1.7457 -1075.64
## - REB        1   0.02421 1.7472 -1075.44
## - PF         1   0.02901 1.7520 -1074.78
```

```
## - FGA         1   0.02978 1.7527 -1074.67
## - FGP         1   0.03953 1.7625 -1073.34
## - `3PM`       1   0.04892 1.7719 -1072.06
## - PTS         1   0.05469 1.7776 -1071.28
## - FTM         1   0.05954 1.7825 -1070.63
## - FGM         1   0.07945 1.8024 -1067.96
## - TEAM       32   0.61376 2.3367 -1067.65
## - PlusMinus   1   0.87701 2.6000  -980.03
##
## Step:  AIC=-1078.78
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + `3PA` + `3PP` +
##     FTM + FTA + FTP + OREB + DREB + REB + TOV + STL + BLK + BLKA +
##     PF + PFD + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## - TOV        1   0.00071 1.7237 -1080.68
## - `3PP`      1   0.00103 1.7240 -1080.64
## - BLK        1   0.00277 1.7258 -1080.39
## - `3PA`      1   0.00375 1.7267 -1080.26
## - FTA        1   0.00392 1.7269 -1080.23
## - BLKA       1   0.00863 1.7316 -1079.58
## - FTP        1   0.00913 1.7321 -1079.51
## - PFD        1   0.01040 1.7334 -1079.33
## - STL        1   0.01427 1.7373 -1078.80
## <none>                   1.7230 -1078.78
## - OREB       1   0.02297 1.7460 -1077.60
## - DREB       1   0.02301 1.7460 -1077.60
## - REB        1   0.02450 1.7475 -1077.39
## - PF         1   0.02906 1.7520 -1076.77
## - FGA        1   0.02975 1.7527 -1076.67
## - FGP        1   0.03950 1.7625 -1075.34
## - `3PM`      1   0.04892 1.7719 -1074.06
## - PTS        1   0.05468 1.7777 -1073.28
## - FTM        1   0.05956 1.7826 -1072.62
## - FGM        1   0.07947 1.8025 -1069.96
## - TEAM      32   0.61595 2.3389 -1069.43
## - PlusMinus  1   0.87755 2.6005  -981.98
##
## Step:  AIC=-1080.68
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + `3PA` + `3PP` +
##     FTM + FTA + FTP + OREB + DREB + REB + STL + BLK + BLKA +
##     PF + PFD + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## - `3PP`      1   0.00108 1.7248 -1082.53
## - BLK        1   0.00295 1.7267 -1082.27
## - `3PA`      1   0.00383 1.7275 -1082.15
## - FTA        1   0.00447 1.7282 -1082.06
## - FTP        1   0.00957 1.7333 -1081.35
## - PFD        1   0.00973 1.7334 -1081.33
## - BLKA       1   0.01089 1.7346 -1081.17
## <none>                   1.7237 -1080.68
## - STL        1   0.01476 1.7385 -1080.63
## - OREB       1   0.02252 1.7462 -1079.56
```

```
## - DREB       1   0.02254 1.7462 -1079.56
## - REB        1   0.02395 1.7476 -1079.37
## - PF         1   0.03287 1.7566 -1078.15
## - FGA        1   0.03474 1.7584 -1077.89
## - FGP        1   0.04190 1.7656 -1076.92
## - `3PM`      1   0.04821 1.7719 -1076.06
## - PTS        1   0.05399 1.7777 -1075.28
## - FTM        1   0.05886 1.7826 -1074.62
## - FGM        1   0.07876 1.8025 -1071.96
## - TEAM      32   0.61569 2.3394 -1071.38
## - PlusMinus  1   1.48718 3.2109  -933.38
##
## Step:  AIC=-1082.53
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + `3PA` + FTM + FTA +
##     FTP + OREB + DREB + REB + STL + BLK + BLKA + PF + PFD + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## - BLK        1   0.00281 1.7276 -1084.14
## - FTA        1   0.00469 1.7295 -1083.88
## - `3PA`      1   0.00494 1.7297 -1083.84
## - PFD        1   0.00907 1.7338 -1083.27
## - FTP        1   0.00983 1.7346 -1083.17
## - BLKA       1   0.01136 1.7361 -1082.95
## - STL        1   0.01396 1.7387 -1082.60
## <none>                   1.7248 -1082.53
## - OREB       1   0.02213 1.7469 -1081.47
## - DREB       1   0.02218 1.7470 -1081.46
## - REB        1   0.02356 1.7483 -1081.27
## - PF         1   0.03217 1.7569 -1080.10
## - FGA        1   0.03375 1.7585 -1079.88
## - FGP        1   0.04110 1.7659 -1078.88
## - `3PM`      1   0.04940 1.7742 -1077.75
## - PTS        1   0.05294 1.7777 -1077.27
## - FTM        1   0.05784 1.7826 -1076.61
## - FGM        1   0.07794 1.8027 -1073.92
## - TEAM      32   0.61642 2.3412 -1073.19
## - PlusMinus  1   1.48823 3.2130  -935.22
##
## Step:  AIC=-1084.14
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + `3PA` + FTM + FTA +
##     FTP + OREB + DREB + REB + STL + BLKA + PF + PFD + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## - `3PA`      1   0.00411 1.7317 -1085.57
## - FTA        1   0.00458 1.7322 -1085.50
## - FTP        1   0.00984 1.7374 -1084.78
## - PFD        1   0.01034 1.7379 -1084.71
## - BLKA       1   0.01145 1.7390 -1084.55
## - STL        1   0.01288 1.7405 -1084.36
## <none>                   1.7276 -1084.14
## - DREB       1   0.02278 1.7504 -1083.00
## - OREB       1   0.02278 1.7504 -1082.99
## - REB        1   0.02414 1.7517 -1082.81
## - FGA        1   0.03242 1.7600 -1081.68
```

```
## - PF         1   0.03372 1.7613 -1081.50
## - FGP        1   0.03971 1.7673 -1080.68
## - `3PM`      1   0.04950 1.7771 -1079.36
## - PTS        1   0.05283 1.7804 -1078.91
## - FTM        1   0.05777 1.7854 -1078.25
## - FGM        1   0.07731 1.8049 -1075.63
## - TEAM      32   0.61497 2.3426 -1075.05
## - PlusMinus  1   1.49876 3.2264  -936.23
##
## Step:  AIC=-1085.57
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + FTM + FTA + FTP +
##     OREB + DREB + REB + STL + BLKA + PF + PFD + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## - FTA        1   0.00466 1.7364 -1086.92
## - BLKA       1   0.00914 1.7408 -1086.30
## - PFD        1   0.00924 1.7409 -1086.29
## - FTP        1   0.00945 1.7412 -1086.26
## - STL        1   0.01352 1.7452 -1085.70
## <none>                   1.7317 -1085.57
## - OREB       1   0.02266 1.7544 -1084.45
## - DREB       1   0.02271 1.7544 -1084.44
## - REB        1   0.02401 1.7557 -1084.26
## - FGA        1   0.03007 1.7618 -1083.44
## - PF         1   0.03216 1.7639 -1083.15
## - FGP        1   0.03815 1.7699 -1082.34
## - `3PM`      1   0.05549 1.7872 -1080.00
## - PTS        1   0.05569 1.7874 -1079.97
## - FTM        1   0.06066 1.7924 -1079.31
## - TEAM      32   0.61119 2.3429 -1077.02
## - FGM        1   0.07985 1.8115 -1076.75
## - PlusMinus  1   1.62460 3.3563  -928.75
##
## Step:  AIC=-1086.92
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + FTM + FTP + OREB +
##     DREB + REB + STL + BLKA + PF + PFD + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## - PFD        1   0.00988 1.7462 -1087.56
## - BLKA       1   0.01018 1.7465 -1087.52
## - FTP        1   0.01438 1.7507 -1086.94
## <none>                   1.7364 -1086.92
## - STL        1   0.01480 1.7512 -1086.89
## - DREB       1   0.02470 1.7611 -1085.53
## - OREB       1   0.02478 1.7611 -1085.52
## - REB        1   0.02610 1.7625 -1085.34
## - FGA        1   0.02977 1.7661 -1084.84
## - PF         1   0.03135 1.7677 -1084.63
## - FGP        1   0.03757 1.7739 -1083.79
## - `3PM`      1   0.05428 1.7906 -1081.54
## - PTS        1   0.05438 1.7907 -1081.52
## - FTM        1   0.05612 1.7925 -1081.29
## - TEAM      32   0.61222 2.3486 -1078.44
## - FGM        1   0.07811 1.8145 -1078.36
```

```
## - PlusMinus  1   1.63853 3.3749  -929.43
##
## Step:  AIC=-1087.56
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + FTM + FTP + OREB +
##     DREB + REB + STL + BLKA + PF + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## - FTP        1   0.00616 1.7524 -1088.72
## - BLKA       1   0.01288 1.7591 -1087.80
## - STL        1   0.01350 1.7597 -1087.71
## <none>                   1.7462 -1087.56
## - PF         1   0.02379 1.7700 -1086.31
## - DREB       1   0.02516 1.7714 -1086.13
## - OREB       1   0.02526 1.7715 -1086.12
## - REB        1   0.02658 1.7728 -1085.94
## - FGA        1   0.02846 1.7747 -1085.68
## - FGP        1   0.03592 1.7822 -1084.67
## - `3PM`      1   0.05431 1.8005 -1082.21
## - PTS        1   0.05454 1.8008 -1082.18
## - FTM        1   0.05466 1.8009 -1082.16
## - FGM        1   0.07779 1.8240 -1079.10
## - TEAM      32   0.62738 2.3736 -1077.89
## - PlusMinus  1   1.65824 3.4045  -929.33
##
## Step:  AIC=-1088.72
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + FTM + OREB + DREB +
##     REB + STL + BLKA + PF + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## - STL        1   0.01072 1.7631 -1089.25
## - BLKA       1   0.01361 1.7660 -1088.86
## <none>                   1.7524 -1088.72
## - DREB       1   0.02321 1.7756 -1087.56
## - OREB       1   0.02340 1.7758 -1087.53
## - REB        1   0.02447 1.7769 -1087.39
## - FGA        1   0.02766 1.7801 -1086.96
## - PF         1   0.02895 1.7813 -1086.78
## - FGP        1   0.03377 1.7862 -1086.14
## - `3PM`      1   0.06189 1.8143 -1082.39
## - FTM        1   0.06190 1.8143 -1082.39
## - PTS        1   0.06238 1.8148 -1082.32
## - FGM        1   0.08664 1.8390 -1079.13
## - TEAM      32   0.64295 2.3954 -1077.71
## - PlusMinus  1   1.79863 3.5510  -921.22
##
## Step:  AIC=-1089.25
## WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + FTM + OREB + DREB +
##     REB + BLKA + PF + PlusMinus
##
##             Df Sum of Sq    RSS      AIC
## <none>                   1.7631 -1089.25
## - BLKA       1   0.01595 1.7791 -1089.09
## - DREB       1   0.02294 1.7861 -1088.15
## - OREB       1   0.02317 1.7863 -1088.12
```

```
## - REB        1   0.02393 1.7870 -1088.02
## - PF         1   0.02546 1.7886 -1087.81
## - FGA        1   0.03491 1.7980 -1086.55
## - FGP        1   0.03818 1.8013 -1086.11
## - FTM        1   0.05491 1.8180 -1083.89
## - `3PM`      1   0.05505 1.8182 -1083.87
## - PTS        1   0.05534 1.8185 -1083.84
## - FGM        1   0.07955 1.8427 -1080.66
## - TEAM      32   0.64296 2.4061 -1078.63
## - PlusMinus  1   2.22740 3.9905  -895.21
##
## Call:
## lm(formula = WINP ~ TEAM + PTS + FGM + FGA + FGP + `3PM` + FTM +
##     OREB + DREB + REB + BLKA + PF + PlusMinus, data = dados_regressaop)
##
## Coefficients:
##                (Intercept)          TEAMBoston Celtics
##                 -3.0127620                  0.0089531
##          TEAMBrooklyn Nets       TEAMCharlotte Bobcats
##                 -0.0914435                 -0.1996107
##      TEAMCharlotte Hornets           TEAMChicago Bulls
##                  0.1698991                 -0.0421215
##    TEAMCleveland Cavaliers        TEAMDallas Mavericks
##                 -0.0026697                 -0.0201210
##         TEAMDenver Nuggets         TEAMDetroit Pistons
##                 -0.0244783                 -0.1025228
##  TEAMGolden State Warriors         TEAMHouston Rockets
##                  0.0542535                  0.0245631
##         TEAMIndiana Pacers             TEAMLA Clippers
##                 -0.1359005                 -0.0805878
##   TEAMLos Angeles Clippers      TEAMLos Angeles Lakers
##                 -0.0143692                  0.0006072
##      TEAMMemphis Grizzlies              TEAMMiami Heat
##                  0.0347612                  0.0082209
##        TEAMMilwaukee Bucks  TEAMMinnesota Timberwolves
##                 -0.0381503                 -0.0748874
##    TEAMNew Orleans Hornets    TEAMNew Orleans Pelicans
##                  0.1903755                 -0.1030496
##        TEAMNew York Knicks   TEAMOklahoma City Thunder
##                 -0.0805517                 -0.0380085
##          TEAMOrlando Magic      TEAMPhiladelphia 76ers
##                 -0.0634460                 -0.0304316
##           TEAMPhoenix Suns  TEAMPortland Trail Blazers
##                  0.0804626                 -0.0348200
##       TEAMSacramento Kings       TEAMSan Antonio Spurs
##                 -0.0262251                 -0.0522148
##        TEAMToronto Raptors               TEAMUtah Jazz
##                  0.0350867                 -0.0567606
##     TEAMWashington Wizards                         PTS
##                  0.0132161                  0.2632184
##                        FGM                        FGA
##                 -0.6258514                  0.0417751
##                        FGP                     `3PM`
```

```
##                   0.0818073                  -0.2627328
##                         FTM                        OREB
##                  -0.2617705                  -0.2433056
##                        DREB                         REB
##                  -0.2424773                   0.2478942
##                        BLKA                          PF
##                  -0.0083491                  -0.0063721
##                   PlusMinus
##                   0.0235847
```

```
# Coefficients:
#   (Intercept)          PTS          FGM         `3PM`          FTM
# 0.196477               0.269215    -0.539644    -0.270392    -0.272894
# FT_P         OREB         DREB          REB           PF
# 0.002872    -0.256336    -0.252691     0.256559    -0.006153
# PFD          PlusMinus
# 0.008881     0.025024
```

```
modelo_backp <- lm(WINP ~ PTS + FGM + `3PM` + FTM + FTP + OREB +  DREB +  REB+ PF + PFD + PlusMinus, da
modelo_backp
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + FTP + OREB + DREB +
##     REB + PF + PFD + PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS          FGM         `3PM`          FTM          FTP
##    0.196477     0.269215    -0.539644    -0.270392    -0.272894     0.002872
##        OREB         DREB          REB           PF          PFD    PlusMinus
##   -0.256336    -0.252691     0.256559    -0.006153     0.008881     0.025024
```

```
coef(modelo_backp)
```

```
##  (Intercept)          PTS          FGM         `3PM`          FTM          FTP
##  0.196476922  0.269215481 -0.539643656 -0.270392166 -0.272893982  0.002872311
##         OREB         DREB          REB           PF          PFD    PlusMinus
## -0.256336470 -0.252690864  0.256559028 -0.006153204  0.008881281  0.025023726
```

```
anova(modelo_backp)
```

```
## Analysis of Variance Table
##
## Response: WINP
##            Df Sum Sq Mean Sq  F value    Pr(>F)
## PTS         1 1.1235  1.1235 107.1427 < 2.2e-16 ***
## FGM         1 0.0017  0.0017   0.1613 0.6883381
## `3PM`       1 0.1373  0.1373  13.0947 0.0003647 ***
## FTM         1 0.2803  0.2803  26.7331 5.105e-07 ***
## FTP         1 0.0437  0.0437   4.1680 0.0423462 *
## OREB        1 0.0514  0.0514   4.9040 0.0277849 *
## DREB        1 0.3545  0.3545  33.8066 2.041e-08 ***
## REB         1 0.0627  0.0627   5.9785 0.0152399 *
## PF          1 0.3945  0.3945  37.6202 3.758e-09 ***
## PFD         1 0.0758  0.0758   7.2283 0.0077061 **
## PlusMinus   1 5.0826  5.0826 484.7217 < 2.2e-16 ***
```

```
## Residuals 228 2.3907  0.0105
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(modelo_backp) #Adjusted R-squared: 0.7494
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + FTP + OREB + DREB +
##     REB + PF + PFD + PlusMinus, data = dados_regressaop)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.34937 -0.05361  0.00614  0.06622  0.32397
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.196477   0.218295   0.900  0.36904
## PTS          0.269215   0.101902   2.642  0.00881 **
## FGM         -0.539644   0.203929  -2.646  0.00871 **
## `3PM`       -0.270392   0.101866  -2.654  0.00850 **
## FTM         -0.272894   0.101722  -2.683  0.00784 **
## FTP          0.002872   0.001830   1.569  0.11798
## OREB        -0.256336   0.153018  -1.675  0.09526 .
## DREB        -0.252691   0.153206  -1.649  0.10045
## REB          0.256559   0.153247   1.674  0.09547 .
## PF          -0.006153   0.003741  -1.645  0.10136
## PFD          0.008881   0.006343   1.400  0.16284
## PlusMinus    0.025024   0.001137  22.016  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1024 on 228 degrees of freedom
## Multiple R-squared:  0.7609, Adjusted R-squared:  0.7494
## F-statistic: 65.96 on 11 and 228 DF,  p-value: < 2.2e-16
```

```
#### Backward mas com PTS, FGM, `3PM`, FTM e PlusMinus que não deu significante no summary ######
modelo_backp1 <- lm(WINP ~ PTS + FGM + `3PM` + FTM + PlusMinus, data = dados_regressaop)
modelo_backp1
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS          FGM        `3PM`          FTM    PlusMinus
##     0.50100      0.30049     -0.60240     -0.29907     -0.29963      0.02587
```

```
coef(modelo_backp1)
```

```
## (Intercept)         PTS         FGM       `3PM`         FTM   PlusMinus
##  0.50099740  0.30048884 -0.60240155 -0.29907374 -0.29963161  0.02587394
```

```
anova(modelo_backp1)
```

```
## Analysis of Variance Table
##
```

```
## Response: WINP
##             Df Sum Sq Mean Sq  F value    Pr(>F)
## PTS          1 1.1235  1.1235 104.9912 < 2.2e-16 ***
## FGM          1 0.0017  0.0017   0.1581 0.6913099
## `3PM`        1 0.1373  0.1373  12.8317 0.0004145 ***
## FTM          1 0.2803  0.2803  26.1962 6.431e-07 ***
## PlusMinus    1 5.9520  5.9520 556.2338 < 2.2e-16 ***
## Residuals  234 2.5039  0.0107
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(modelo_backp1) #Adjusted R-squared:  0.7442
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + PlusMinus, data = dados_regressaop)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.36997 -0.05051  0.00575  0.06999  0.33687
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.500997   0.104349   4.801 2.81e-06 ***
## PTS          0.300489   0.101080   2.973  0.00326 **
## FGM         -0.602402   0.202342  -2.977  0.00322 **
## `3PM`       -0.299074   0.101103  -2.958  0.00341 **
## FTM         -0.299632   0.100958  -2.968  0.00331 **
## PlusMinus    0.025874   0.001097  23.585  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1034 on 234 degrees of freedom
## Multiple R-squared:  0.7496, Adjusted R-squared:  0.7442
## F-statistic: 140.1 on 5 and 234 DF,  p-value: < 2.2e-16
```

```
#### Forward Selection ########
completop = lm(WINP ~ ., data = dados_regressaop)
vaziop = lm(WINP ~ 1, data = dados_regressaop)
step(vaziop, scope=list(upper=completop, lower=vaziop), direction='forward', trace=TRUE)
```

```
## Start:  AIC=-760.76
## WINP ~ 1
##
##                   Df Sum of Sq    RSS      AIC
## + PlusMinus        1    7.3972 2.6015 -1081.89
## + FGP              1    2.1854 7.8134  -817.95
## + `3PP`            1    1.2163 8.7824  -789.89
## + PTS              1    1.1235 8.8753  -787.37
## + DREB             1    0.9192 9.0796  -781.91
## + FGM              1    0.8903 9.1084  -781.15
## + BLKA             1    0.7995 9.1993  -778.76
## + TEAM            32    2.8133 7.1854  -776.06
## + BLK              1    0.6027 9.3960  -773.68
## + REB              1    0.6020 9.3968  -773.67
```

```
## + AST                1    0.5279 9.4708  -771.78
## + FTM                1    0.3216 9.6772  -766.61
## + STL                1    0.3156 9.6831  -766.46
## + `3PM`              1    0.3150 9.6838  -766.45
## + FTP                1    0.2706 9.7281  -765.35
## + PF                 1    0.2134 9.7853  -763.94
## + TOV                1    0.2013 9.7974  -763.65
## + FTA                1    0.1599 9.8388  -762.63
## + PFD                1    0.1490 9.8497  -762.37
## <none>                           9.9987  -760.76
## + `3PA`              1    0.0649 9.9339  -760.33
## + FGA                1    0.0137 9.9850  -759.09
## + OREB               1    0.0040 9.9948  -758.86
## + Numero_temporada 14    0.0341 9.9646  -733.58
##
## Step:  AIC=-1081.89
## WINP ~ PlusMinus
##
##                    Df Sum of Sq    RSS     AIC
## + DREB              1   0.02993 2.5716 -1082.7
## + TEAM             32   0.61436 1.9872 -1082.5
## + FTP               1   0.02335 2.5782 -1082.0
## + PF                1   0.02274 2.5788 -1082.0
## <none>                          2.6015 -1081.9
## + REB               1   0.01651 2.5850 -1081.4
## + BLKA              1   0.00851 2.5930 -1080.7
## + TOV               1   0.00466 2.5969 -1080.3
## + FGP               1   0.00443 2.5971 -1080.3
## + `3PA`             1   0.00440 2.5971 -1080.3
## + `3PP`             1   0.00264 2.5989 -1080.1
## + FGA               1   0.00210 2.5994 -1080.1
## + BLK               1   0.00160 2.5999 -1080.0
## + FTA               1   0.00143 2.6001 -1080.0
## + `3PM`             1   0.00140 2.6001 -1080.0
## + OREB              1   0.00091 2.6006 -1080.0
## + STL               1   0.00074 2.6008 -1080.0
## + AST               1   0.00047 2.6011 -1079.9
## + PTS               1   0.00026 2.6013 -1079.9
## + FTM               1   0.00025 2.6013 -1079.9
## + PFD               1   0.00013 2.6014 -1079.9
## + FGM               1   0.00007 2.6015 -1079.9
## + Numero_temporada 14   0.04277 2.5588 -1057.9
##
## Step:  AIC=-1082.67
## WINP ~ PlusMinus + DREB
##
##                    Df Sum of Sq    RSS     AIC
## + TEAM             32   0.61823 1.9534 -1084.7
## <none>                          2.5716 -1082.7
## + FTP               1   0.02107 2.5505 -1082.6
## + PF                1   0.01401 2.5576 -1082.0
## + BLKA              1   0.00912 2.5625 -1081.5
## + FGM               1   0.00546 2.5661 -1081.2
## + BLK               1   0.00360 2.5680 -1081.0
```

```
## + FGA                1   0.00327 2.5683 -1081.0
## + PTS                1   0.00298 2.5686 -1080.9
## + STL                1   0.00203 2.5696 -1080.9
## + FGP                1   0.00188 2.5697 -1080.8
## + AST                1   0.00167 2.5699 -1080.8
## + `3PP`              1   0.00137 2.5702 -1080.8
## + TOV                1   0.00136 2.5703 -1080.8
## + `3PM`              1   0.00119 2.5704 -1080.8
## + FTA                1   0.00073 2.5709 -1080.7
## + OREB               1   0.00062 2.5710 -1080.7
## + FTM                1   0.00060 2.5710 -1080.7
## + PFD                1   0.00057 2.5710 -1080.7
## + REB                1   0.00041 2.5712 -1080.7
## + `3PA`              1   0.00036 2.5712 -1080.7
## + Numero_temporada 14   0.05965 2.5120 -1060.3
##
## Step:  AIC=-1084.66
## WINP ~ PlusMinus + DREB + TEAM
##
##                     Df Sum of Sq    RSS     AIC
## + BLKA               1  0.022591 1.9308 -1085.5
## <none>                          1.9534 -1084.7
## + PF                 1  0.013827 1.9395 -1084.4
## + FGA                1  0.012619 1.9407 -1084.2
## + FGM                1  0.007867 1.9455 -1083.6
## + PTS                1  0.007060 1.9463 -1083.5
## + AST                1  0.003988 1.9494 -1083.2
## + FTP                1  0.003911 1.9495 -1083.1
## + BLK                1  0.003229 1.9501 -1083.1
## + `3PA`              1  0.002563 1.9508 -1083.0
## + `3PM`              1  0.001614 1.9518 -1082.9
## + FTA                1  0.001602 1.9518 -1082.9
## + `3PP`              1  0.001137 1.9522 -1082.8
## + TOV                1  0.000798 1.9526 -1082.8
## + OREB               1  0.000694 1.9527 -1082.8
## + REB                1  0.000471 1.9529 -1082.7
## + FTM                1  0.000422 1.9529 -1082.7
## + STL                1  0.000252 1.9531 -1082.7
## + FGP                1  0.000073 1.9533 -1082.7
## + PFD                1  0.000067 1.9533 -1082.7
## + Numero_temporada 14  0.059759 1.8936 -1064.1
##
## Step:  AIC=-1085.45
## WINP ~ PlusMinus + DREB + TEAM + BLKA
##
##                     Df Sum of Sq    RSS     AIC
## <none>                          1.9308 -1085.5
## + PF                 1  0.010094 1.9207 -1084.7
## + FGM                1  0.007805 1.9230 -1084.4
## + PTS                1  0.006703 1.9241 -1084.3
## + FGA                1  0.004356 1.9264 -1084.0
## + FTP                1  0.004201 1.9266 -1084.0
## + `3PA`              1  0.003861 1.9269 -1083.9
## + AST                1  0.003803 1.9270 -1083.9
```

```
## + `3PM`             1  0.002754 1.9280 -1083.8
## + FGP               1  0.002538 1.9282 -1083.8
## + REB               1  0.001140 1.9296 -1083.6
## + BLK               1  0.001136 1.9296 -1083.6
## + TOV               1  0.001115 1.9297 -1083.6
## + STL               1  0.000927 1.9299 -1083.6
## + OREB              1  0.000852 1.9299 -1083.6
## + `3PP`             1  0.000745 1.9300 -1083.5
## + FTA               1  0.000644 1.9301 -1083.5
## + FTM               1  0.000016 1.9308 -1083.5
## + PFD               1  0.000015 1.9308 -1083.5
## + Numero_temporada 14  0.057541 1.8732 -1064.7
```

```
##
## Call:
## lm(formula = WINP ~ PlusMinus + DREB + TEAM + BLKA, data = dados_regressaop)
##
## Coefficients:
##                (Intercept)                   PlusMinus
##                   0.390391                    0.024334
##                       DREB          TEAMBoston Celtics
##                   0.004624                   -0.001519
##          TEAMBrooklyn Nets       TEAMCharlotte Bobcats
##                  -0.107191                   -0.250451
##      TEAMCharlotte Hornets           TEAMChicago Bulls
##                   0.176088                   -0.028888
##    TEAMCleveland Cavaliers        TEAMDallas Mavericks
##                   0.015627                   -0.027764
##         TEAMDenver Nuggets         TEAMDetroit Pistons
##                  -0.041128                   -0.095568
##  TEAMGolden State Warriors         TEAMHouston Rockets
##                   0.030665                    0.019375
##         TEAMIndiana Pacers             TEAMLA Clippers
##                  -0.132932                   -0.074236
##   TEAMLos Angeles Clippers      TEAMLos Angeles Lakers
##                  -0.034614                    0.008678
##      TEAMMemphis Grizzlies              TEAMMiami Heat
##                   0.029931                    0.009115
##        TEAMMilwaukee Bucks  TEAMMinnesota Timberwolves
##                  -0.040125                   -0.070236
##    TEAMNew Orleans Hornets    TEAMNew Orleans Pelicans
##                   0.179344                   -0.122315
##        TEAMNew York Knicks   TEAMOklahoma City Thunder
##                  -0.072820                   -0.043125
##          TEAMOrlando Magic      TEAMPhiladelphia 76ers
##                  -0.047260                   -0.030793
##           TEAMPhoenix Suns  TEAMPortland Trail Blazers
##                   0.047530                   -0.036305
##       TEAMSacramento Kings       TEAMSan Antonio Spurs
##                  -0.020185                   -0.045168
##        TEAMToronto Raptors               TEAMUtah Jazz
##                   0.012363                   -0.050531
##     TEAMWashington Wizards                         BLKA
##                  -0.001053                   -0.008203
```

```
# Coefficients:
#   (Intercept)   PlusMinus         DREB
# 0.345213     0.025682     0.004033

modelo_forwp <- lm(formula = WINP ~ PlusMinus + DREB, data = dados_regressaop)
modelo_forwp
```

```
##
## Call:
## lm(formula = WINP ~ PlusMinus + DREB, data = dados_regressaop)
##
## Coefficients:
## (Intercept)    PlusMinus         DREB
##    0.345213     0.025682     0.004033
```

```
coef(modelo_forwp)
```

```
## (Intercept)   PlusMinus        DREB
## 0.345212858 0.025681939 0.004033267
```

```
anova(modelo_forwp)
```

```
## Analysis of Variance Table
##
## Response: WINP
##            Df Sum Sq Mean Sq  F value  Pr(>F)
## PlusMinus   1 7.3972  7.3972 681.7284 < 2e-16 ***
## DREB        1 0.0299  0.0299   2.7587 0.09805 .
## Residuals 237 2.5716  0.0109
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(modelo_forwp) #Adjusted R-squared:  0.7406
```

```
##
## Call:
## lm(formula = WINP ~ PlusMinus + DREB, data = dados_regressaop)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.36469 -0.05721  0.01300  0.07160  0.36417
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.345213   0.078459   4.400 1.64e-05 ***
## PlusMinus   0.025682   0.001049  24.490  < 2e-16 ***
## DREB        0.004033   0.002428   1.661    0.098 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1042 on 237 degrees of freedom
## Multiple R-squared:  0.7428, Adjusted R-squared:  0.7406
## F-statistic: 342.2 on 2 and 237 DF,  p-value: < 2.2e-16
```

```
############### Anova ################
modelop1
```

```
##
## Call:
## lm(formula = WINP ~ ., data = dados_regressaop)
##
## Coefficients:
##                (Intercept)          TEAMBoston Celtics
##                 -4.1919753                  0.0144791
##          TEAMBrooklyn Nets       TEAMCharlotte Bobcats
##                 -0.0902612                 -0.1899634
##      TEAMCharlotte Hornets           TEAMChicago Bulls
##                  0.1880048                 -0.0406993
##    TEAMCleveland Cavaliers        TEAMDallas Mavericks
##                  0.0129796                 -0.0290254
##         TEAMDenver Nuggets         TEAMDetroit Pistons
##                 -0.0324792                 -0.1120277
##  TEAMGolden State Warriors         TEAMHouston Rockets
##                  0.0562513                  0.0126562
##         TEAMIndiana Pacers             TEAMLA Clippers
##                 -0.1327322                 -0.0772309
##   TEAMLos Angeles Clippers      TEAMLos Angeles Lakers
##                 -0.0279115                  0.0057702
##      TEAMMemphis Grizzlies              TEAMMiami Heat
##                  0.0301724                  0.0088091
##        TEAMMilwaukee Bucks  TEAMMinnesota Timberwolves
##                 -0.0303277                 -0.0554371
##    TEAMNew Orleans Hornets    TEAMNew Orleans Pelicans
##                  0.1765498                 -0.0963682
##        TEAMNew York Knicks   TEAMOklahoma City Thunder
##                 -0.0740628                 -0.0315064
##          TEAMOrlando Magic      TEAMPhiladelphia 76ers
##                 -0.0746230                 -0.0221161
##           TEAMPhoenix Suns  TEAMPortland Trail Blazers
##                  0.0804244                 -0.0353439
##       TEAMSacramento Kings       TEAMSan Antonio Spurs
##                 -0.0064064                 -0.0528235
##        TEAMToronto Raptors               TEAMUtah Jazz
##                  0.0518557                 -0.0643191
##     TEAMWashington Wizards                        PTS
##                  0.0323634                  0.2608978
##                        FGM                        FGA
##                 -0.6268567                  0.0420247
##                        FGP                       `3PM`
##                  0.0907029                 -0.2511703
##                      `3PA`                       `3PP`
##                 -0.0017515                 -0.0011207
##                        FTM                        FTA
##                 -0.2953386                  0.0244539
##                        FTP                       OREB
##                  0.0101773                 -0.2531358
##                       DREB                        REB
##                 -0.2533837                  0.2629635
##                        AST                        TOV
##                  0.0001122                 -0.0031138
##                        STL                        BLK
```

```
##                   0.0119496                  -0.0030451
##                        BLKA                          PF
##                  -0.0060846                  -0.0084088
##                         PFD                   PlusMinus
##                   0.0050481                   0.0209355
##           Numero_temporada2           Numero_temporada3
##                  -0.0119810                  -0.0336366
##           Numero_temporada4           Numero_temporada5
##                  -0.0051483                  -0.0063949
##           Numero_temporada6           Numero_temporada7
##                  -0.0152817                  -0.0484842
##           Numero_temporada8           Numero_temporada9
##                  -0.0355406                  -0.0670718
##          Numero_temporada10          Numero_temporada11
##                  -0.0595573                  -0.0349054
##          Numero_temporada12          Numero_temporada13
##                  -0.0452540                  -0.0530468
##          Numero_temporada14          Numero_temporada15
##                  -0.0616146                  -0.0600435
```

```
modelop2 #PTS + FGM + `3PM` + FTM + PlusMinus
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS          FGM         `3PM`          FTM    PlusMinus
##     0.50100      0.30049     -0.60240     -0.29907     -0.29963      0.02587
```

```
modelop3#PTS + `3PM` + FTM + PlusMinus
```

```
##
## Call:
## lm(formula = WINP ~ PTS + `3PM` + FTM + PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS         `3PM`          FTM    PlusMinus
##   0.4856893   -0.0004137    0.0017246    0.0008315    0.0261724
```

```
modelop4 #PTS + FGM + `3PM` + FTM + OREB + DREB + REB + PF + PlusMinus
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + OREB + DREB + REB +
##     PF + PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS          FGM         `3PM`          FTM         OREB
##    0.486164     0.280600    -0.562404    -0.280975    -0.277993    -0.265438
##        DREB          REB           PF    PlusMinus
##   -0.261270     0.264906    -0.005546     0.025106
```

```
modelop5 #PTS + FGM + `3PM` + FTM + OREB + DREB + REB + PlusMinus
```

```
##
## Call:
```

```
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + OREB + DREB + REB +
##     PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS          FGM        `3PM`          FTM         OREB
##     0.40027      0.27527     -0.55261     -0.27510     -0.27461     -0.25091
##        DREB          REB    PlusMinus
##    -0.24599      0.25051      0.02549
```

```
modelo_backp # PTS + FGM + `3PM` + FTM + FTP + OREB + DREB +REB + PF + PFD + PlusMinus
```

```
##
## Call:
## lm(formula = WINP ~ PTS + FGM + `3PM` + FTM + FTP + OREB + DREB +
##     REB + PF + PFD + PlusMinus, data = dados_regressaop)
##
## Coefficients:
## (Intercept)          PTS          FGM        `3PM`          FTM          FTP
##    0.196477     0.269215    -0.539644    -0.270392    -0.272894     0.002872
##        OREB         DREB          REB           PF          PFD    PlusMinus
##   -0.256336    -0.252691     0.256559    -0.006153     0.008881     0.025024
```

```
modelo_forwp #PlusMinus + DREB
```

```
##
## Call:
## lm(formula = WINP ~ PlusMinus + DREB, data = dados_regressaop)
##
## Coefficients:
## (Intercept)    PlusMinus         DREB
##    0.345213     0.025682     0.004033
```

```
modelo_plus <-lm(WINP ~ PlusMinus, data = dados_regressaop)
modelo_pts <- lm(WINP ~ PTS + DREB + PlusMinus, data = dados_regressaop)
modelo_ftm <- lm(WINP ~ FTM + DREB + PlusMinus, data = dados_regressaop)
modelo_pfd <- lm(WINP ~ PFD + DREB + PlusMinus, data = dados_regressaop)
modelo_pf <- lm(WINP ~ PF + DREB + PlusMinus, data = dados_regressaop)
modelo_reb <- lm(WINP ~ REB + DREB + PlusMinus, data = dados_regressaop)
modelo_oreb <- lm(WINP ~ OREB + DREB + PlusMinus, data = dados_regressaop)
modelo_ftp <- lm(WINP ~ FTP + DREB + PlusMinus, data = dados_regressaop)
modelo_3pm <- lm(WINP ~ `3PM` + DREB + PlusMinus, data = dados_regressaop)
modelo_fgm <- lm(WINP ~ FGM + DREB + PlusMinus, data = dados_regressaop)

anova(modelo_plus, modelo_forwp) #0.09805
```

```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus
## Model 2: WINP ~ PlusMinus + DREB
##   Res.Df    RSS Df Sum of Sq      F  Pr(>F)
## 1    238 2.6015
## 2    237 2.5716  1  0.029934 2.7587 0.09805 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#Isto significa que adicionar DREB ao modelo levou a um ajuste significativamente
#melhor em relação ao modelo simples.
```

```r
anova(modelo_forwp, modelo_pts)#0.6013 PTS não foi significativo
```

```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus + DREB
## Model 2: WINP ~ PTS + DREB + PlusMinus
##   Res.Df    RSS Df Sum of Sq      F Pr(>F)
## 1    237 2.5716
## 2    236 2.5686  1 0.0029794 0.2737 0.6013
```

```r
anova(modelo_forwp, modelo_ftm)#0.8144 FTM deu não significativo
```

```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus + DREB
## Model 2: WINP ~ FTM + DREB + PlusMinus
##   Res.Df    RSS Df  Sum of Sq      F Pr(>F)
## 1    237 2.5716
## 2    236 2.5710  1 0.00060149 0.0552 0.8144
```

```r
anova(modelo_forwp, modelo_pfd)#0.819, PFD não sinificativo
```

```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus + DREB
## Model 2: WINP ~ PFD + DREB + PlusMinus
##   Res.Df    RSS Df  Sum of Sq      F Pr(>F)
## 1    237 2.5716
## 2    236 2.5710  1 0.00057193 0.0525  0.819
```

```r
anova(modelo_forwp, modelo_pf)#0.2566, PF não sinificativo
```

```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus + DREB
## Model 2: WINP ~ PF + DREB + PlusMinus
##   Res.Df    RSS Df Sum of Sq      F Pr(>F)
## 1    237 2.5716
## 2    236 2.5576  1  0.014014 1.2932 0.2566
```

```r
anova(modelo_forwp, modelo_reb)#0.8461, REB não sinificativo
```

```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus + DREB
## Model 2: WINP ~ REB + DREB + PlusMinus
##   Res.Df    RSS Df  Sum of Sq      F Pr(>F)
## 1    237 2.5716
## 2    236 2.5712  1 0.00041148 0.0378 0.8461
```

```r
anova(modelo_forwp, modelo_oreb)#0.812, OREB não sinificativo
```

```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus + DREB
## Model 2: WINP ~ OREB + DREB + PlusMinus
##   Res.Df    RSS Df  Sum of Sq      F Pr(>F)
```

```
## 1    237 2.5716
## 2    236 2.5710  1 0.00061756 0.0567  0.812
```

```
anova(modelo_forwp, modelo_ftp)#0.1639, FTP não sinificativo
```

```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus + DREB
## Model 2: WINP ~ FTP + DREB + PlusMinus
##   Res.Df    RSS Df Sum of Sq      F Pr(>F)
## 1    237 2.5716
## 2    236 2.5505  1   0.02107 1.9496 0.1639
```

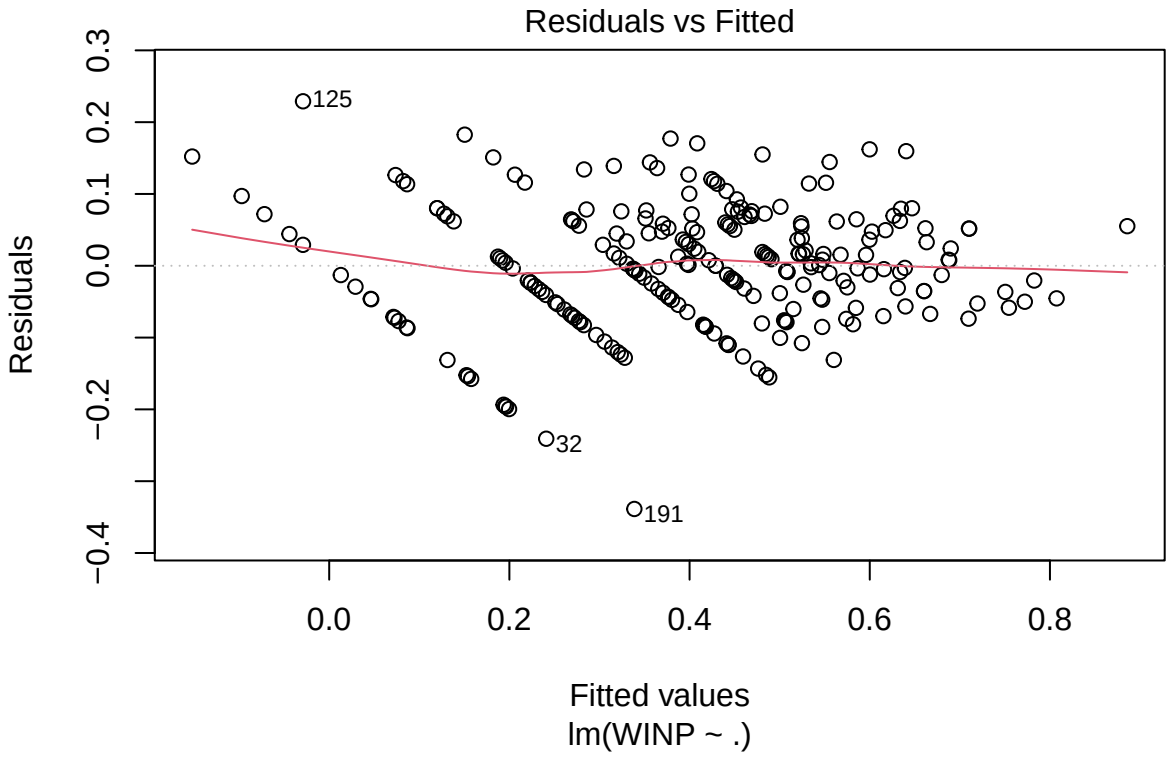
```
anova(modelo_forwp, modelo_3pm)#0.7416, 3PM não sinificativo
```

```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus + DREB
## Model 2: WINP ~ `3PM` + DREB + PlusMinus
##   Res.Df    RSS Df Sum of Sq     F Pr(>F)
## 1    237 2.5716
## 2    236 2.5704  1 0.0011871 0.109 0.7416
```

```
anova(modelo_forwp, modelo_fgm)#0.4791, FGM não sinificativo
```

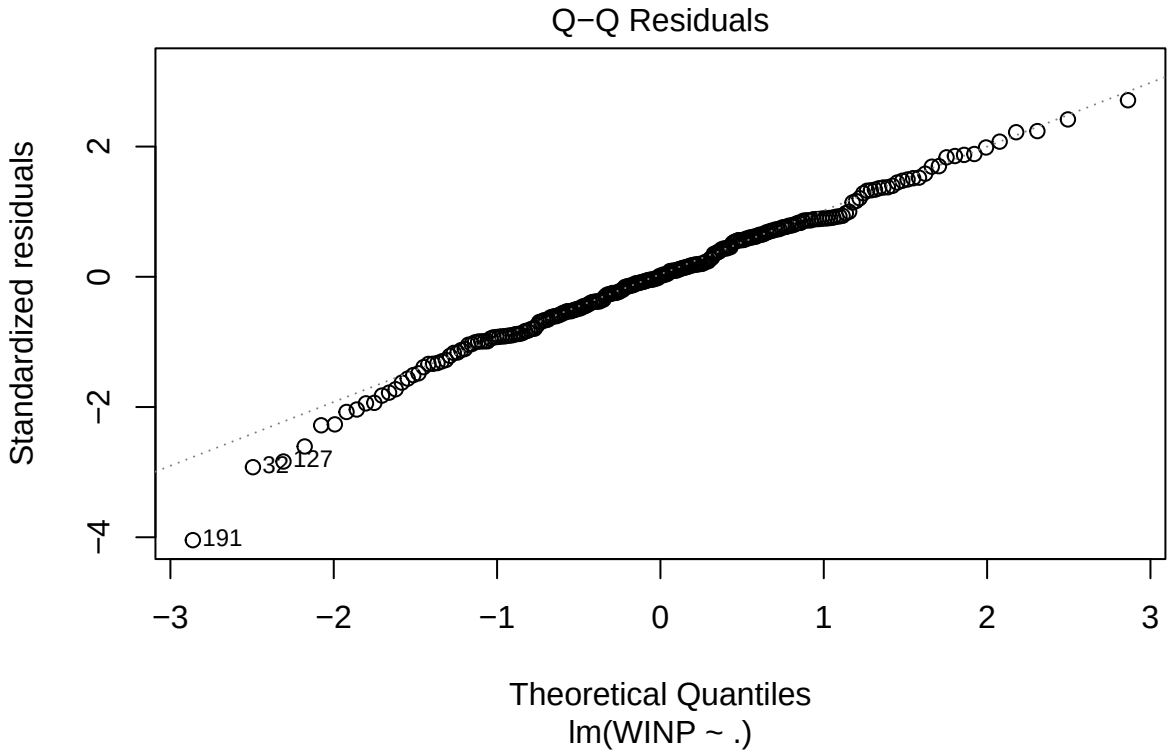
```
## Analysis of Variance Table
##
## Model 1: WINP ~ PlusMinus + DREB
## Model 2: WINP ~ FGM + DREB + PlusMinus
##   Res.Df    RSS Df Sum of Sq      F Pr(>F)
## 1    237 2.5716
## 2    236 2.5661  1 0.0054645 0.5026 0.4791
```

```
#melhor modelo é o modelo_forwp com PlusMinus e DREB

############### Análise de resíduos #############

####### Modelo completo ########
plot(modelop1, which = 1)
```



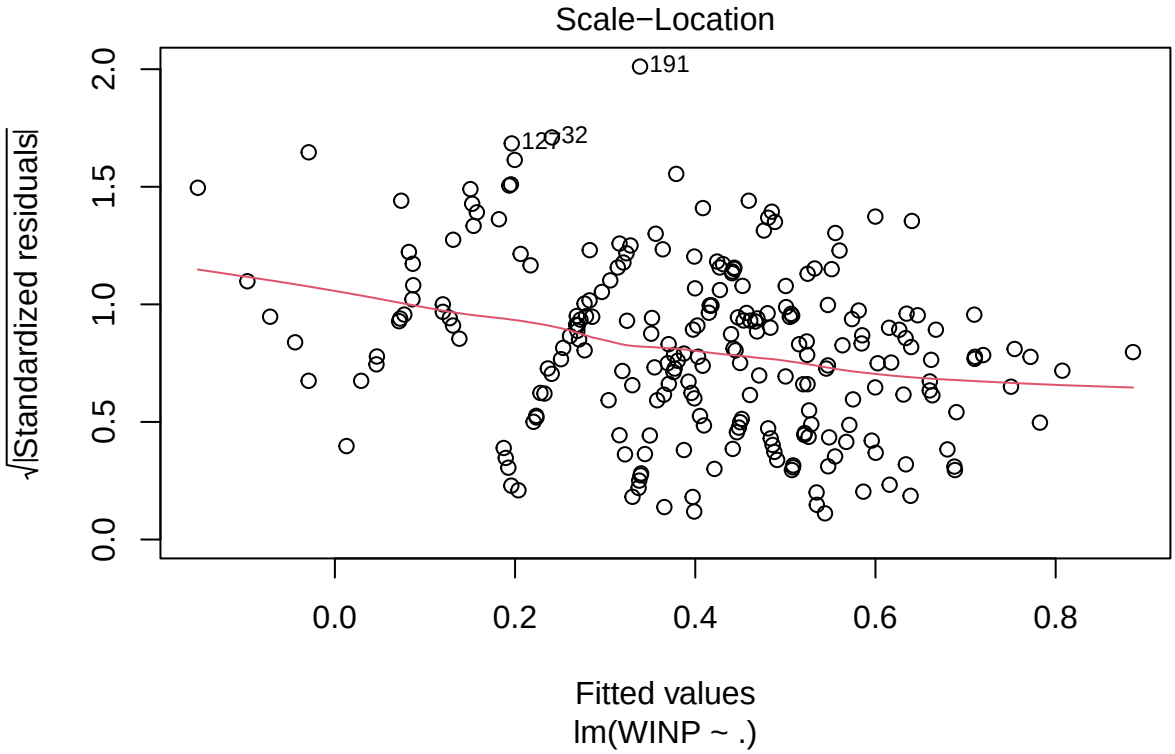

```
plot(modelop1, which = 2)
```

```
## Warning: not plotting observations with leverage one:
##   9, 120
```

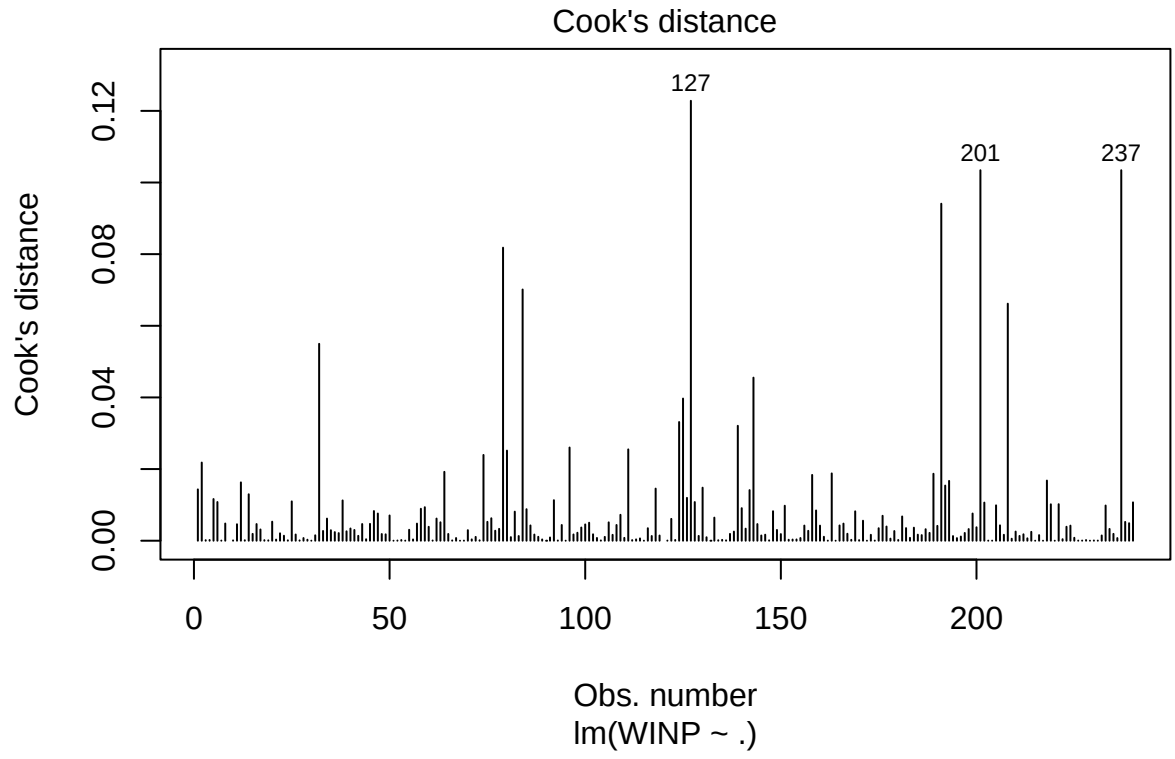


```r
plot(modelop1, which = 3)
```

```
## Warning: not plotting observations with leverage one:
##   9, 120
```

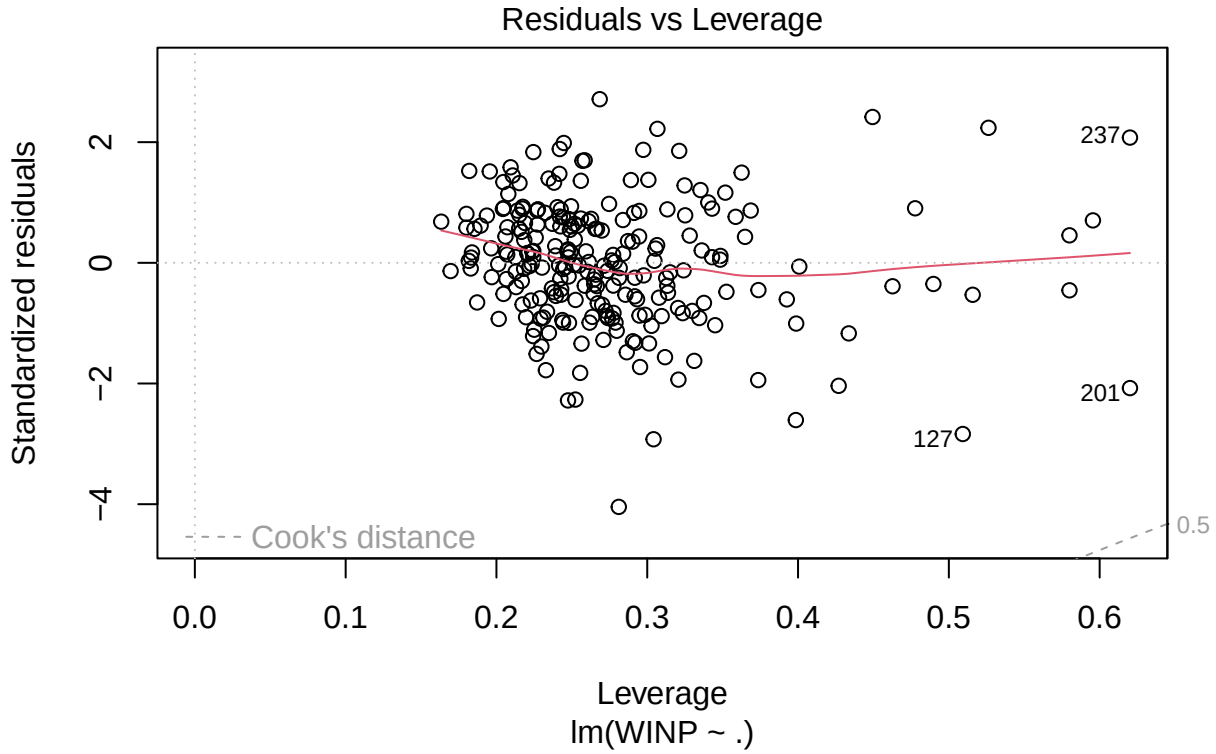



```r
plot(modelop1, which = 4)
```



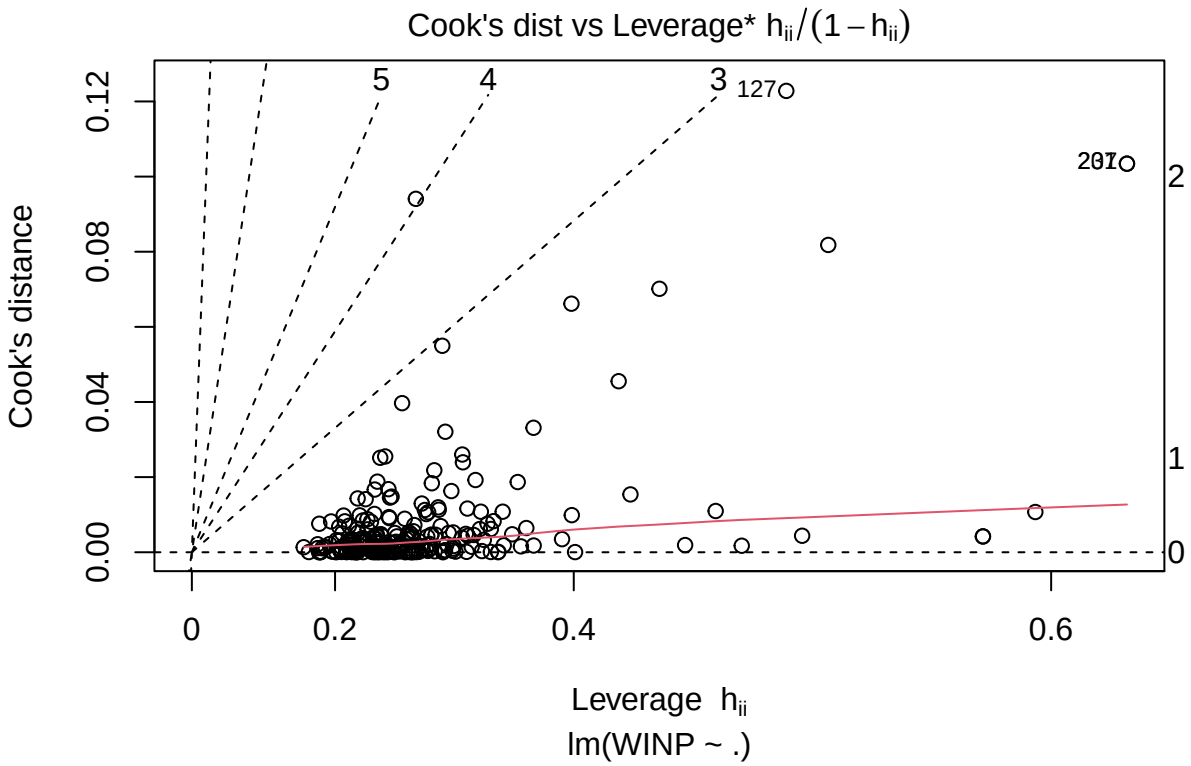
```
plot(modelop1, which = 5)
```

```
## Warning: not plotting observations with leverage one:
##   9, 120
```




```
plot(modelop1, which = 6)
```

```
## Warning: not plotting observations with leverage one:
##   9, 120
```




```
shapiro.test(modelop1$residuals) #p-value = 0.001294, normal
```

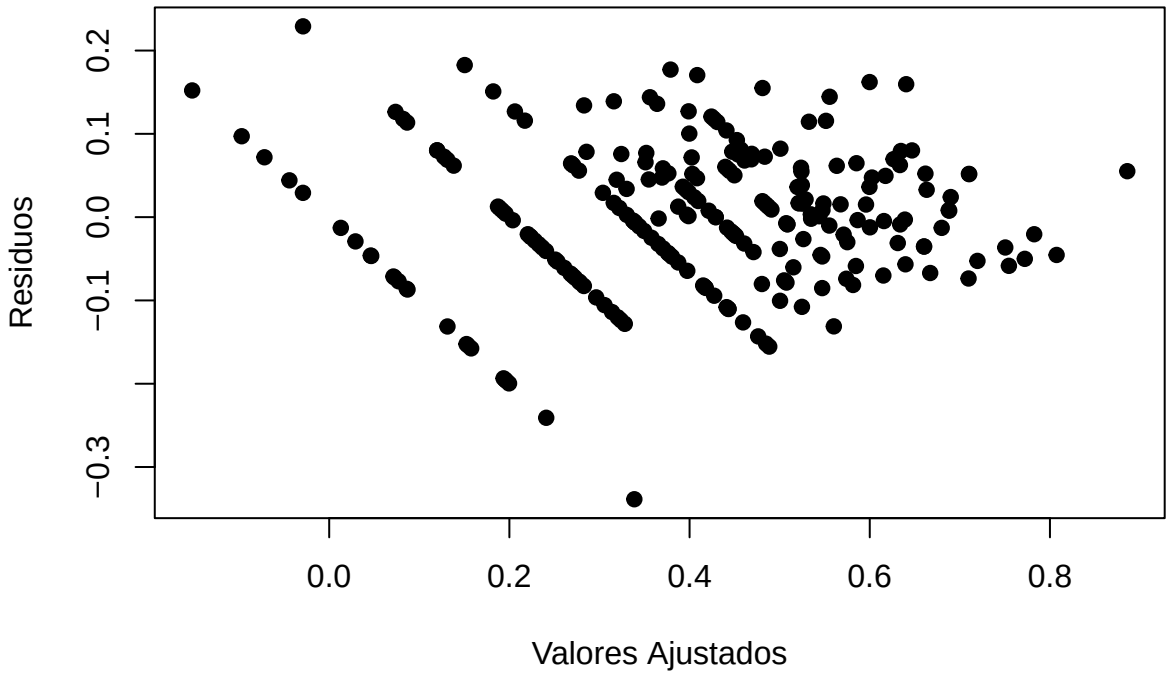
```
##
##  Shapiro-Wilk normality test
##
## data:  modelop1$residuals
## W = 0.99035, p-value = 0.1121
```

```
#Teste de durbin watson para independencia
library(lmtest)
dwtest(modelop1) #p-value = 0.1243
```

```
##
##  Durbin-Watson test
##
## data:  modelop1
## DW = 1.9021, p-value = 0.04183
## alternative hypothesis: true autocorrelation is greater than 0
```

```
#Independência
plot(modelop1$residuals,
     ylab = "Residuos",
     xlab = "Index dos Imovéis",
     main = "Suposição de independência",
     pch = 19)
```

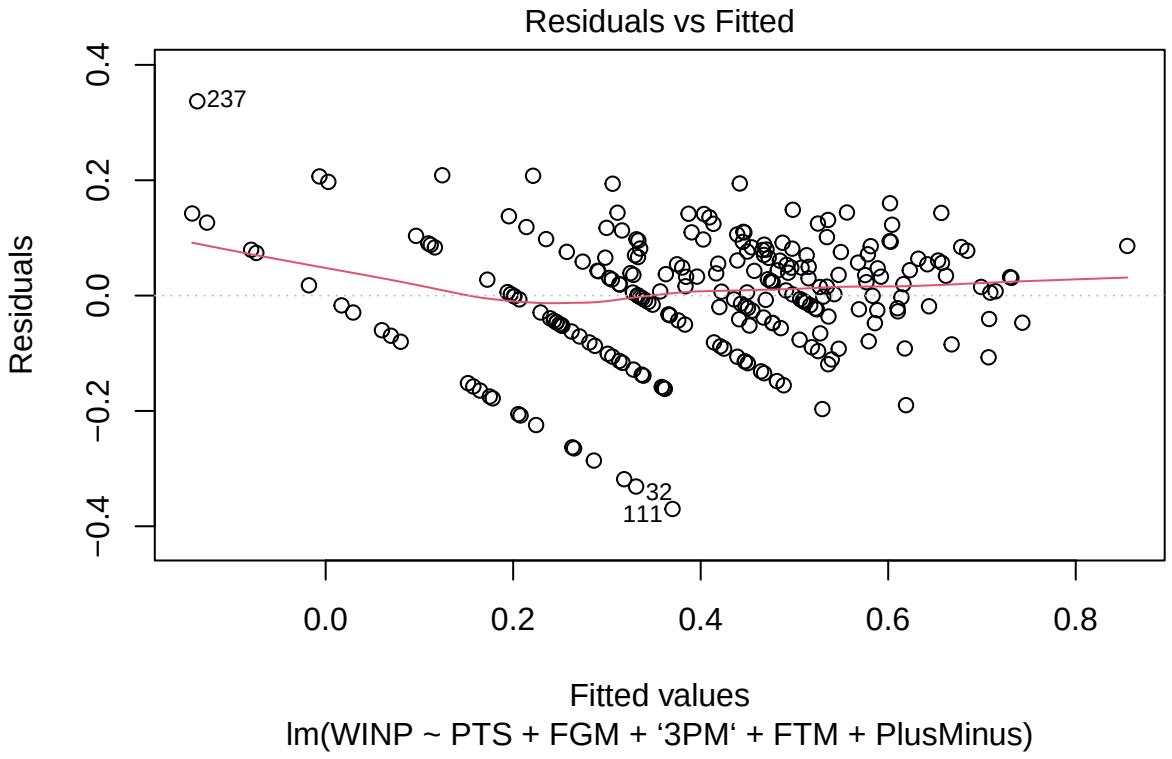

```
#Homocedasticidade
plot(modelop1$fitted.values, modelop1$residuals,
     xlab = "Valores Ajustados",
     ylab = "Residuos",
     pch = 19,
     main = "Suposição de homocedasticidade"
)
```



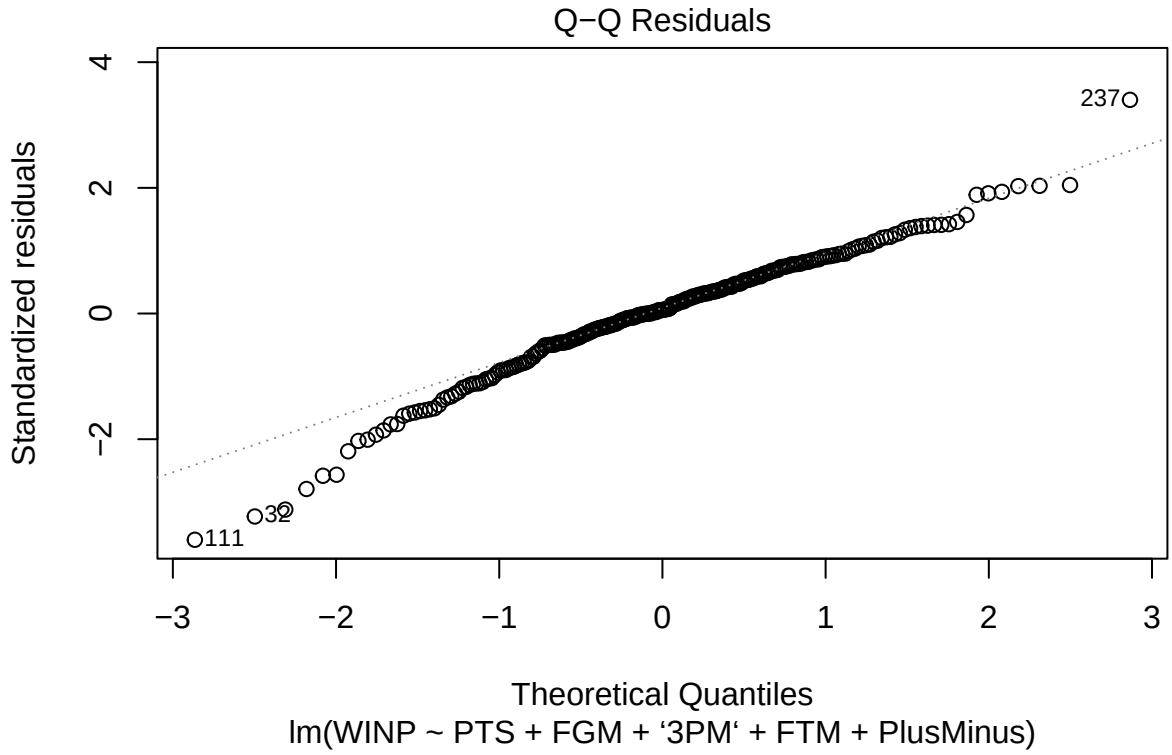

```
#Breusch_Pagan para homocedasticdade
bptest(modelop1) #p-value = 0.004251, heterocedasticidade
```

```
##
##  studentized Breusch-Pagan test
##
## data:  modelop1
## BP = 88.168, df = 67, p-value = 0.04258
```

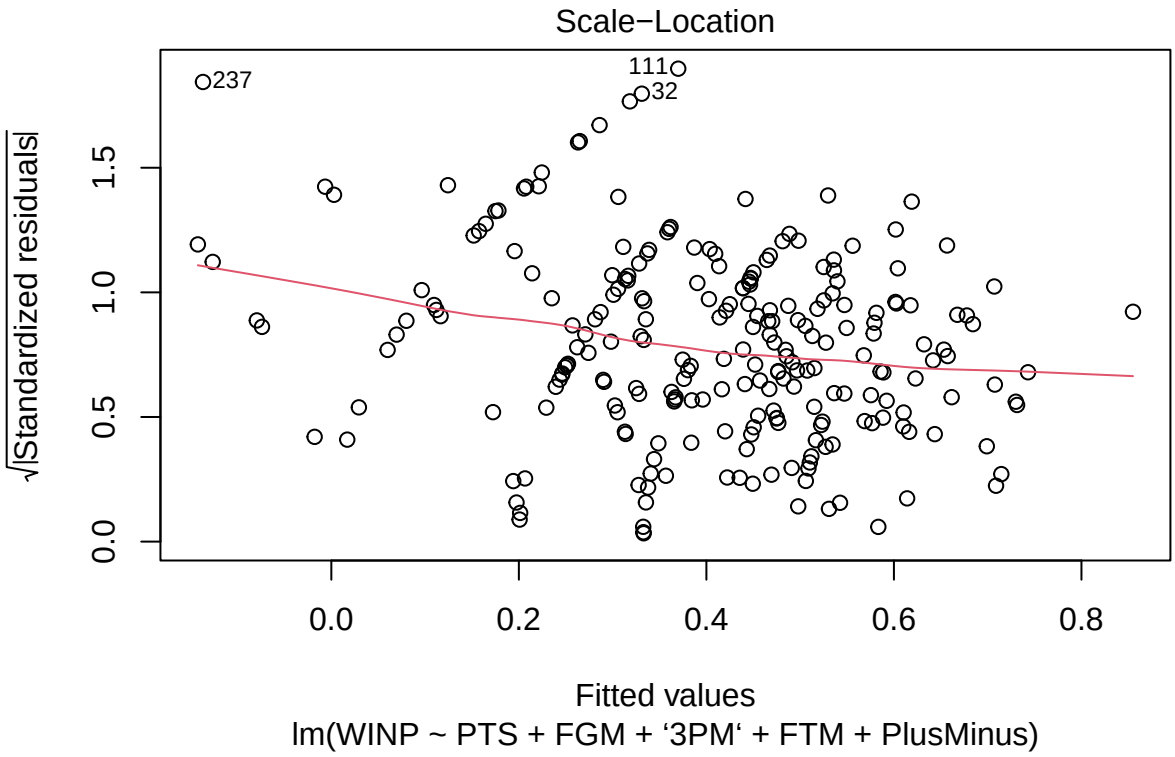
```
###### Modelo 2 #######
plot(modelop2, which = 1)
```



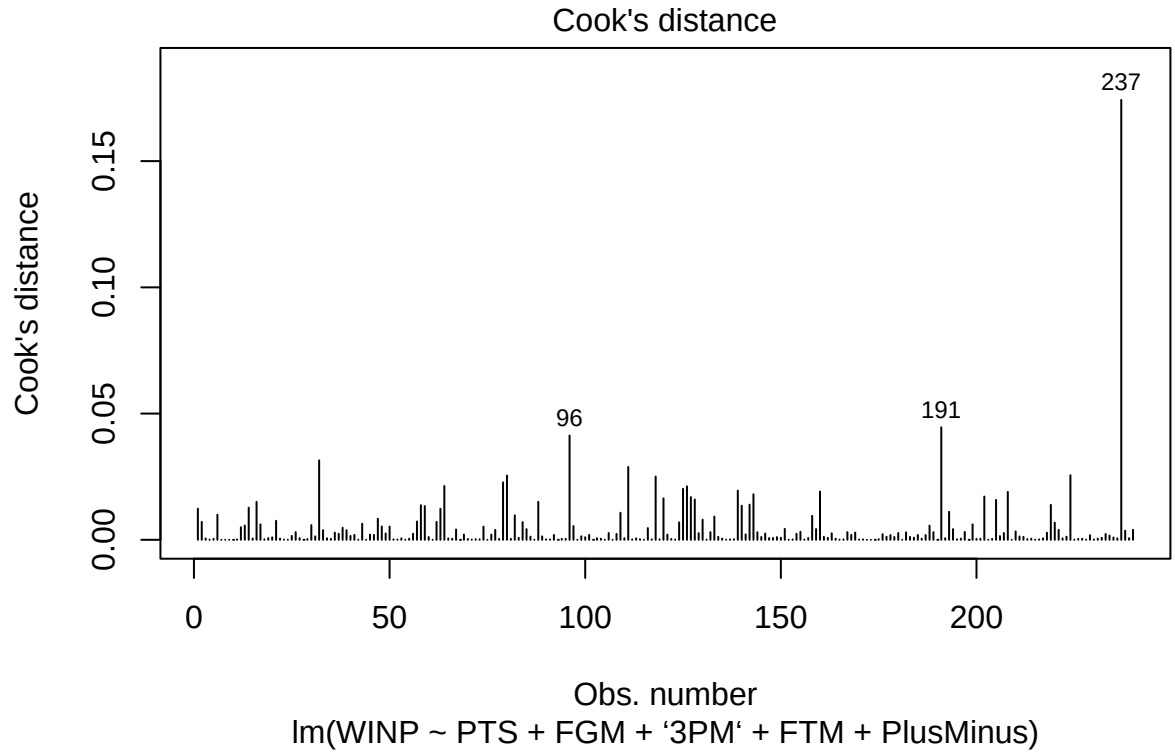

```
plot(modelop2, which = 2)
```



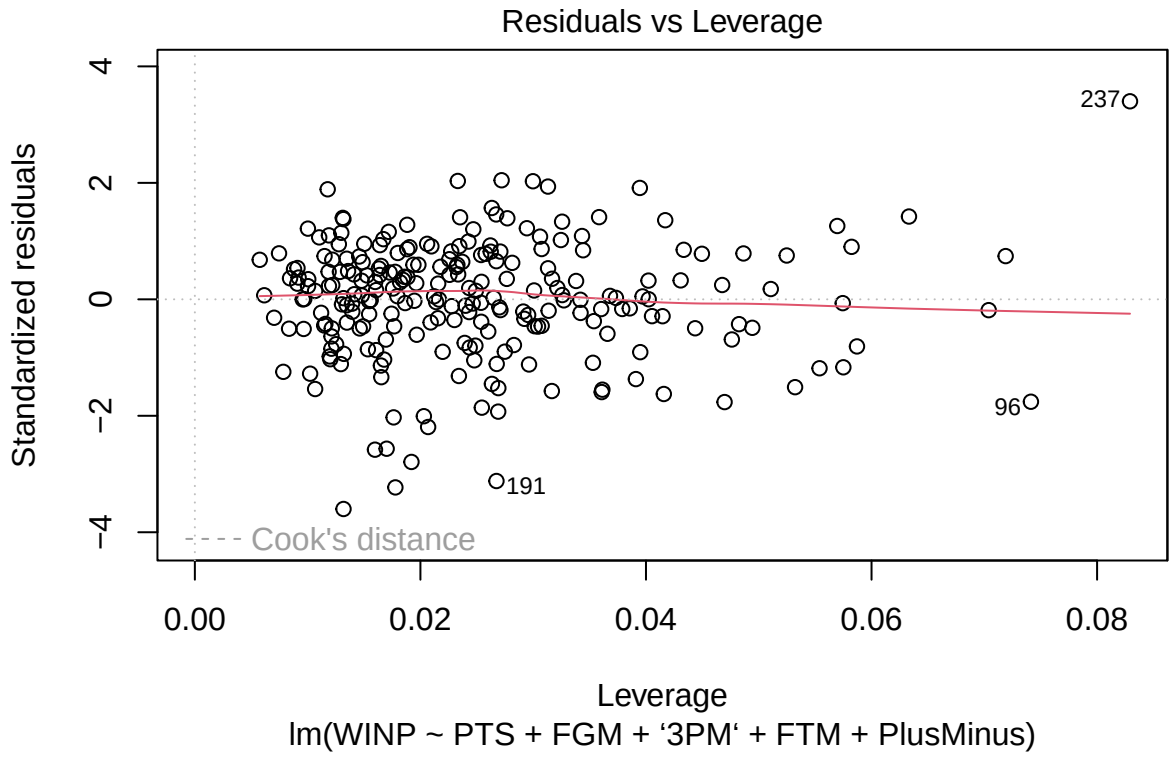

```
plot(modelop2, which = 3)
```



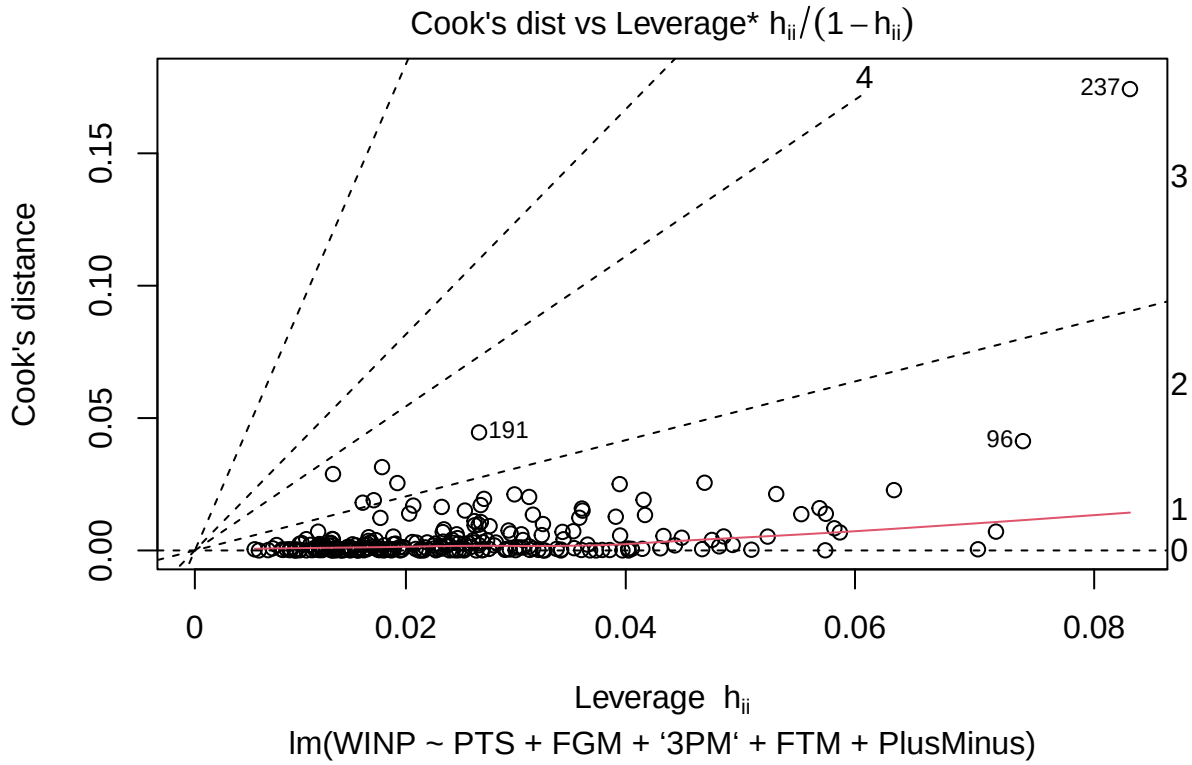

```
plot(modelop2, which = 4)
```




```
plot(modelop2, which = 5)
```




```
plot(modelop2, which = 6)
```




```
shapiro.test(modelop2$residuals) #p-value = 1.682e-05, normal
```

```
##
##  Shapiro-Wilk normality test
```

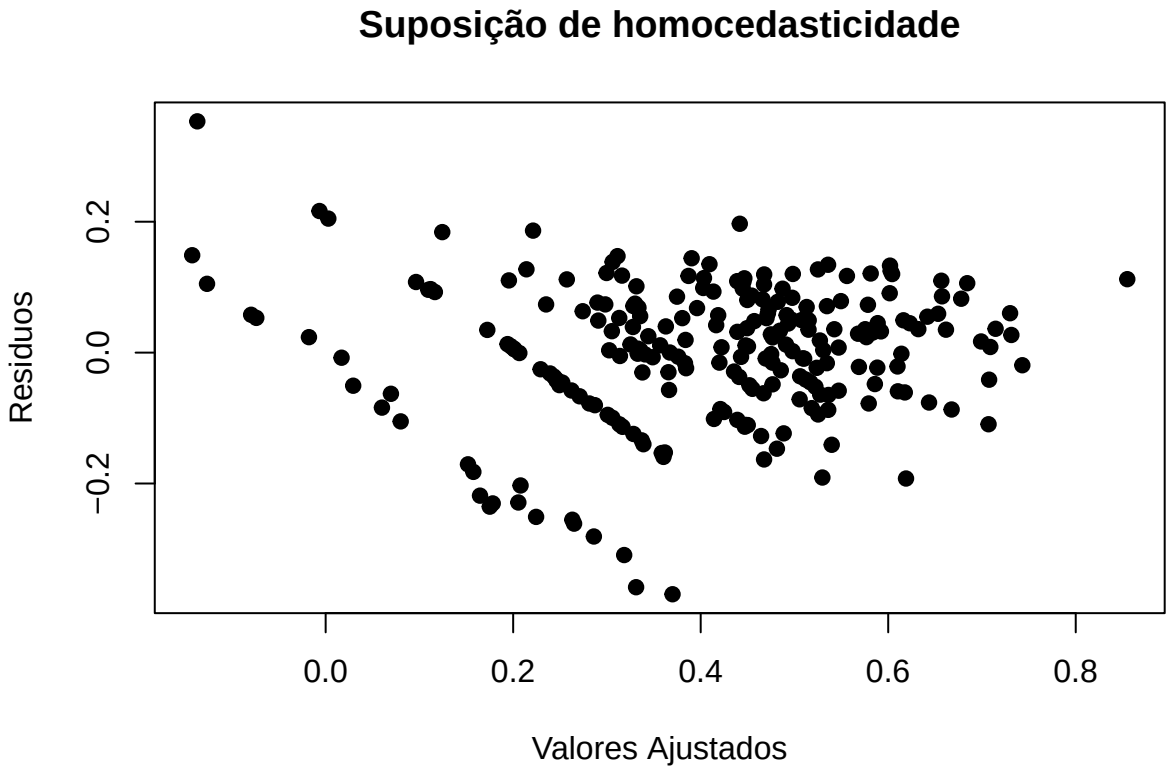
```
##
## data:  modelop2$residuals
## W = 0.97529, p-value = 0.0003381
```

```
#Teste de durbin watson para independencia
library(lmtest)
dwtest(modelop2) #p-value =
```

```
##
##  Durbin-Watson test
##
## data:  modelop2
## DW = 1.788, p-value = 0.04164
## alternative hypothesis: true autocorrelation is greater than 0
```

```
#Independência
plot(modelop2$residuals,
     ylab = "Residuos",
     xlab = "Index dos Imovéis",
     main = "Suposição de independência",
     pch = 19)
```

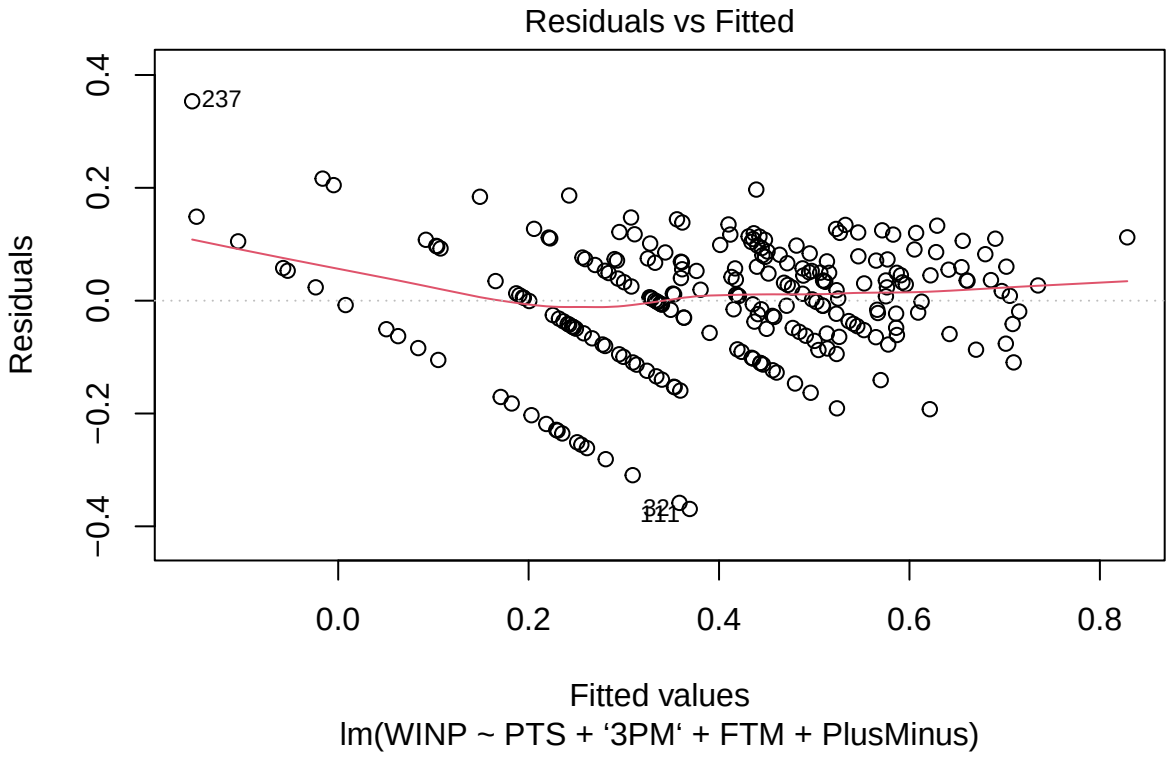

```
#Homocedasticidade
plot(modelop2$fitted.values, modelop3$residuals,
     xlab = "Valores Ajustados",
     ylab = "Residuos",
     pch = 19,
     main = "Suposição de homocedasticidade"
)
```



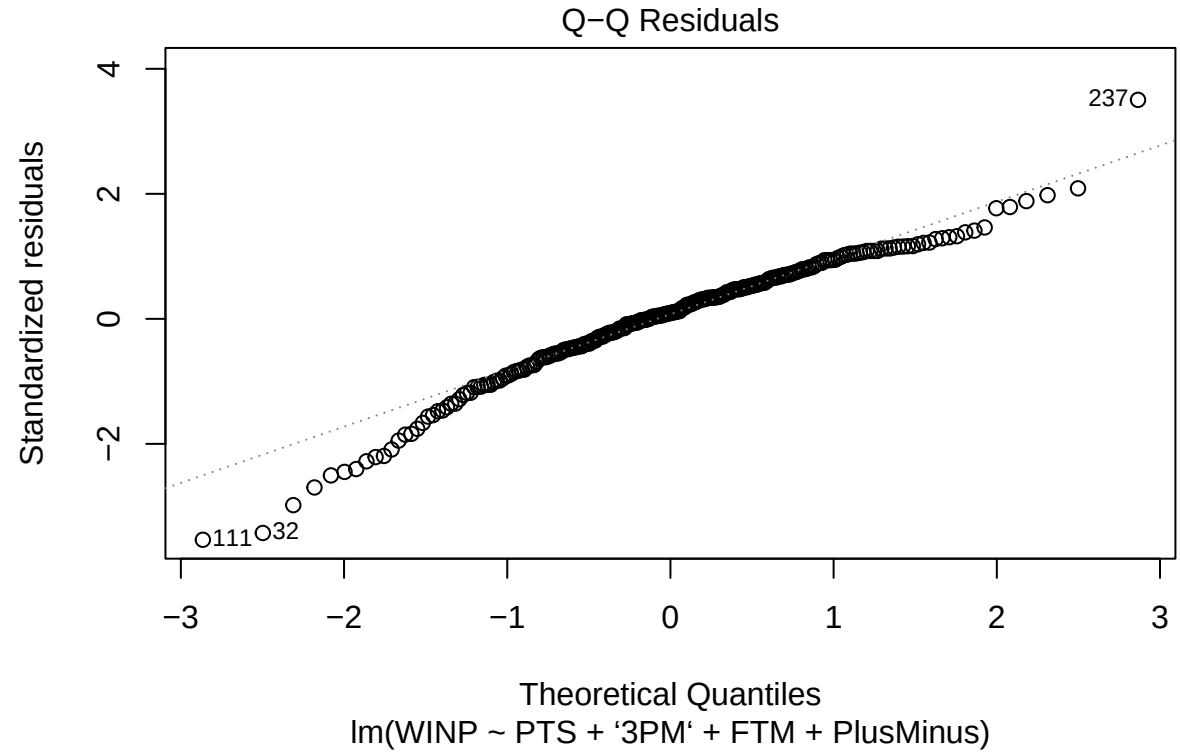

```
#Breusch_Pagan para homocedasticdade
bptest(modelop2) #p-value =
```

```
##
##  studentized Breusch-Pagan test
##
## data:  modelop2
## BP = 20.276, df = 5, p-value = 0.001109
```

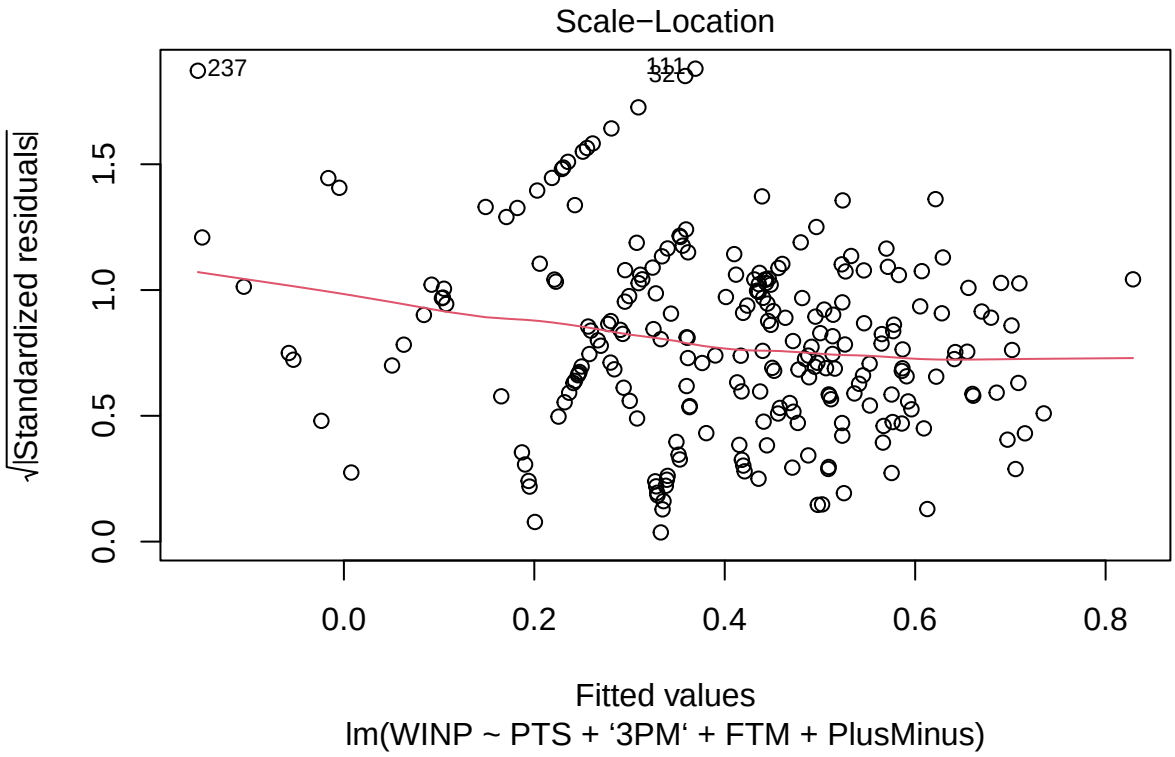
```
###### Modelo 3 #######
plot(modelop3, which = 1)
```



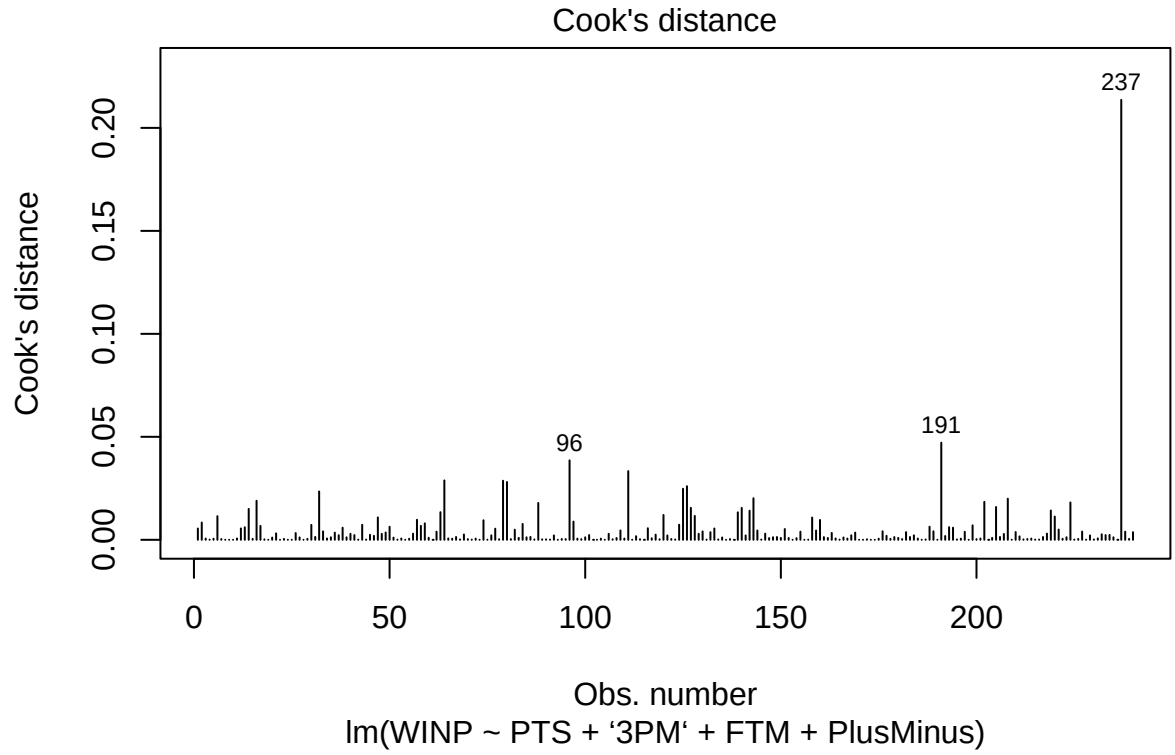

```
plot(modelop3, which = 2)
```



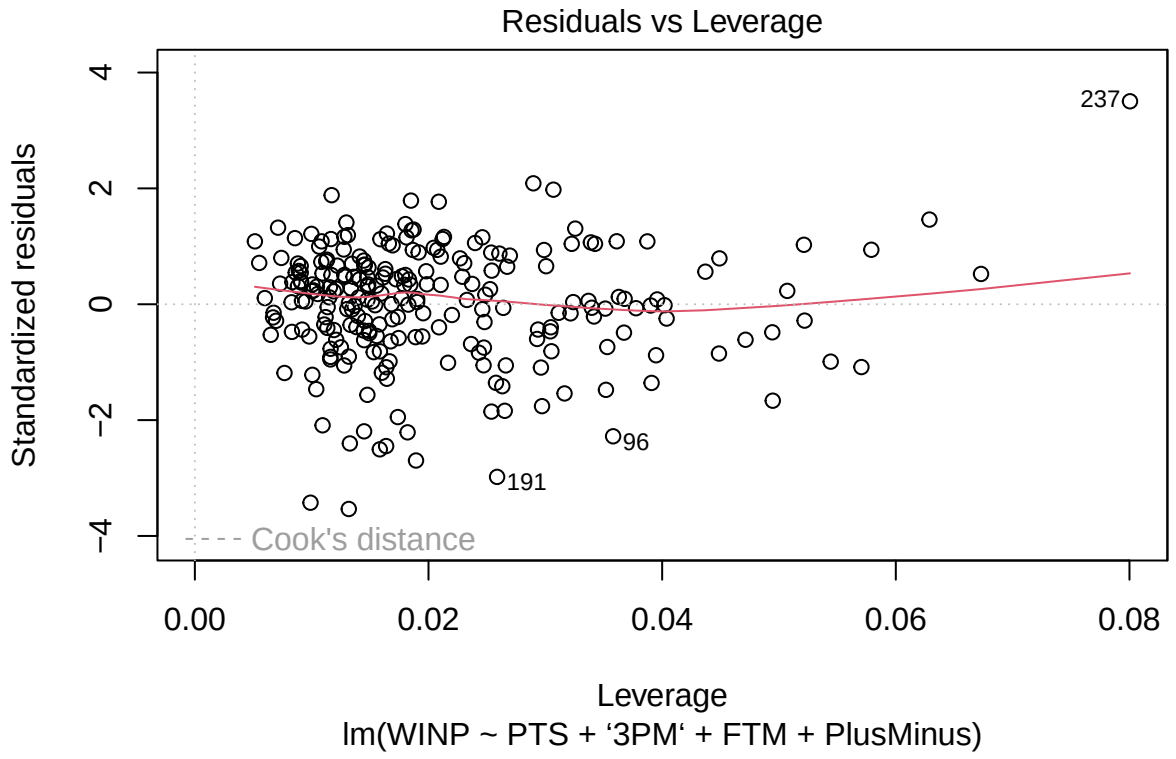

```
plot(modelop3, which = 3)
```



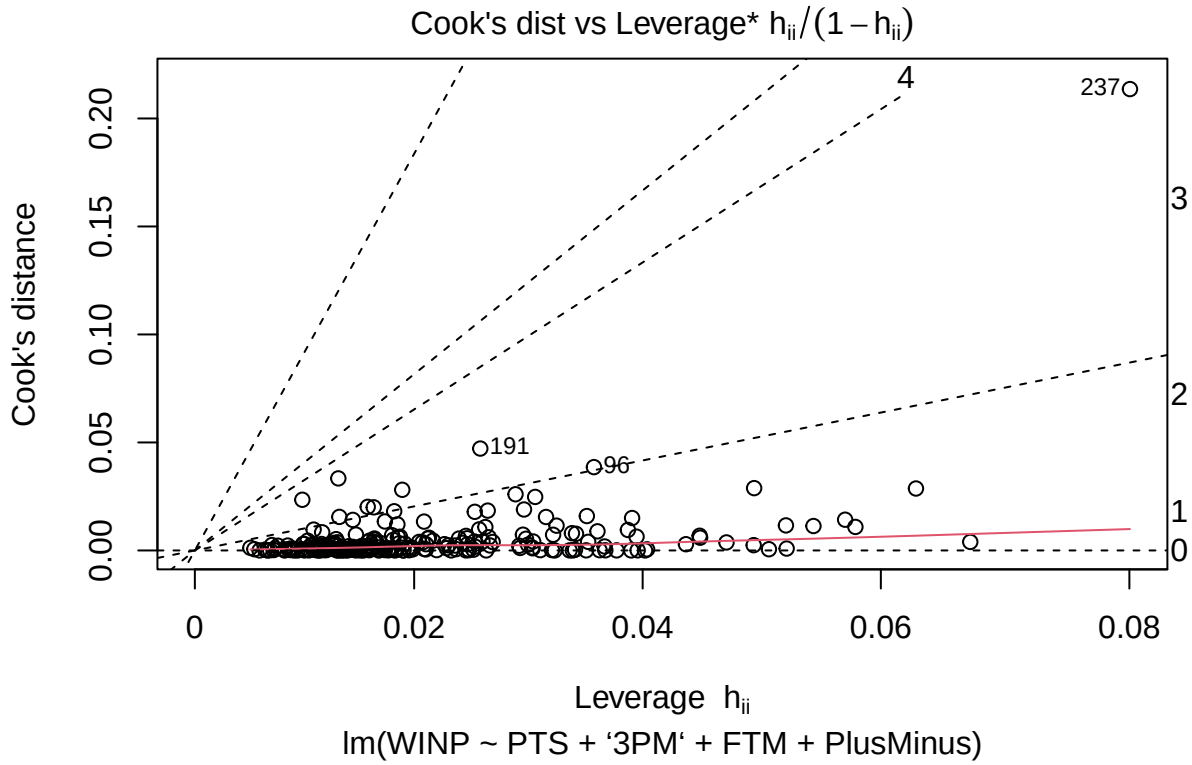

```
plot(modelop3, which = 4)
```




```
plot(modelop3, which = 5)
```




```
plot(modelop3, which = 6)
```




```
shapiro.test(modelop3$residuals) #p-value = 1.682e-05, normal
```

```
##
##  Shapiro-Wilk normality test
```

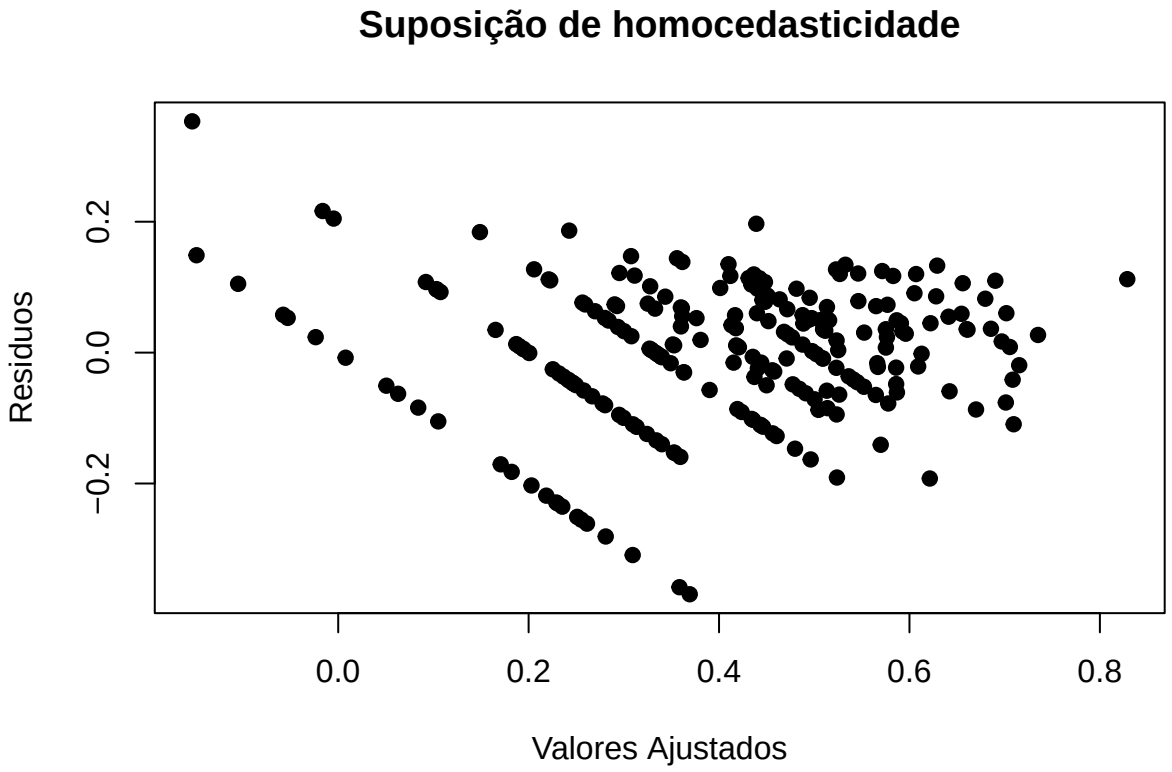
```
##
## data:  modelop3$residuals
## W = 0.9659, p-value = 1.682e-05
```

```
#Teste de durbin watson para independencia
library(lmtest)
dwtest(modelop3) #p-value = 0.07474
```

```
##
##  Durbin-Watson test
##
## data:  modelop3
## DW = 1.8254, p-value = 0.07474
## alternative hypothesis: true autocorrelation is greater than 0
```

```
#Independência
plot(modelop3$residuals,
     ylab = "Residuos",
     xlab = "Index dos Imovéis",
     main = "Suposição de independência",
     pch = 19)
```

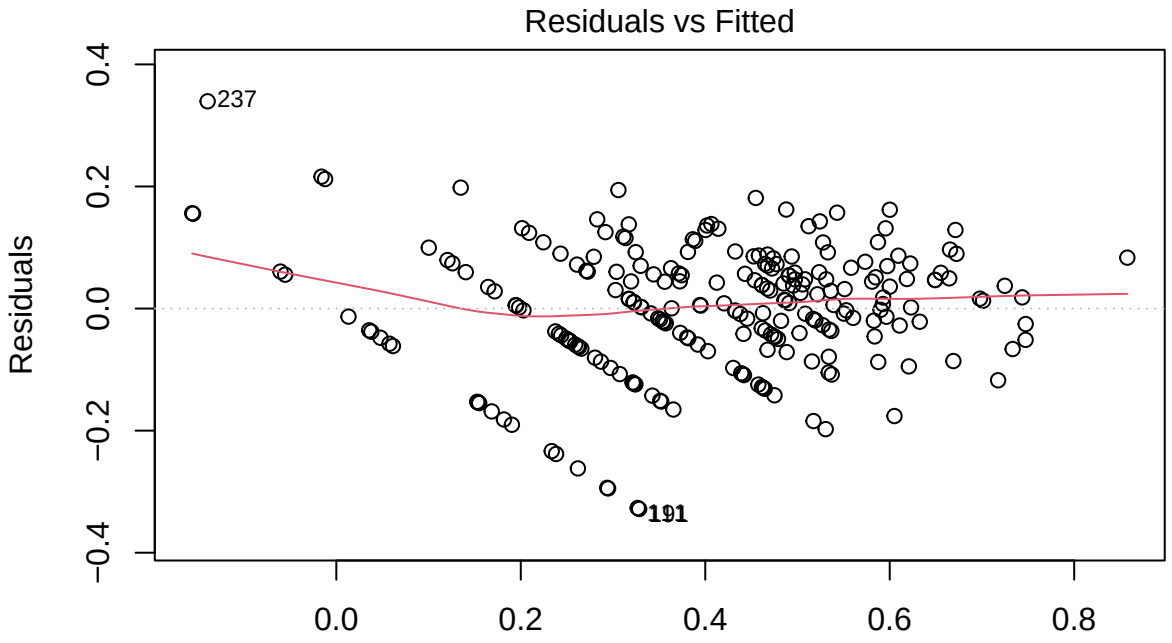

```
#Homocedasticidade
plot(modelop3$fitted.values, modelop3$residuals,
     xlab = "Valores Ajustados",
     ylab = "Residuos",
     pch = 19,
     main = "Suposição de homocedasticidade"
)
```



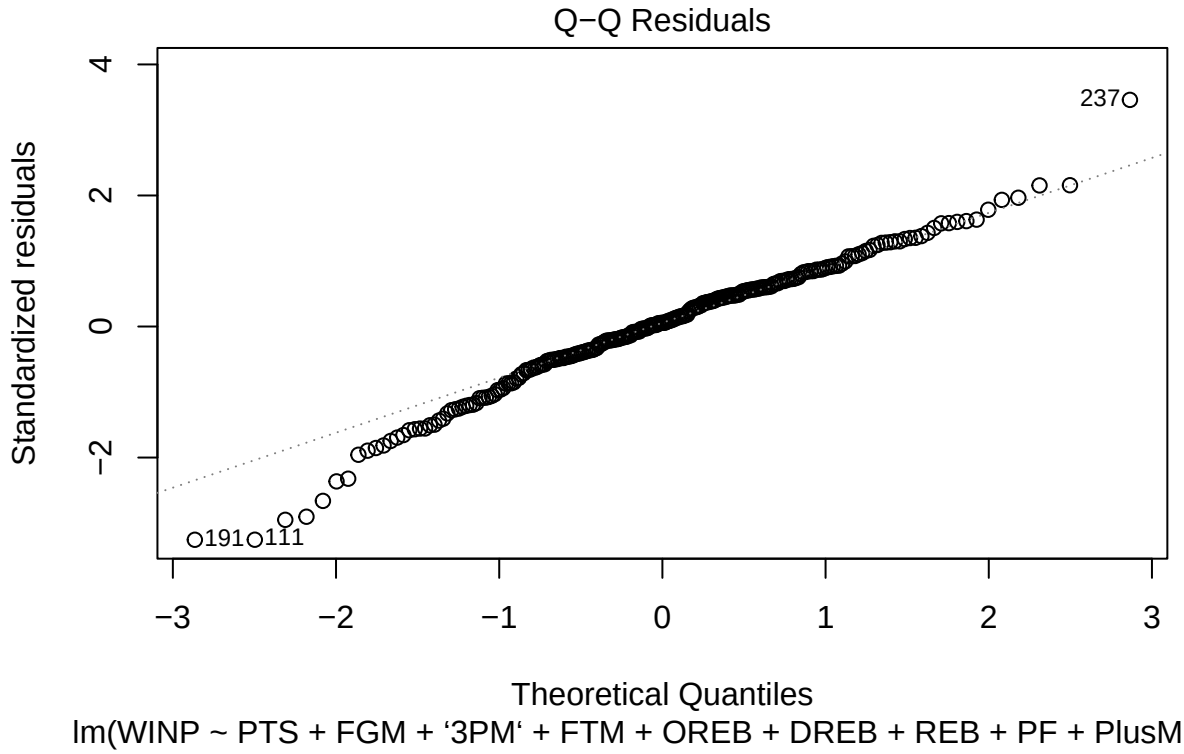

```
#Breusch_Pagan para homocedasticdade
bptest(modelop3) #p-value = 0.001571, heterocedasticidade
```

```
##
##  studentized Breusch-Pagan test
##
## data:  modelop3
## BP = 17.462, df = 4, p-value = 0.001571
```

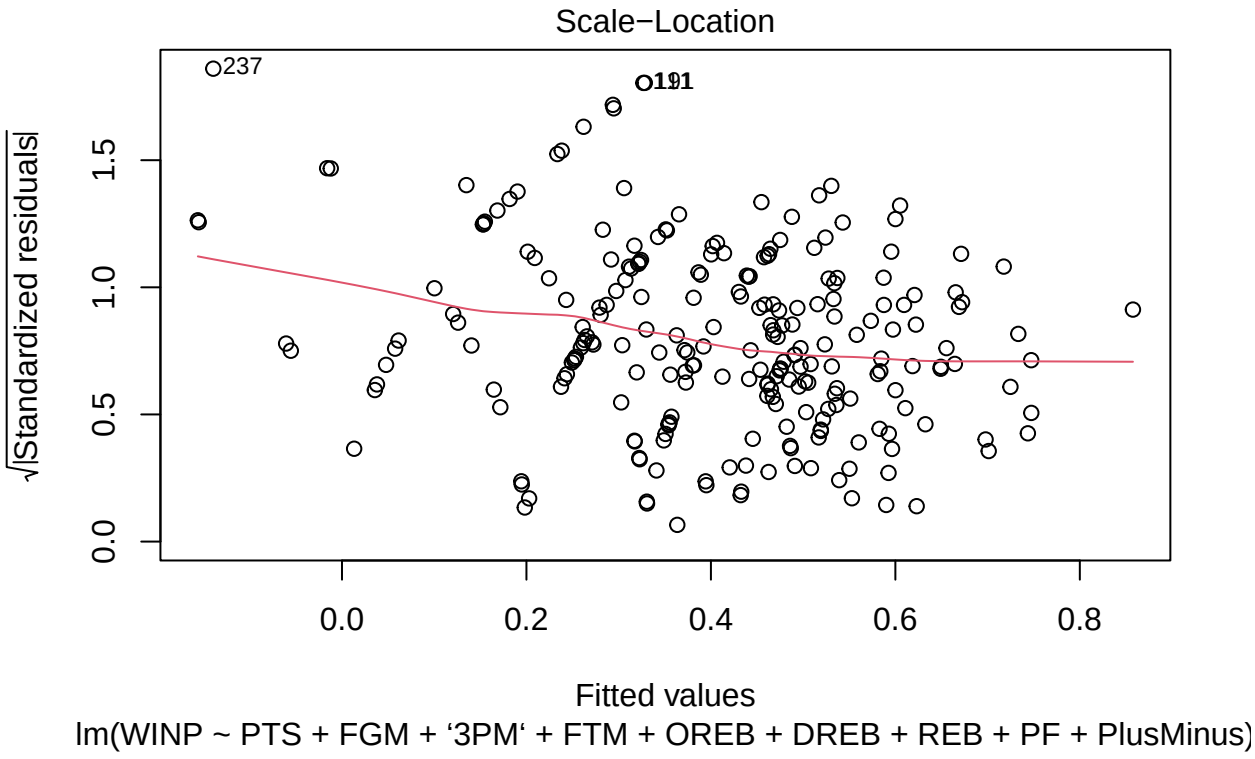
```
###### Modelo 4 #######
plot(modelop4, which = 1)
```



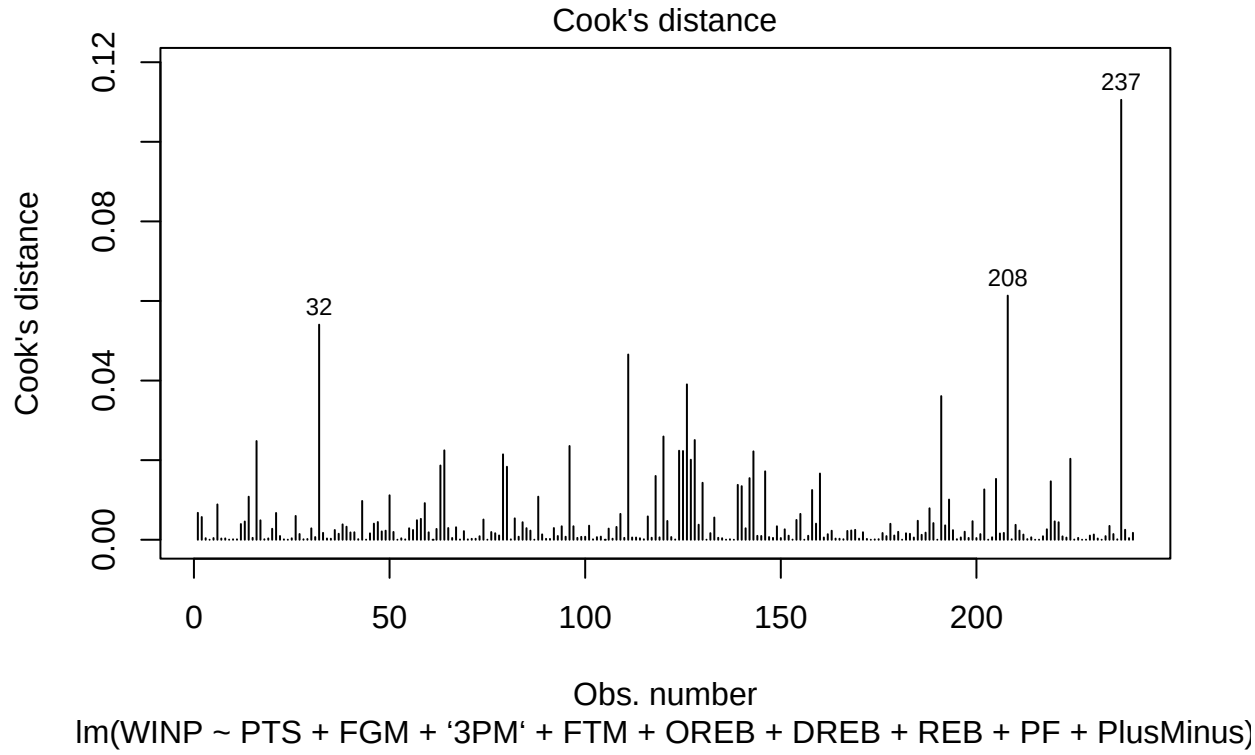

```
plot(modelop4, which = 2)
```



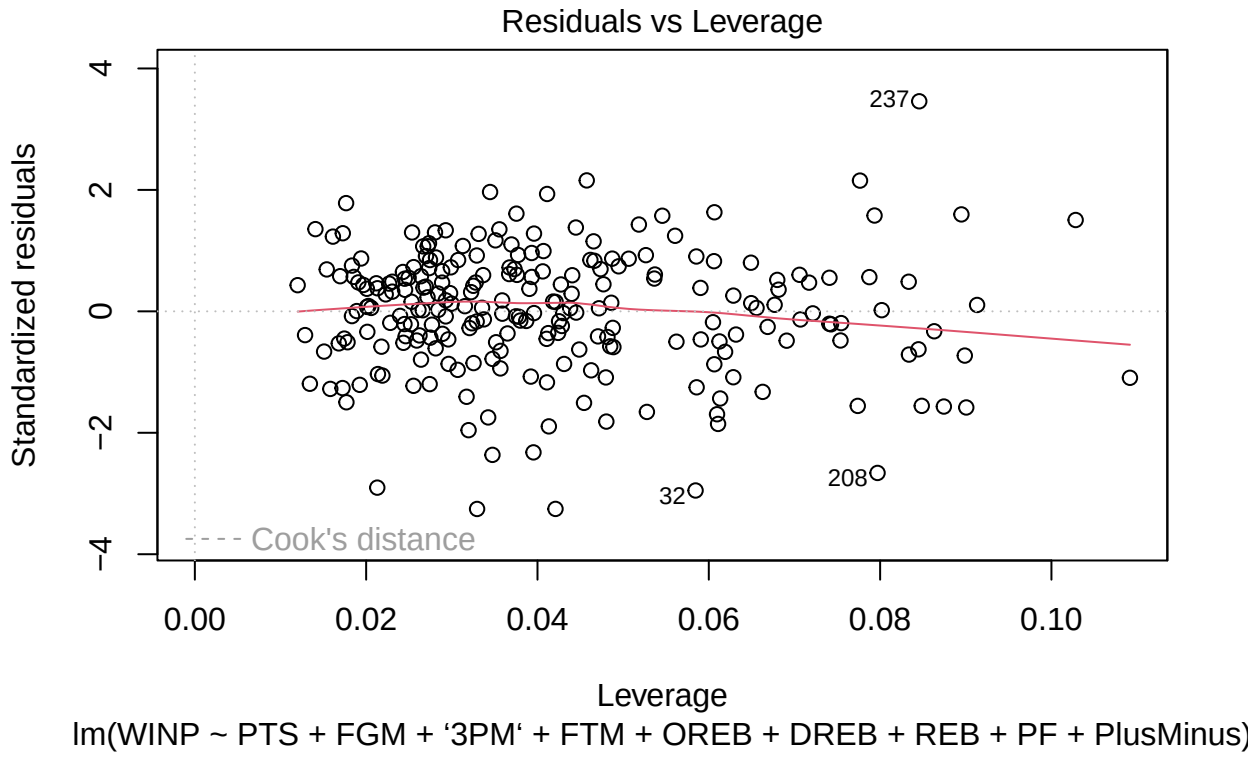

```
plot(modelop4, which = 3)
```



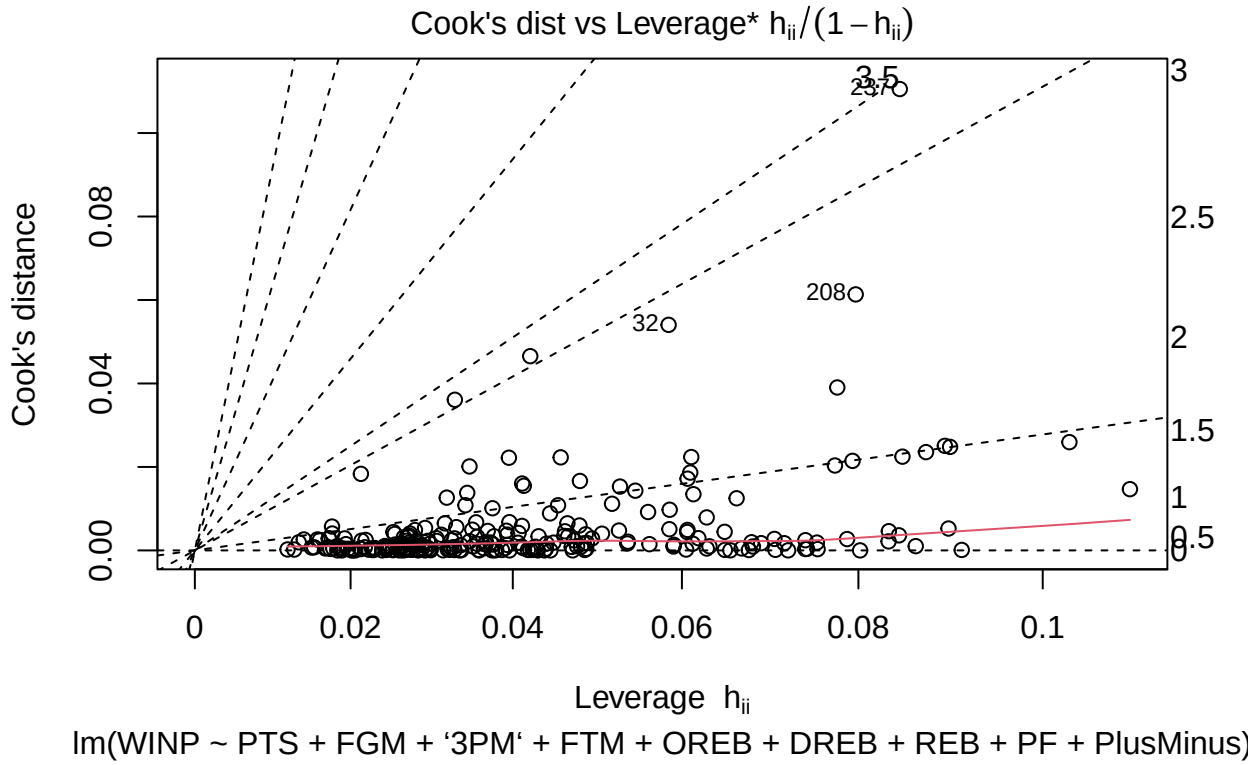

```
plot(modelop4, which = 4)
```




```
plot(modelop4, which = 5)
```




```
plot(modelop4, which = 6)
```




```
shapiro.test(modelop4$residuals) #p-value = 1.682e-05, normal
```

```
##
##  Shapiro-Wilk normality test
```

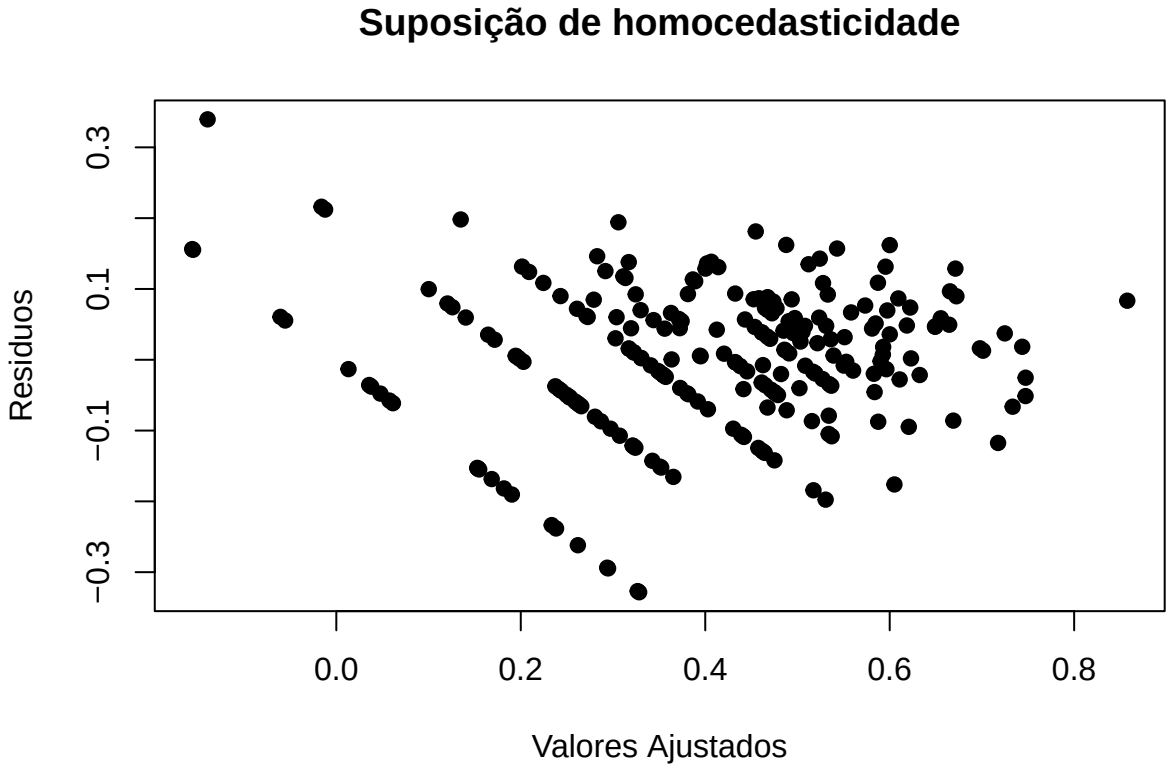
```
##
## data:  modelop4$residuals
## W = 0.98066, p-value = 0.002322
```

```
#Teste de durbin watson para independencia
library(lmtest)
dwtest(modelop4) #p-value = 0.07474
```

```
##
##  Durbin-Watson test
##
## data:  modelop4
## DW = 1.8212, p-value = 0.06851
## alternative hypothesis: true autocorrelation is greater than 0
```

```
#Independência
plot(modelop4$residuals,
     ylab = "Residuos",
     xlab = "Index dos Imovéis",
     main = "Suposição de independência",
     pch = 19)
```

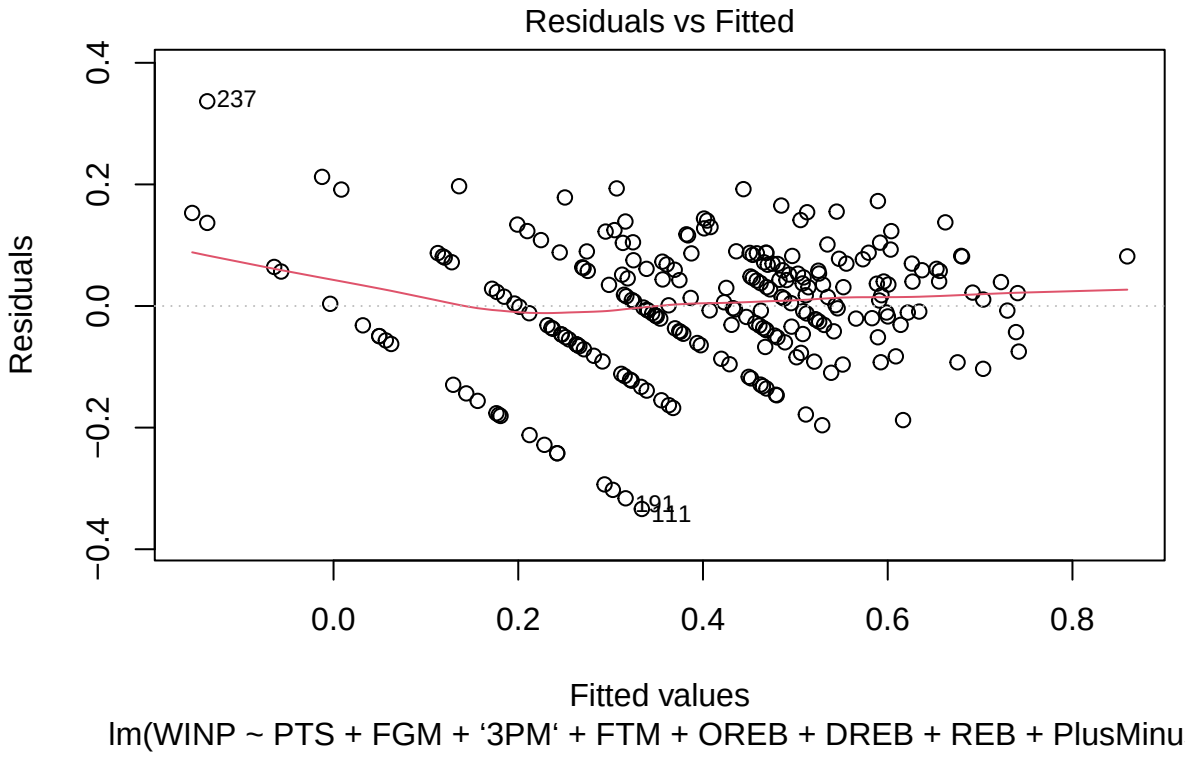

```
#Homocedasticidade
plot(modelop4$fitted.values, modelop4$residuals,
     xlab = "Valores Ajustados",
     ylab = "Residuos",
     pch = 19,
     main = "Suposição de homocedasticidade"
)
```



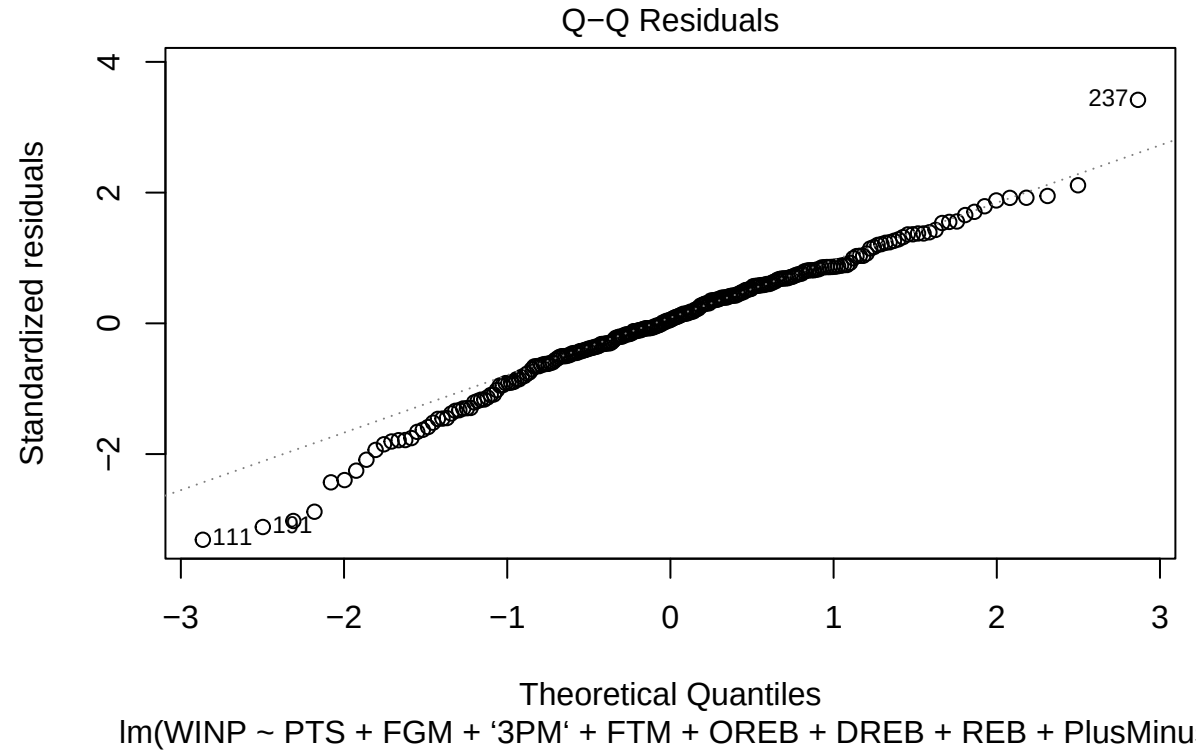

```
#Breusch_Pagan para homocedasticdade
bptest(modelop4) #p-value = 0.001571, heterocedasticidade
```

```
##
##  studentized Breusch-Pagan test
##
## data:  modelop4
## BP = 28.562, df = 9, p-value = 0.0007679
```

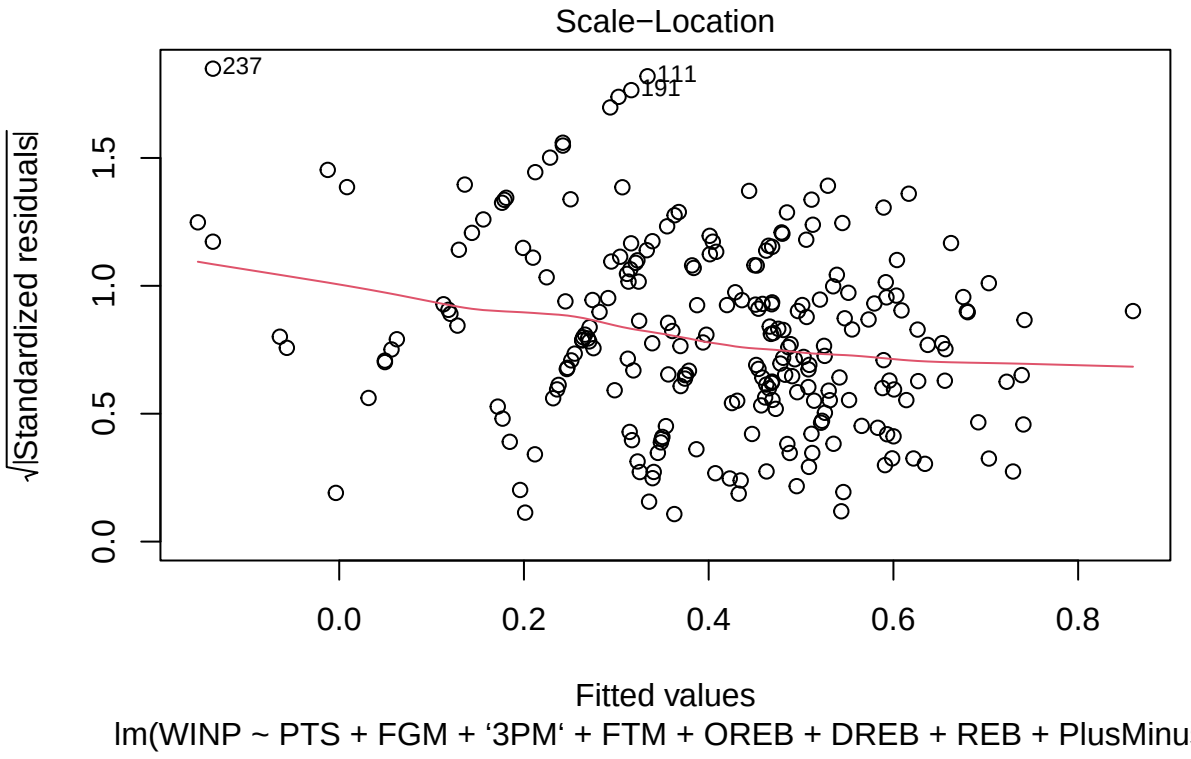
```
###### Modelo 5 #######
plot(modelop5, which = 1)
```



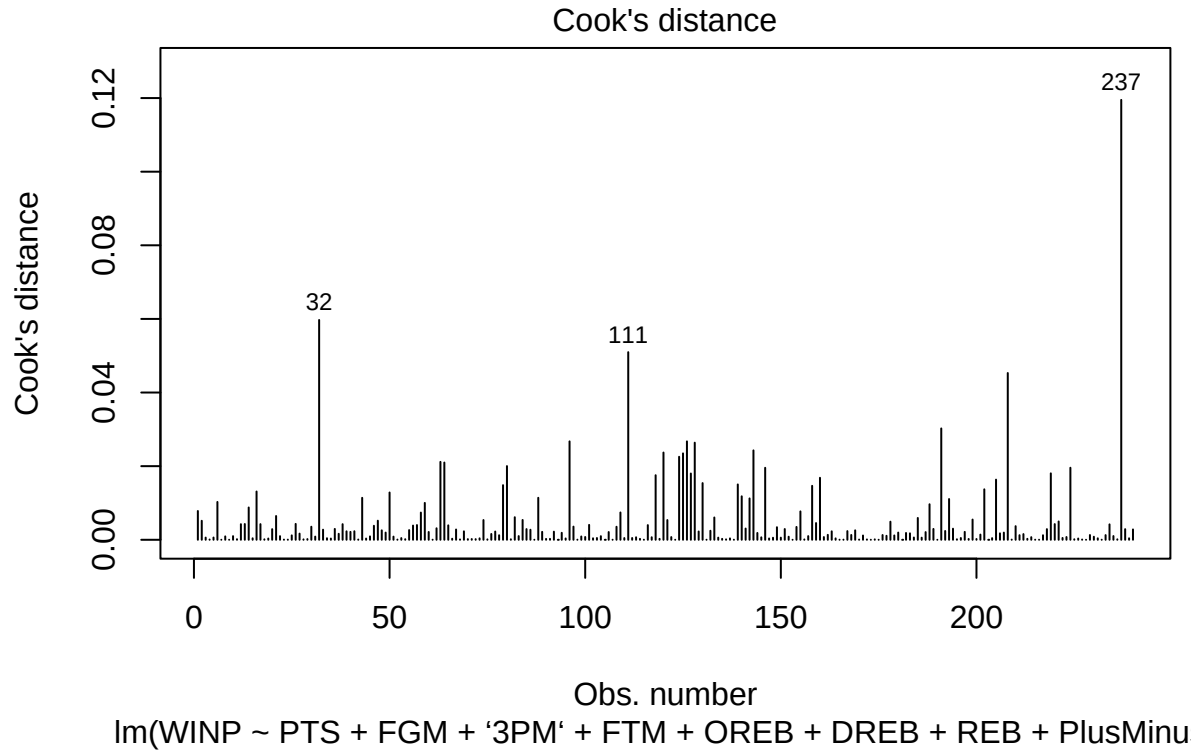

```
plot(modelop5, which = 2)
```



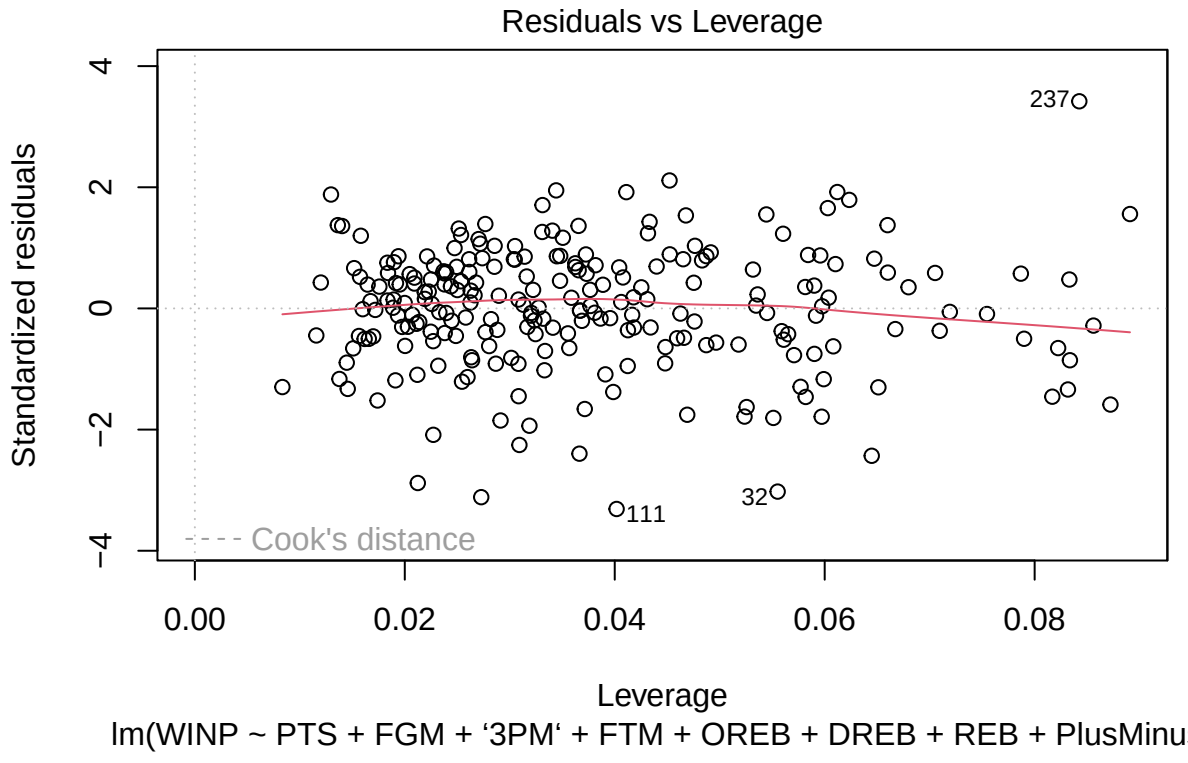

```
plot(modelop5, which = 3)
```



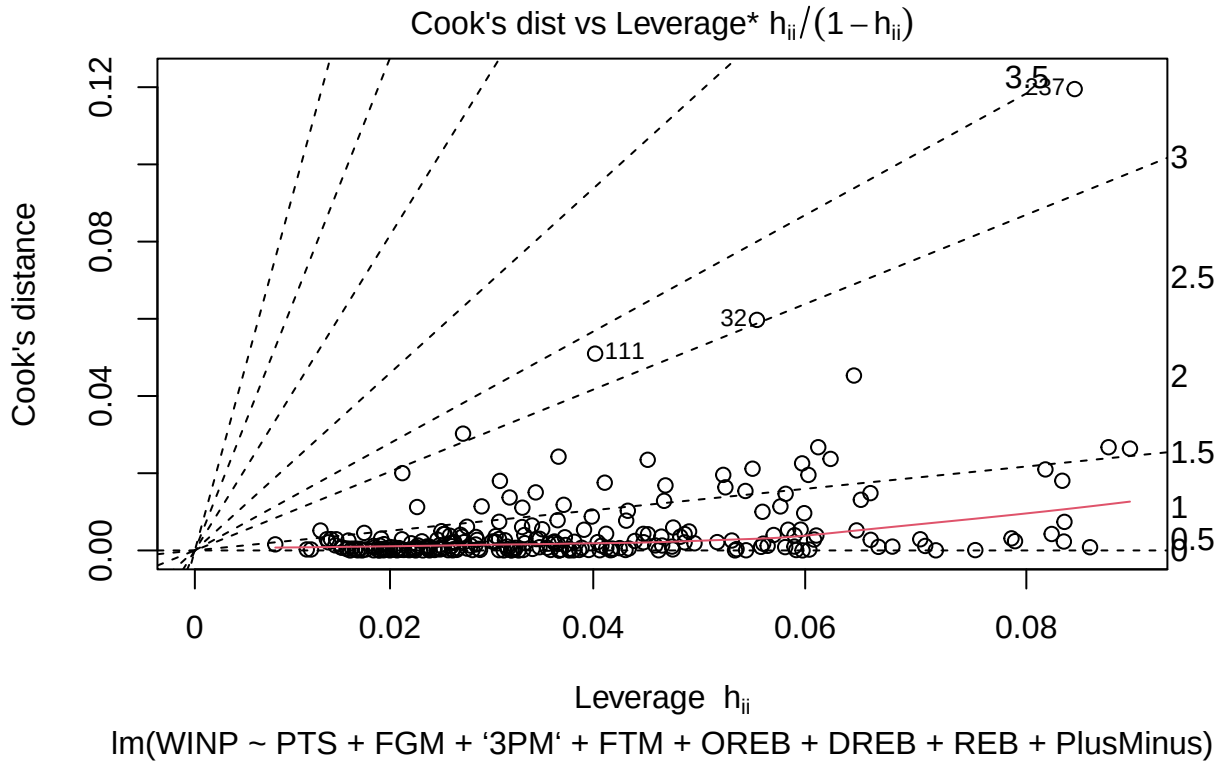

```
plot(modelop5, which = 4)
```




```
plot(modelop5, which = 5)
```




```
plot(modelop5, which = 6)
```




```
shapiro.test(modelop5$residuals) #p-value = 1.682e-05, normal
```

```
##
##  Shapiro-Wilk normality test
```

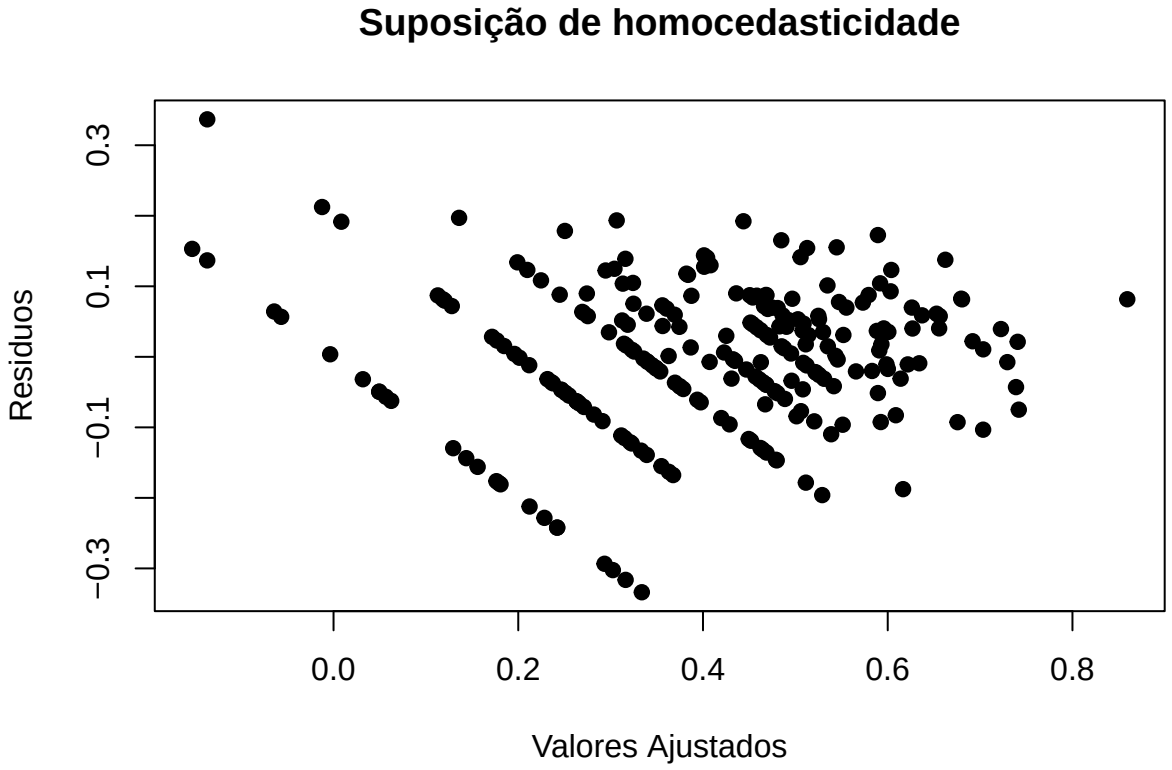
```
##
## data:  modelop5$residuals
## W = 0.98156, p-value = 0.003262
```

```
#Teste de durbin watson para independencia
library(lmtest)
dwtest(modelop5) #p-value = 0.07474
```

```
##
##  Durbin-Watson test
##
## data:  modelop5
## DW = 1.8006, p-value = 0.04952
## alternative hypothesis: true autocorrelation is greater than 0
```

```
#Independência
plot(modelop5$residuals,
     ylab = "Residuos",
     xlab = "Index dos Imovéis",
     main = "Suposição de independência",
     pch = 19)
```

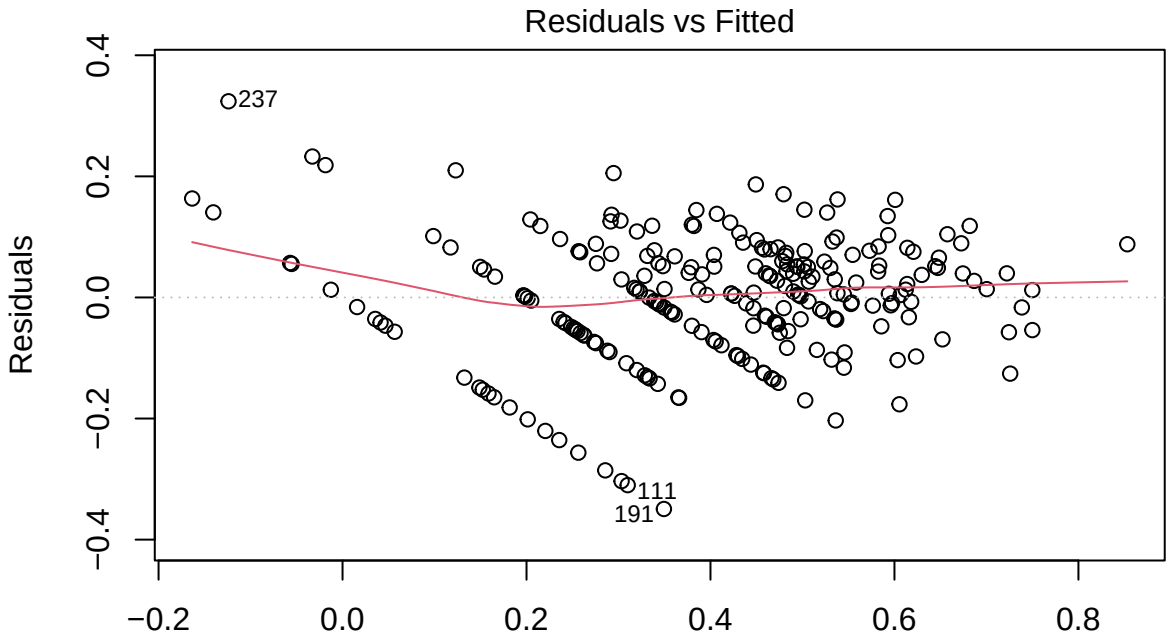

```
#Homocedasticidade
plot(modelop5$fitted.values, modelop5$residuals,
     xlab = "Valores Ajustados",
     ylab = "Residuos",
     pch = 19,
     main = "Suposição de homocedasticidade"
)
```



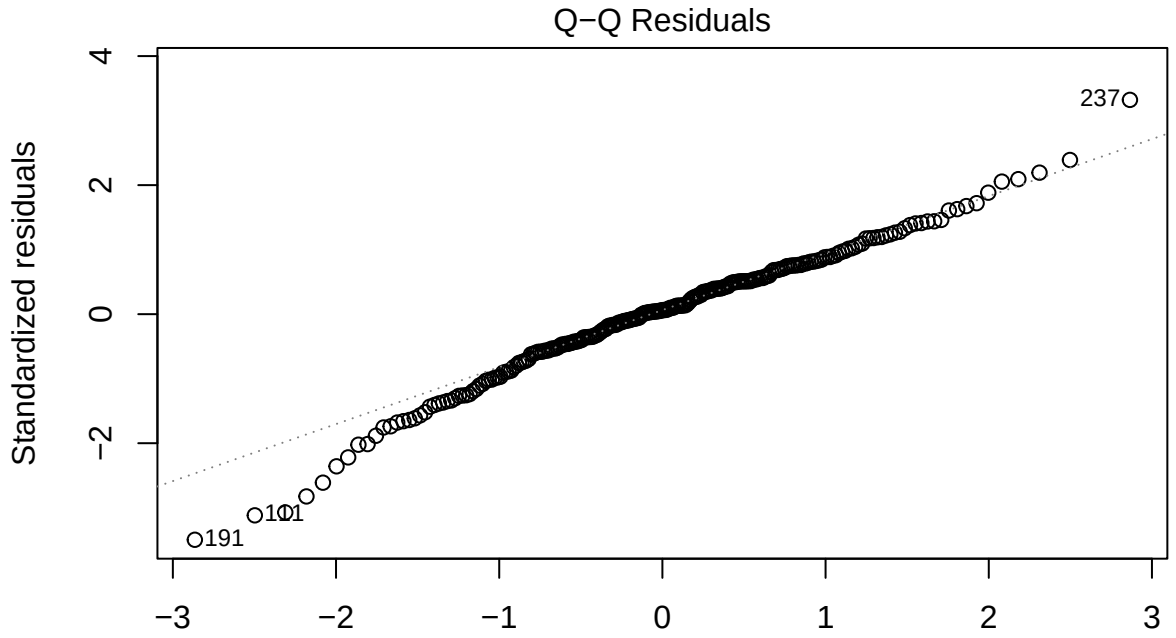

```
#Breusch_Pagan para homocedasticdade
bptest(modelop5) #p-value =
```

```
##
##  studentized Breusch-Pagan test
##
## data:  modelop5
## BP = 27.098, df = 8, p-value = 0.0006799
```

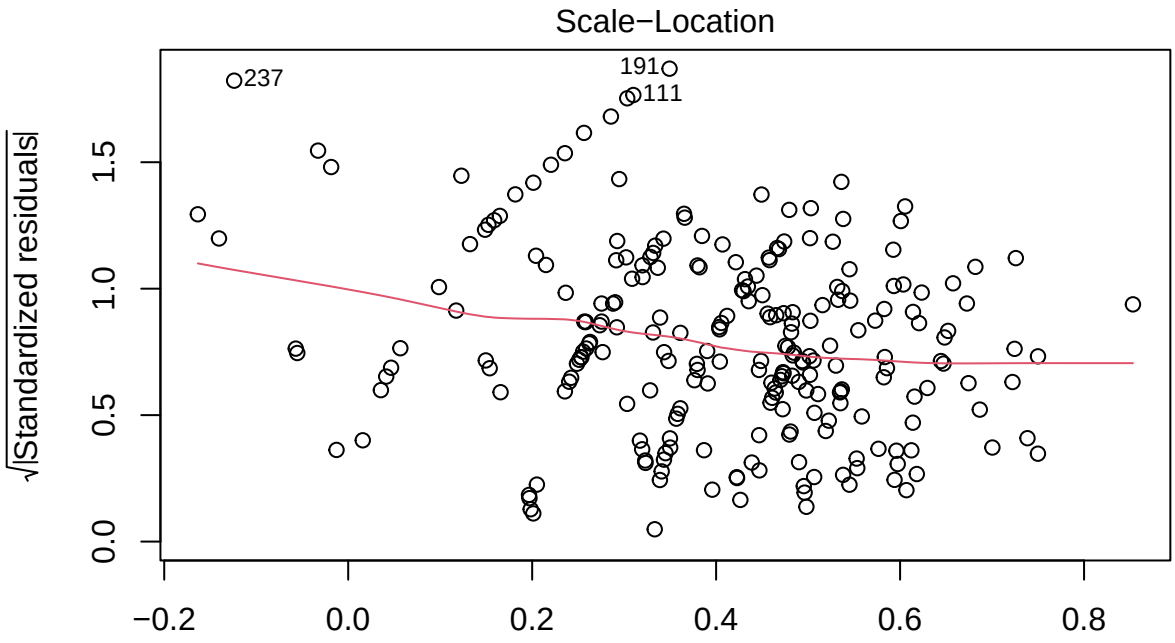
```
#### Backward ##########
plot(modelo_backp, which = 1)
```



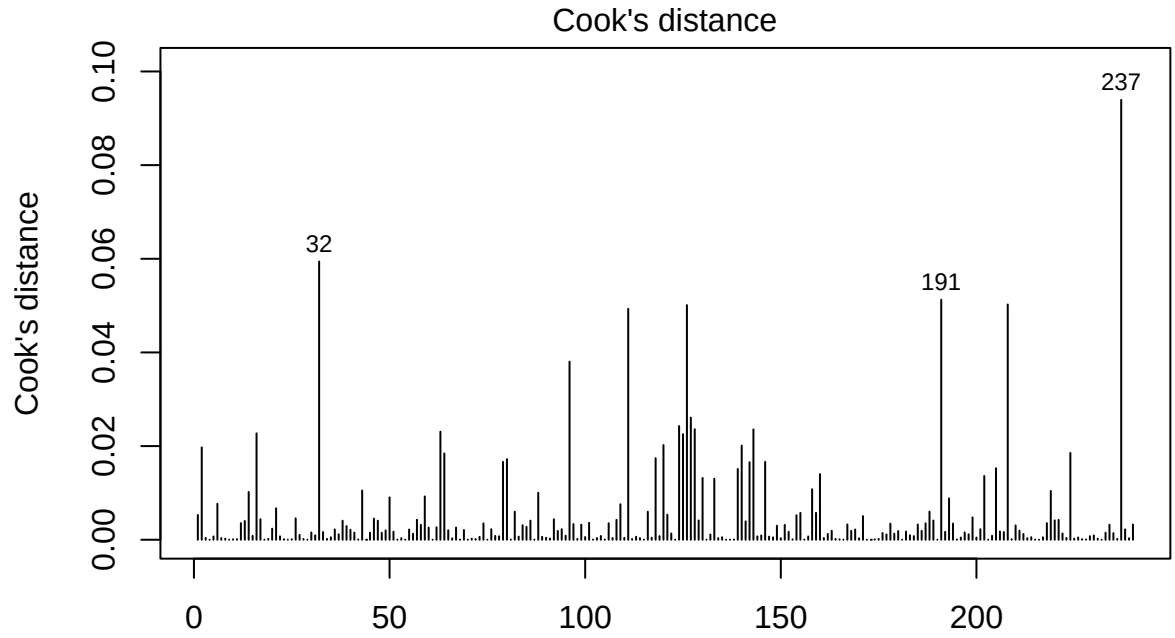

```
plot(modelo_backp, which = 2)
```



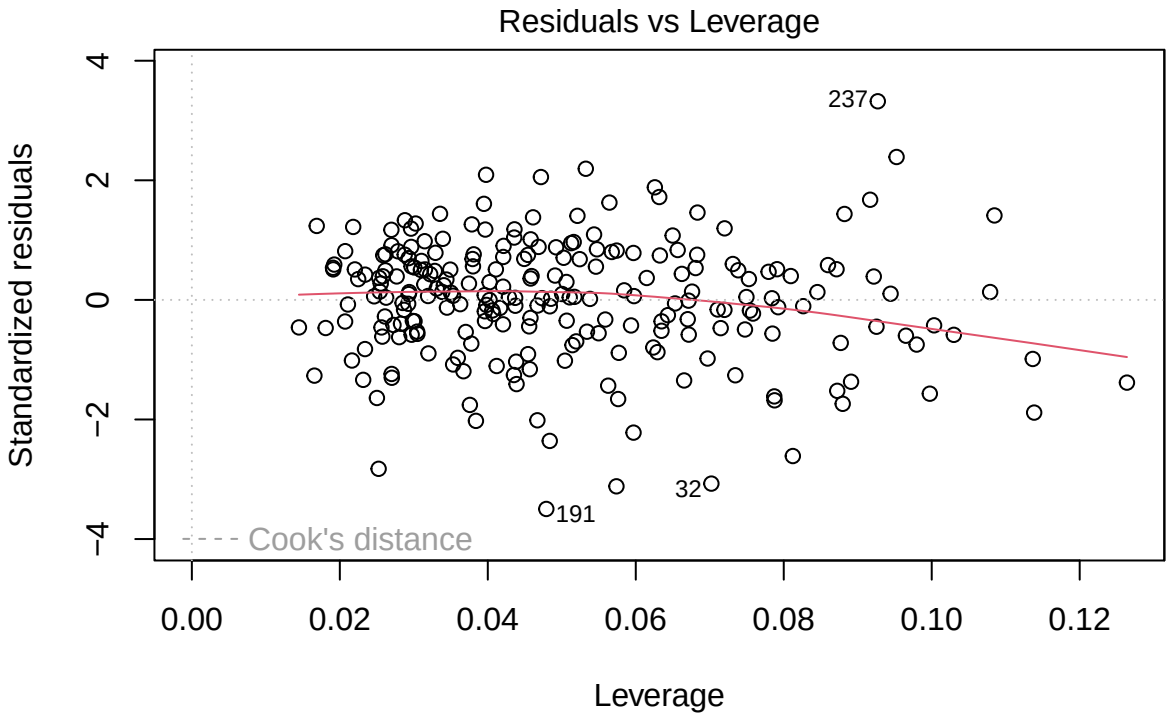

```
plot(modelo_backp, which = 3)
```



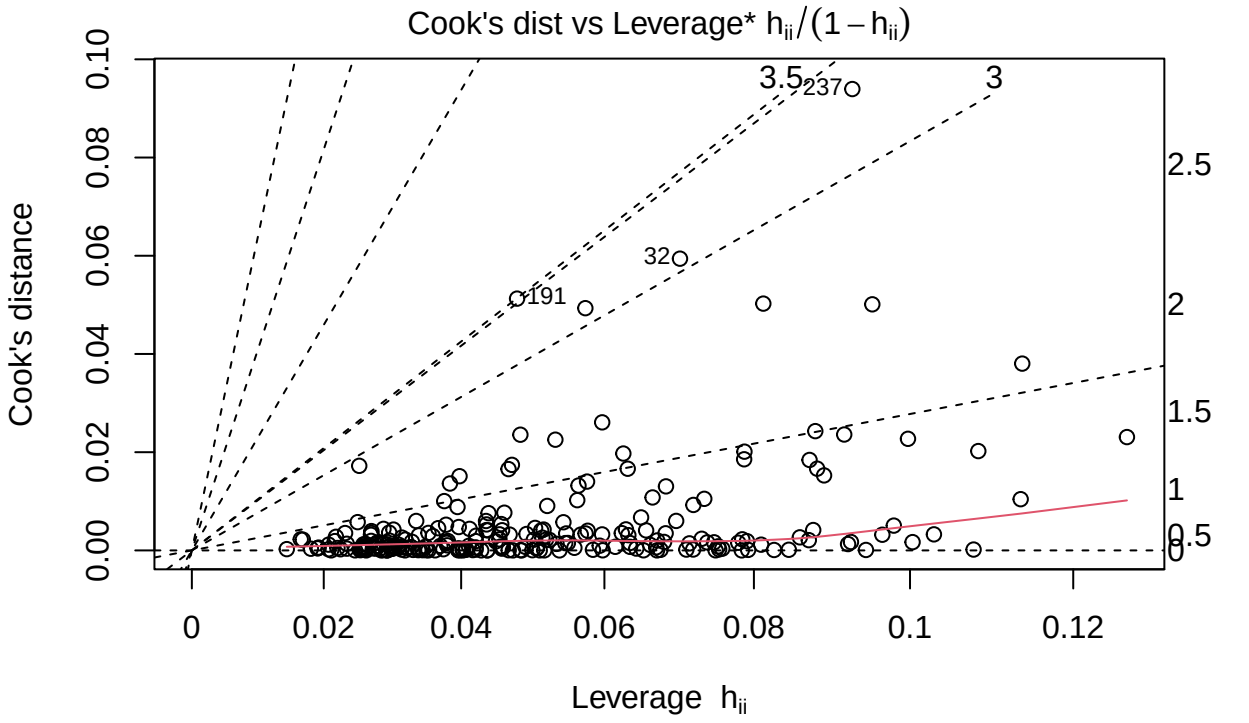

```
plot(modelo_backp, which = 4)
```




```
plot(modelo_backp, which = 5)
```




```
plot(modelo_backp, which = 6)
```




```
shapiro.test(modelo_backp$residuals) #p-value = 0.002993,não normal
```

```
##
##  Shapiro-Wilk normality test
```

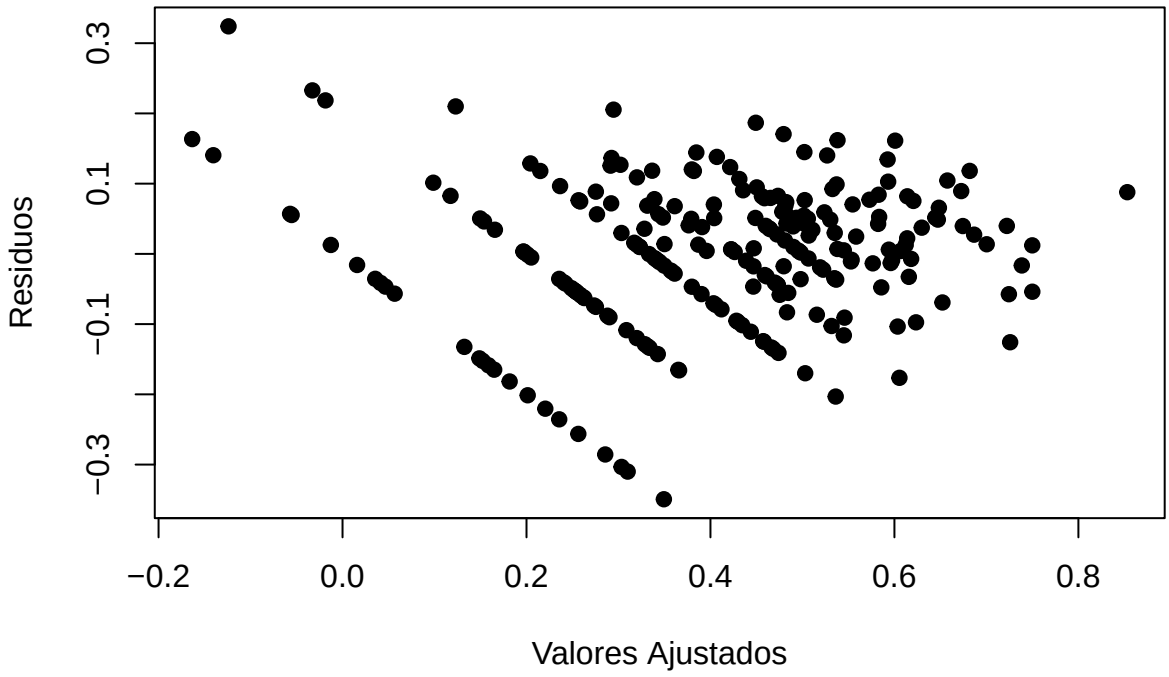
```
##
## data:  modelo_backp$residuals
## W = 0.98133, p-value = 0.002993
```

```
#Teste de durbin watson para independencia
library(lmtest)
dwtest(modelo_backp) #p-value = 0.07689
```

```
##
##  Durbin-Watson test
##
## data:  modelo_backp
## DW = 1.8299, p-value = 0.07689
## alternative hypothesis: true autocorrelation is greater than 0
```

```
#Independência
plot(modelo_backp$residuals,
     ylab = "Residuos",
     xlab = "Index dos Imovéis",
     main = "Suposição de independência",
     pch = 19)
```

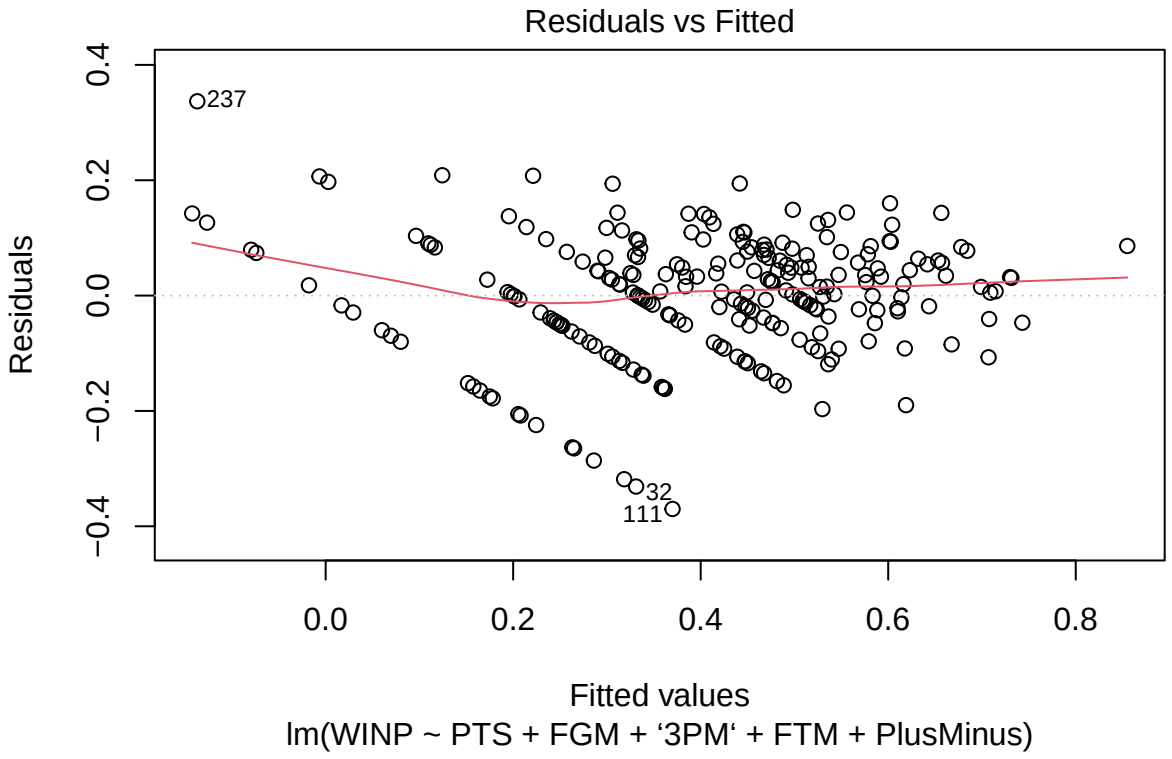

```
#Homocedasticidade
plot(modelo_backp$fitted.values, modelo_backp$residuals,
     xlab = "Valores Ajustados",
     ylab = "Residuos",
     pch = 19,
     main = "Suposição de homocedasticidade"
)
```



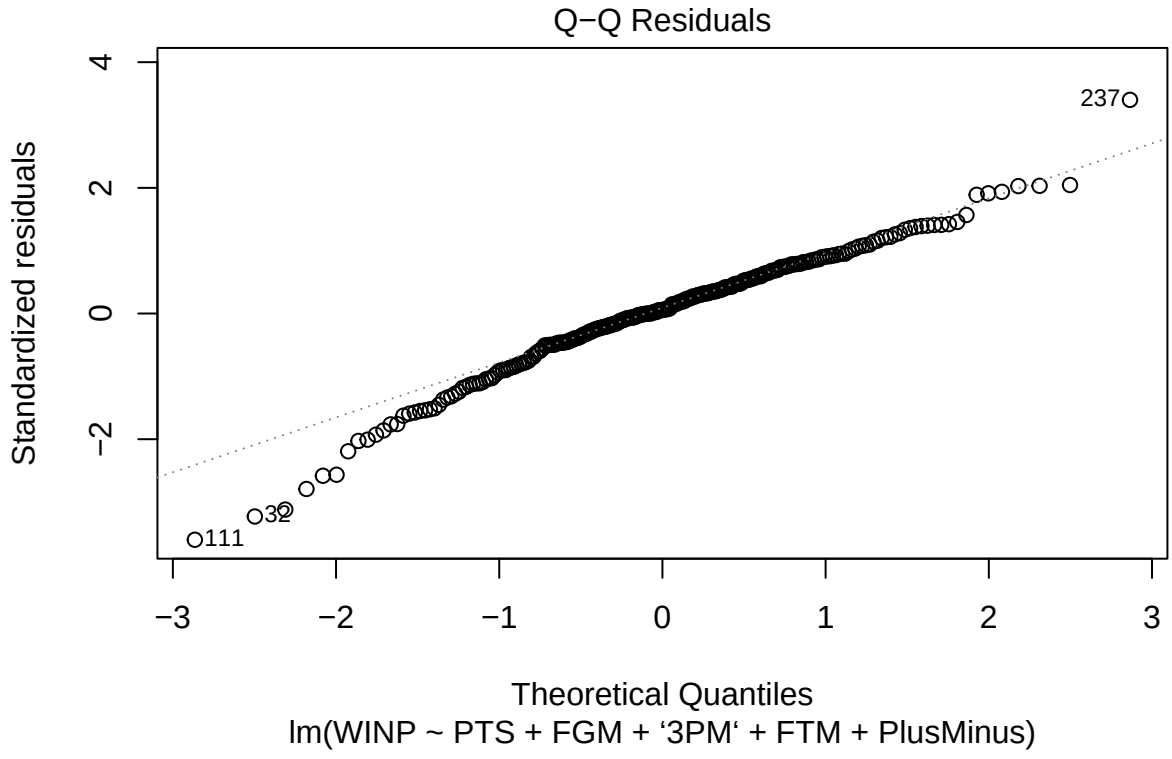

```
#Breusch_Pagan para homocedasticdade
bptest(modelo_backp) #p-value = 0.002445, heterocedasticidade
```

```
##
##  studentized Breusch-Pagan test
##
## data:  modelo_backp
## BP = 28.792, df = 11, p-value = 0.002445
```

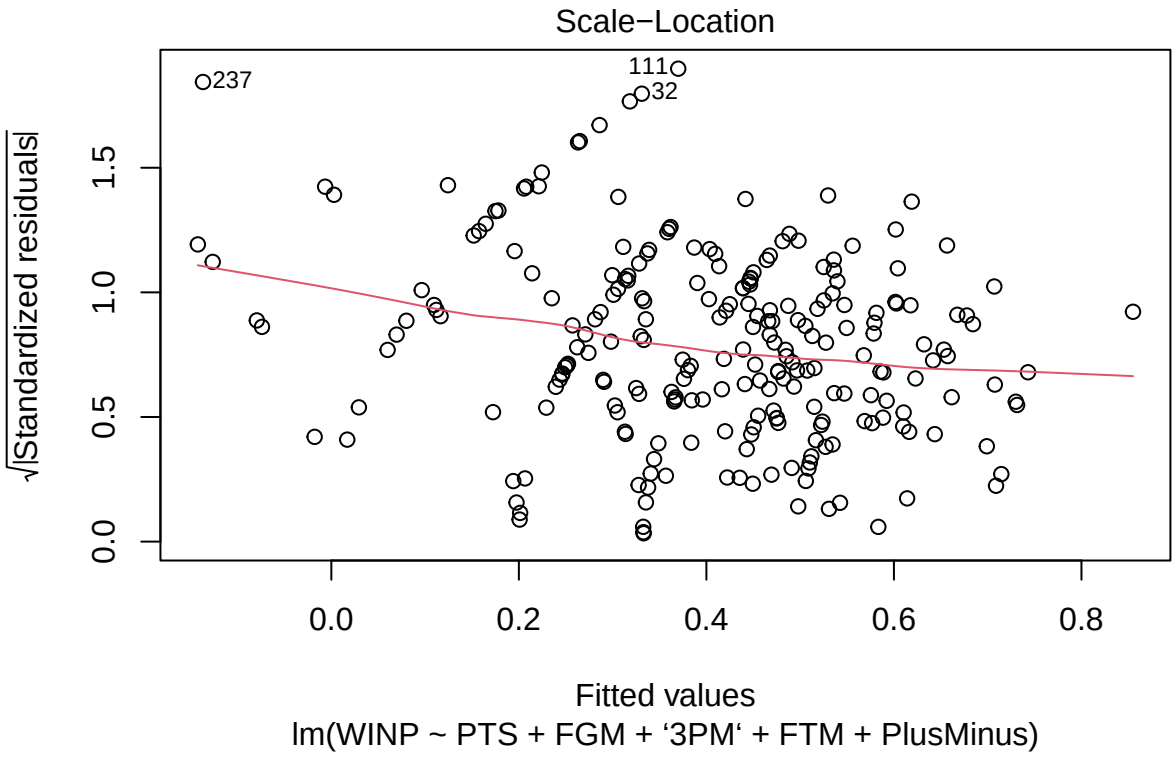
```
#### Backward 5% ##########
plot(modelo_backp1, which = 1)
```



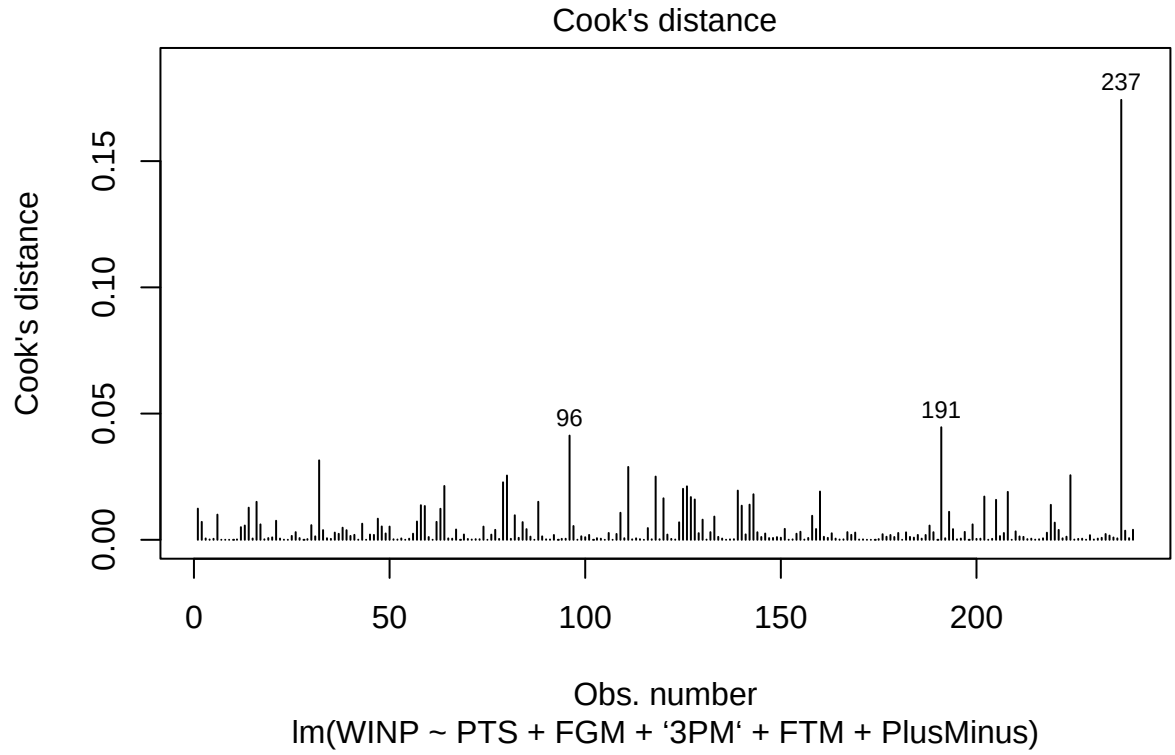

```
plot(modelo_backp1, which = 2)
```



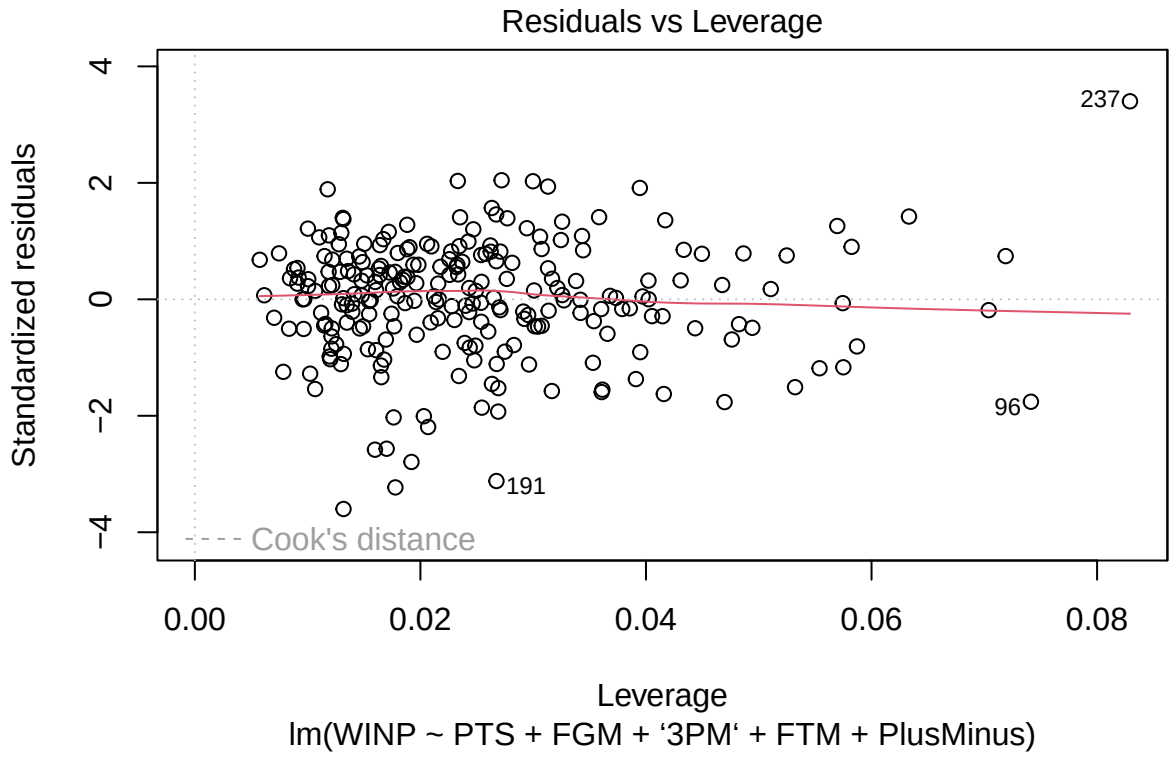

```
plot(modelo_backp1, which = 3)
```



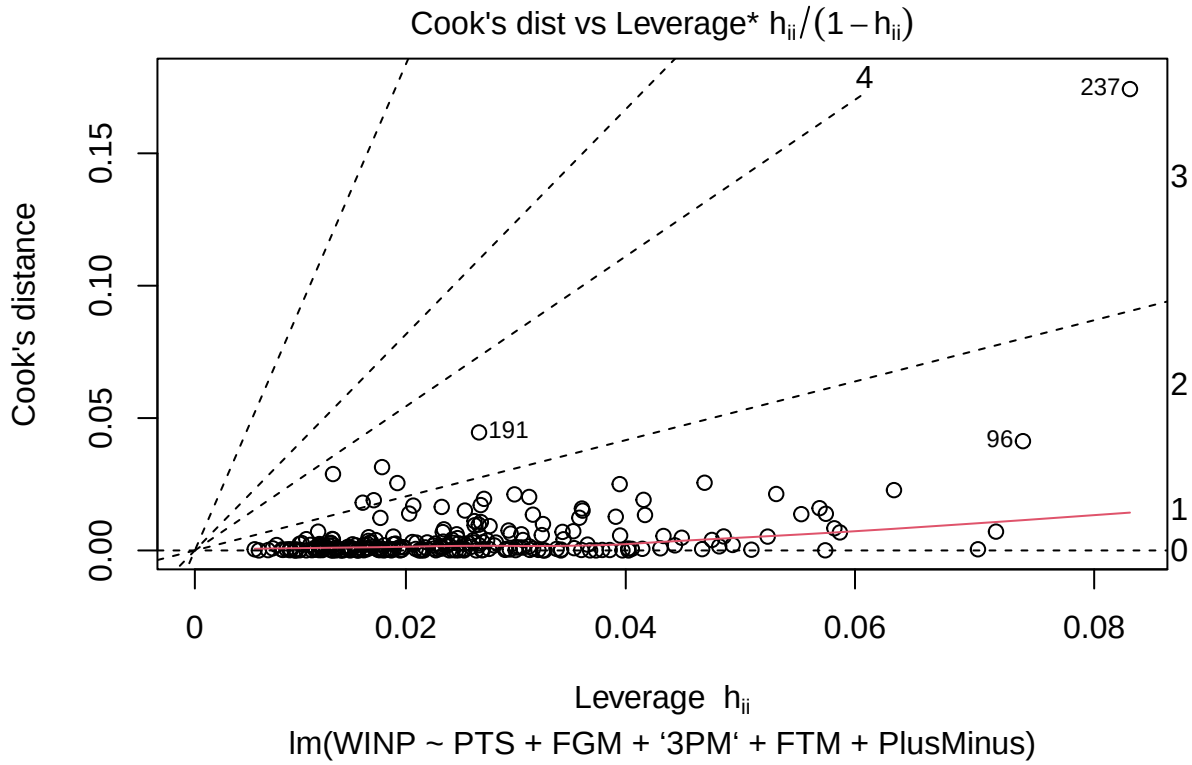

```
plot(modelo_backp1, which = 4)
```




```
plot(modelo_backp1, which = 5)
```




```
plot(modelo_backp1, which = 6)
```




```
shapiro.test(modelo_backp1$residuals) #p-value = 0.002993,não normal
```

```
##
##  Shapiro-Wilk normality test
```

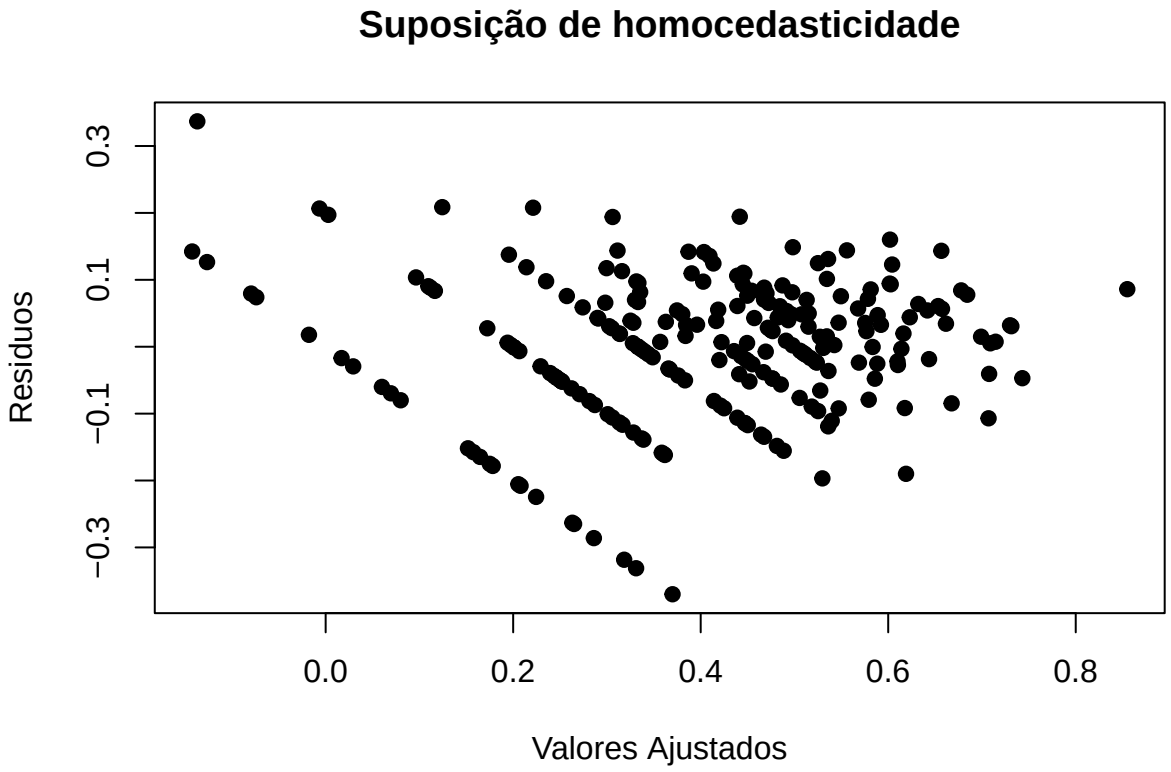
```
##
## data:  modelo_backp1$residuals
## W = 0.97529, p-value = 0.0003381
```

```
#Teste de durbin watson para independencia
library(lmtest)
dwtest(modelo_backp1) #p-value = 0.07689
```

```
##
##  Durbin-Watson test
##
## data:  modelo_backp1
## DW = 1.788, p-value = 0.04164
## alternative hypothesis: true autocorrelation is greater than 0
```

```
#Independência
plot(modelo_backp1$residuals,
     ylab = "Residuos",
     xlab = "Index dos Imovéis",
     main = "Suposição de independência",
     pch = 19)
```

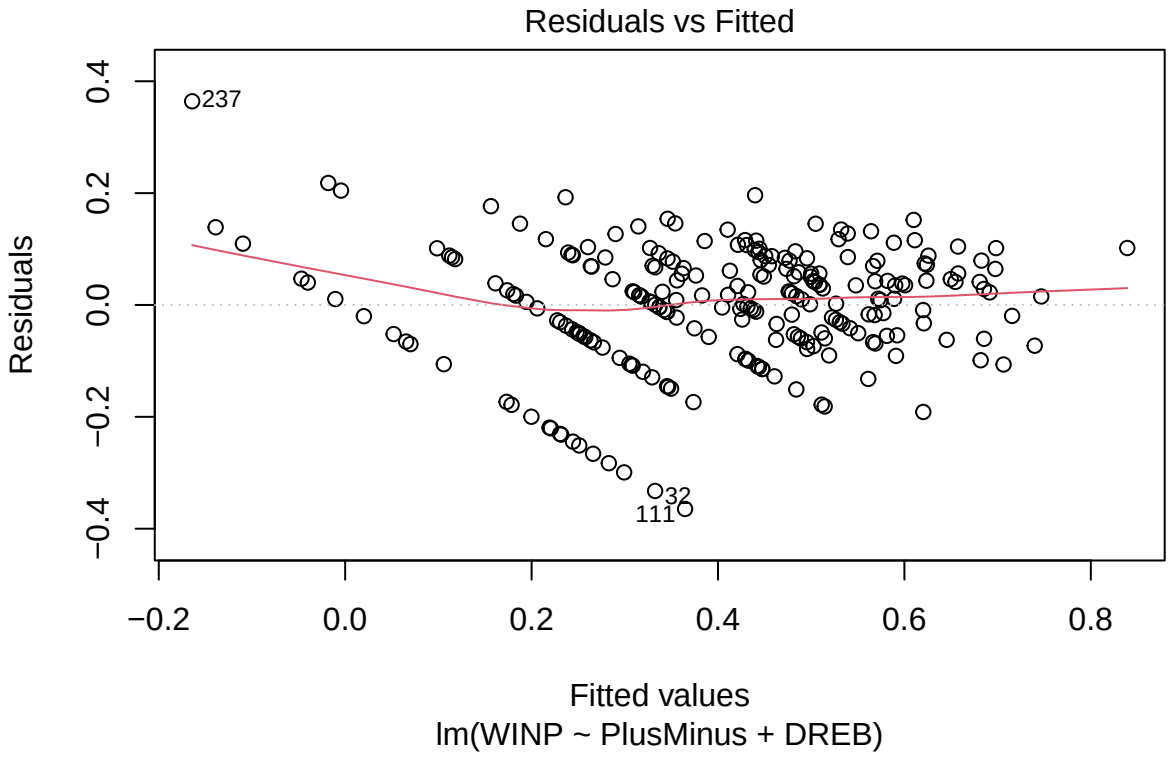

```
#Homocedasticidade
plot(modelo_backp1$fitted.values, modelo_backp1$residuals,
     xlab = "Valores Ajustados",
     ylab = "Residuos",
     pch = 19,
     main = "Suposição de homocedasticidade"
)
```



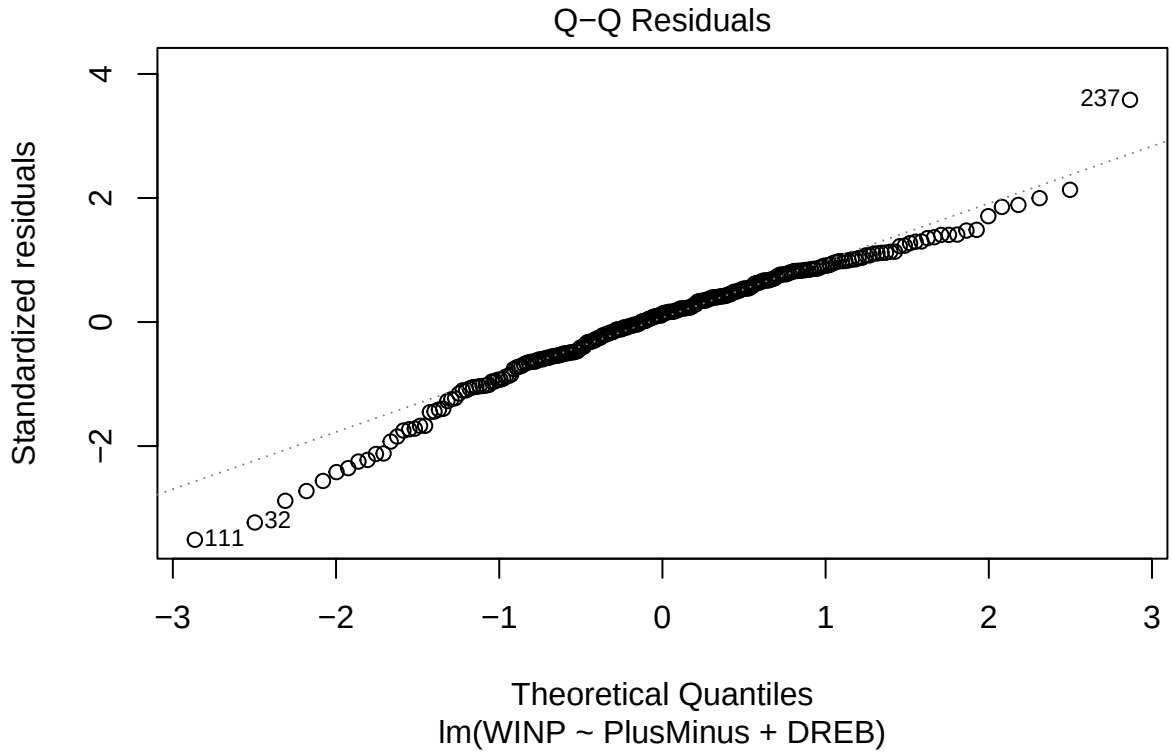

```
#Breusch_Pagan para homocedasticdade
bptest(modelo_backp1) #p-value = 0.002445, heterocedasticidade
```

```
##
##  studentized Breusch-Pagan test
##
## data:  modelo_backp1
## BP = 20.276, df = 5, p-value = 0.001109
```

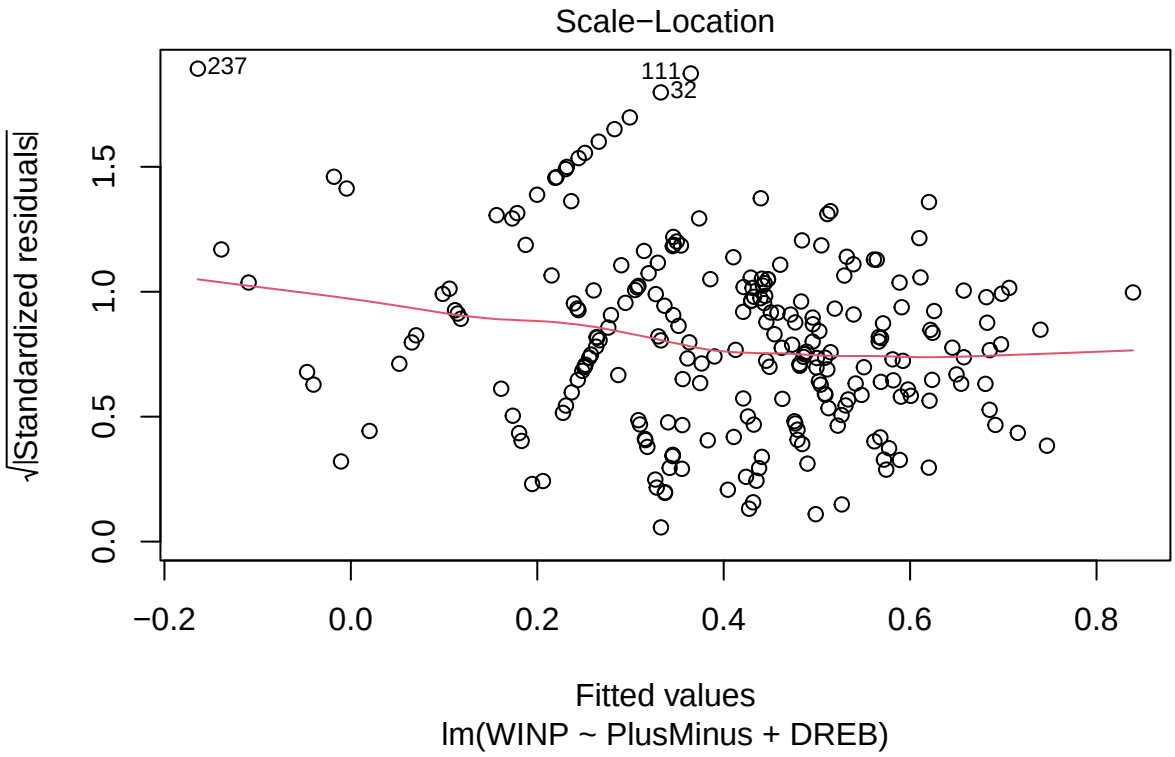
```
#### Forward ######
plot(modelo_forwp, which = 1)
```



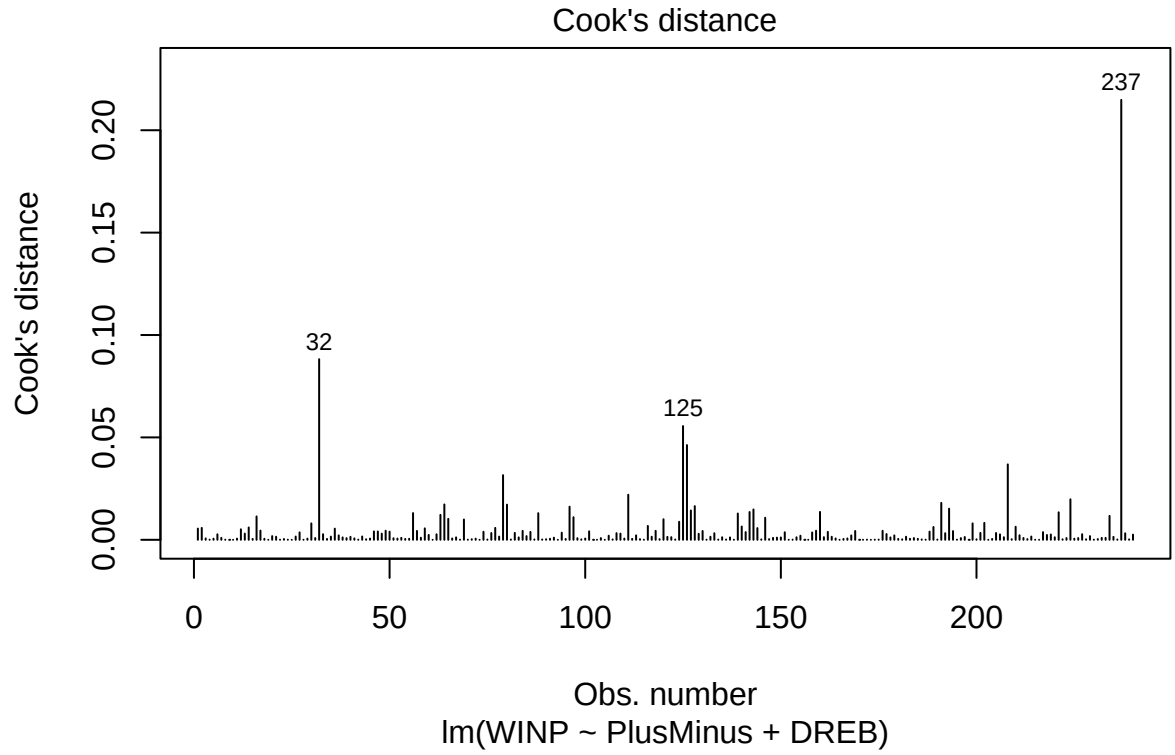

```
plot(modelo_forwp, which = 2)
```



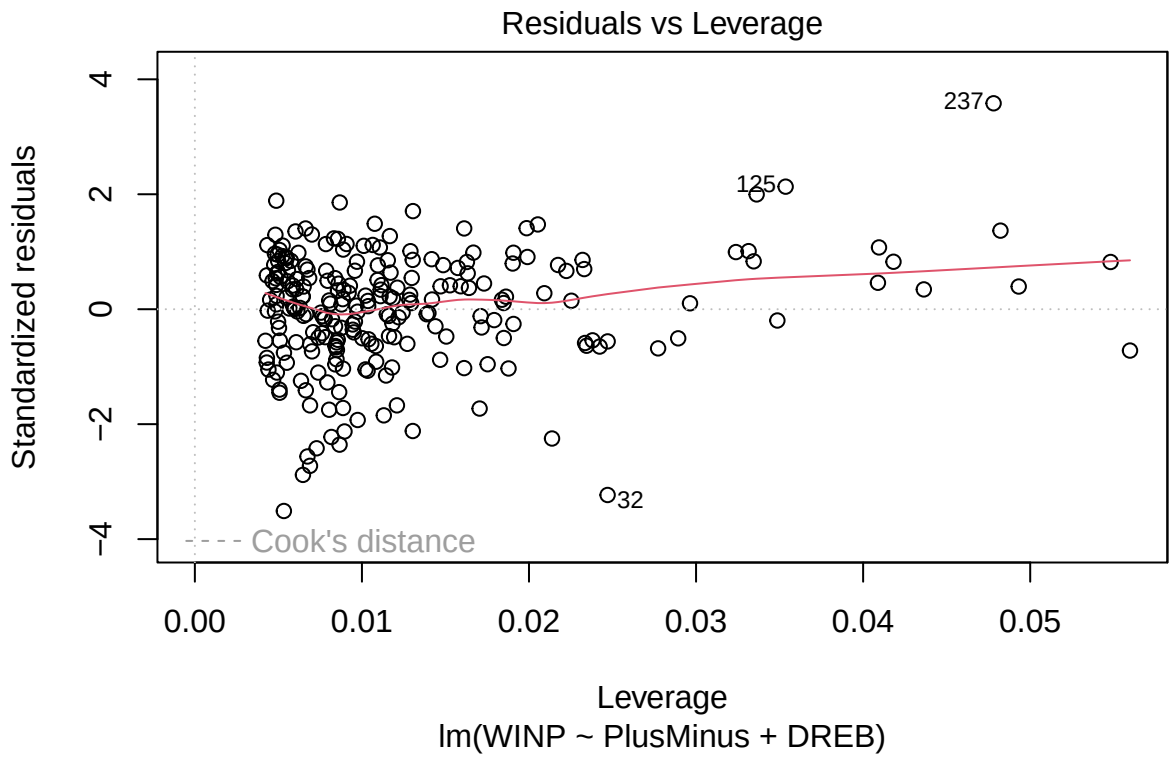

```
plot(modelo_forwp, which = 3)
```



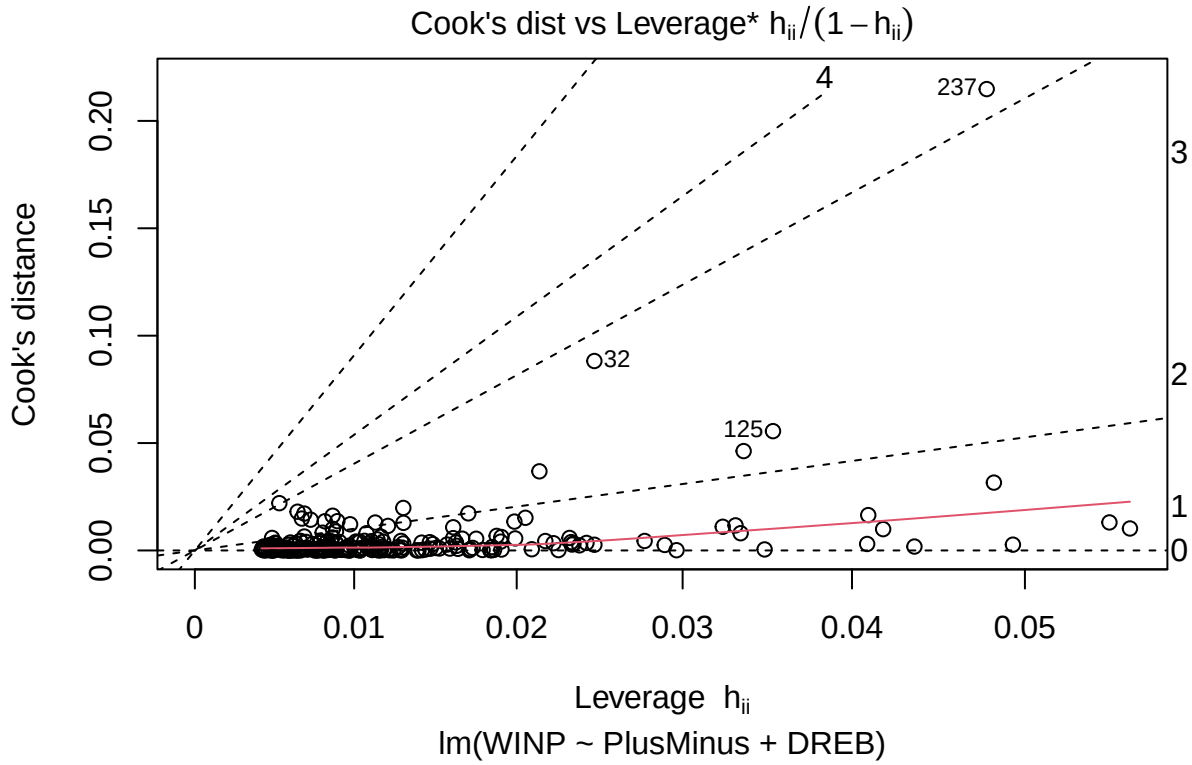

```
plot(modelo_forwp, which = 4)
```




```
plot(modelo_forwp, which = 5)
```




```
plot(modelo_forwp, which = 6)
```




```
shapiro.test(modelo_forwp$residuals) #p-value = 0.1997, normal
```

```
##
##  Shapiro-Wilk normality test
```

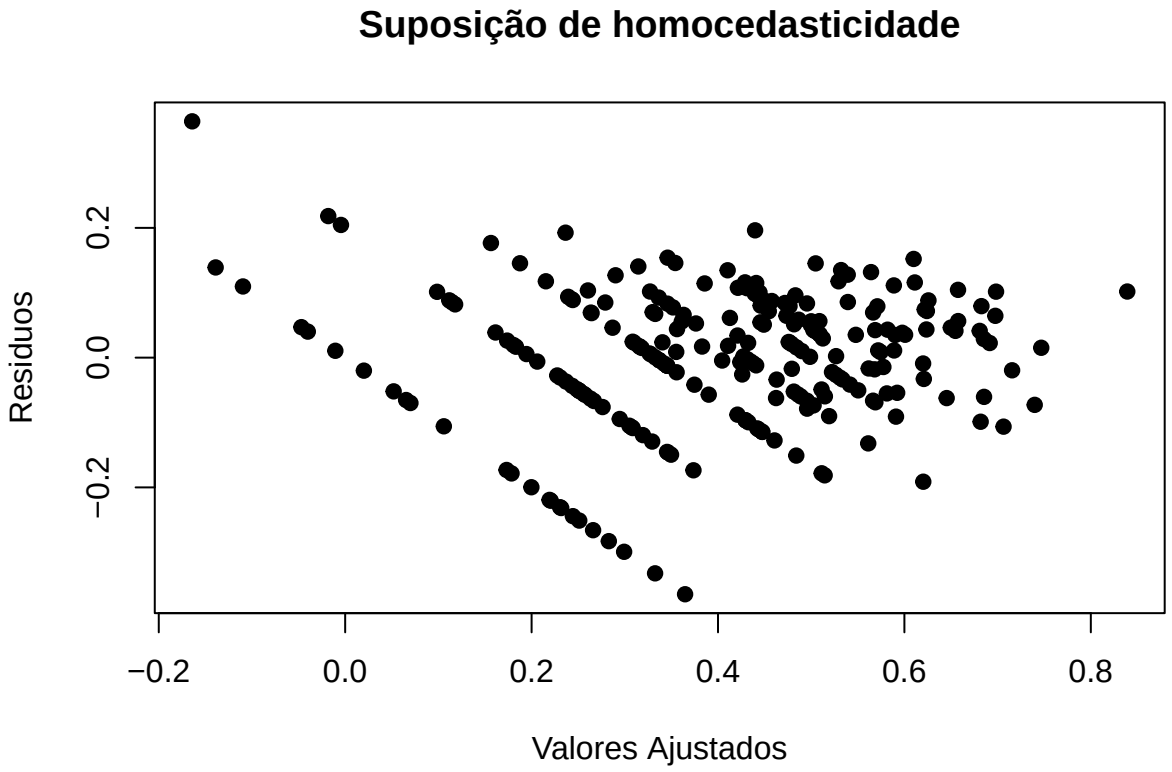
```
##
## data:  modelo_forwp$residuals
## W = 0.96952, p-value = 5.082e-05
```

```r
#Teste de durbin watson para independencia
library(lmtest)
dwtest(modelo_forwp) #p-value = 0.07378
```

```
##
##  Durbin-Watson test
##
## data:  modelo_forwp
## DW = 1.8195, p-value = 0.07378
## alternative hypothesis: true autocorrelation is greater than 0
```

```r
#Independência
plot(modelo_forwp$residuals,
     ylab = "Residuos",
     xlab = "Index dos Imovéis",
     main = "Suposição de independência",
     pch = 19)
```


```r
#Homocedasticidade
plot(modelo_forwp$fitted.values, modelo_forwp$residuals,
     xlab = "Valores Ajustados",
     ylab = "Residuos",
     pch = 19,
     main = "Suposição de homocedasticidade"
)
```




```
#Breusch_Pagan para homocedasticdade
bptest(modelo_forwp) #p-value = 1.981e-05, heterocedasticidade
```

```
##
##  studentized Breusch-Pagan test
##
## data:  modelo_forwp
## BP = 21.659, df = 2, p-value = 1.981e-05
```