NBA Salaries Final Code

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2022-05-10

```r
#install.packages(c("pacman","tidyverse","randomForest","parallel","rpart","readr","janitor","car","MAS
# library(tidyverse)
# library(randomForest)
# library(parallel)
# library(rpart)
# library(readr)
# library(janitor)
# library(car)
# library(MASS)
# library(Hmisc)
# library(rstatix)
# library(forcats)
# library(GGally)
# library(performance)
# library(caret)
# library(lmtest)
# library(corrplot)
# library(PerformanceAnalytics)
# library(plotly)
# library(mlbench)
pacman::p_load(tidymodels,randomForest,parallel,rpart,readr,janitor,car,MASS,Hmisc,rstatix,GGally,perfo
step <- stats::step
```

Data Exploration

```r
# Load dataset

players <- read_csv("players.csv")
```

```
## Rows: 558 Columns: 12
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (5): Name, Position, Team, Height, College
## dbl (7): Age, Height_i, Weight, Salary, Points, Rebounds, Assists
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```r
active_p <- read_csv("active_players_2.csv")
```

```
## Rows: 558 Columns: 9
## -- Column specification --------------------------------------------------------
## Delimiter: ","
```

```
## chr (5): Name, Team, Position, Height, College
## dbl (4): Age, Height_i, Weight, Salary
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```r
# Structure/Dimensions of the data.frame
str(active_p)
```

```
## spec_tbl_df [558 x 9] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ Name    : chr [1:558] "Juhann Begarin" "Jaylen Brown" "Kris Dunn" "Carsen Edwards" ...
##  $ Team    : chr [1:558] "Boston Celtics" "Boston Celtics" "Boston Celtics" "Boston Celtics" ...
##  $ Position: chr [1:558] "SG" "SG" "PG" "PG" ...
##  $ Age     : num [1:558] 19 24 27 23 25 23 35 29 26 21 ...
##  $ Height  : chr [1:558] "6' 5\"" "6' 6\"" "6' 3\"" "5' 11\"" ...
##  $ Height_i: num [1:558] 6.5 6.6 6.3 5.11 7.5 6.9 6.9 6.1 7.2 6.4 ...
##  $ Weight  : num [1:558] 185 223 205 200 311 240 240 250 250 216 ...
##  $ College : chr [1:558] "nan" "California" "Providence" "Purdue" ...
##  $ Salary  : num [1:558] NaN 26758928 5005350 1782621 NaN ...
##  - attr(*, "spec")=
##   .. cols(
##   ..   Name = col_character(),
##   ..   Team = col_character(),
##   ..   Position = col_character(),
##   ..   Age = col_double(),
##   ..   Height = col_character(),
##   ..   Height_i = col_double(),
##   ..   Weight = col_double(),
##   ..   College = col_character(),
##   ..   Salary = col_double()
##   .. )
##  - attr(*, "problems")=<externalptr>
```

```r
# Number of columns containing `NA` or `NaN`
colSums(is.na(active_p))
```

```
##     Name     Team Position      Age   Height Height_i   Weight  College
##        0        0        0        0        0        0        0        0
##   Salary
##      113
```

Data Cleaning

```r
#identifying the rows with NAs
rownames(active_p)[apply(active_p, 2, anyNA)]
```

```
##  [1] "9"   "18"  "27"  "36"  "45"  "54"  "63"  "72"  "81"  "90"  "99"  "108"
## [13] "117" "126" "135" "144" "153" "162" "171" "180" "189" "198" "207" "216"
## [25] "225" "234" "243" "252" "261" "270" "279" "288" "297" "306" "315" "324"
## [37] "333" "342" "351" "360" "369" "378" "387" "396" "405" "414" "423" "432"
## [49] "441" "450" "459" "468" "477" "486" "495" "504" "513" "522" "531" "540"
## [61] "549" "558"
```

```r
#removing all `Salary` observations with NAs
ap_cl <- active_p[!(is.na(active_p$Salary)), ]
```

```
# Checking for leftover `NA` after cleaning
rownames(active_p)[apply(ap_cl, 2, anyNA)]
```

```
## character(0)
```
```
# Transforming Team,Position,College into factors
ap_cl_f <- transform (
  ap_cl,
  fTeam = as.factor(Team),
  fPosition = as.factor(Position),
  fCollege = as.factor(College)
)
```

```
# Rename `fCollege` factor level "nan" as "None"
# levels(ap_cl_f$fCollege)[levels(ap_cl_f$fCollege)=="nan"] <- "None"
#levels(ap_cl_f$fCollege)
```

```
str(ap_cl_f)
```

```
## 'data.frame':    445 obs. of  12 variables:
##  $ Name     : chr  "Jaylen Brown" "Kris Dunn" "Carsen Edwards" "Bruno Fernando" ...
##  $ Team     : chr  "Boston Celtics" "Boston Celtics" "Boston Celtics" "Boston Celtics" ...
##  $ Position : chr  "SG" "PG" "PG" "F" ...
##  $ Age      : num  24 27 23 23 35 29 21 21 26 23 ...
##  $ Height   : chr  "6' 6\"" "6' 3\"" "5' 11\"" "6' 9\"" ...
##  $ Height_i : num  6.6 6.3 5.11 6.9 6.9 6.1 6.4 6.5 6.8 6.1 ...
##  $ Weight   : num  223 205 200 240 240 250 216 215 245 195 ...
##  $ College  : chr  "California" "Providence" "Purdue" "Maryland" ...
##  $ Salary   : num  26758928 5005350 1782621 1782621 27000000 ...
##  $ fTeam    : Factor w/ 30 levels "Atlanta Hawks",..: 2 2 2 2 2 2 2 2 2 2 ...
##  $ fPosition: Factor w/ 7 levels "C","F","G","PF",..: 7 5 5 2 1 1 7 6 4 5 ...
##  $ fCollege : Factor w/ 119 levels "Alabama","Arizona",..: 15 79 80 50 26 41 36 104 25 75 ...
```
```
# Start with `ap_cl_f` data.frame, reclassify as tibble

ap_tibble <- as_tibble(ap_cl_f)
class(ap_tibble)
```

```
## [1] "tbl_df"     "tbl"        "data.frame"
```
```
str(ap_tibble)
```

```
## tibble [445 x 12] (S3: tbl_df/tbl/data.frame)
##  $ Name     : chr [1:445] "Jaylen Brown" "Kris Dunn" "Carsen Edwards" "Bruno Fernando" ...
##  $ Team     : chr [1:445] "Boston Celtics" "Boston Celtics" "Boston Celtics" "Boston Celtics" ...
##  $ Position : chr [1:445] "SG" "PG" "PG" "F" ...
##  $ Age      : num [1:445] 24 27 23 23 35 29 21 21 26 23 ...
##  $ Height   : chr [1:445] "6' 6\"" "6' 3\"" "5' 11\"" "6' 9\"" ...
##  $ Height_i : num [1:445] 6.6 6.3 5.11 6.9 6.9 6.1 6.4 6.5 6.8 6.1 ...
##  $ Weight   : num [1:445] 223 205 200 240 240 250 216 215 245 195 ...
##  $ College  : chr [1:445] "California" "Providence" "Purdue" "Maryland" ...
##  $ Salary   : num [1:445] 26758928 5005350 1782621 1782621 27000000 ...
##  $ fTeam    : Factor w/ 30 levels "Atlanta Hawks",..: 2 2 2 2 2 2 2 2 2 2 ...
##  $ fPosition: Factor w/ 7 levels "C","F","G","PF",..: 7 5 5 2 1 1 7 6 4 5 ...
##  $ fCollege : Factor w/ 119 levels "Alabama","Arizona",..: 15 79 80 50 26 41 36 104 25 75 ...
```

Model Building

Initial Graphs

```
# The diagonal consists of the densities of the three variables and the upper panels consist of the cor
ggpairs(ap_tibble, columns = c(9,4,6,7), cardinality_threshold = NULL)
```
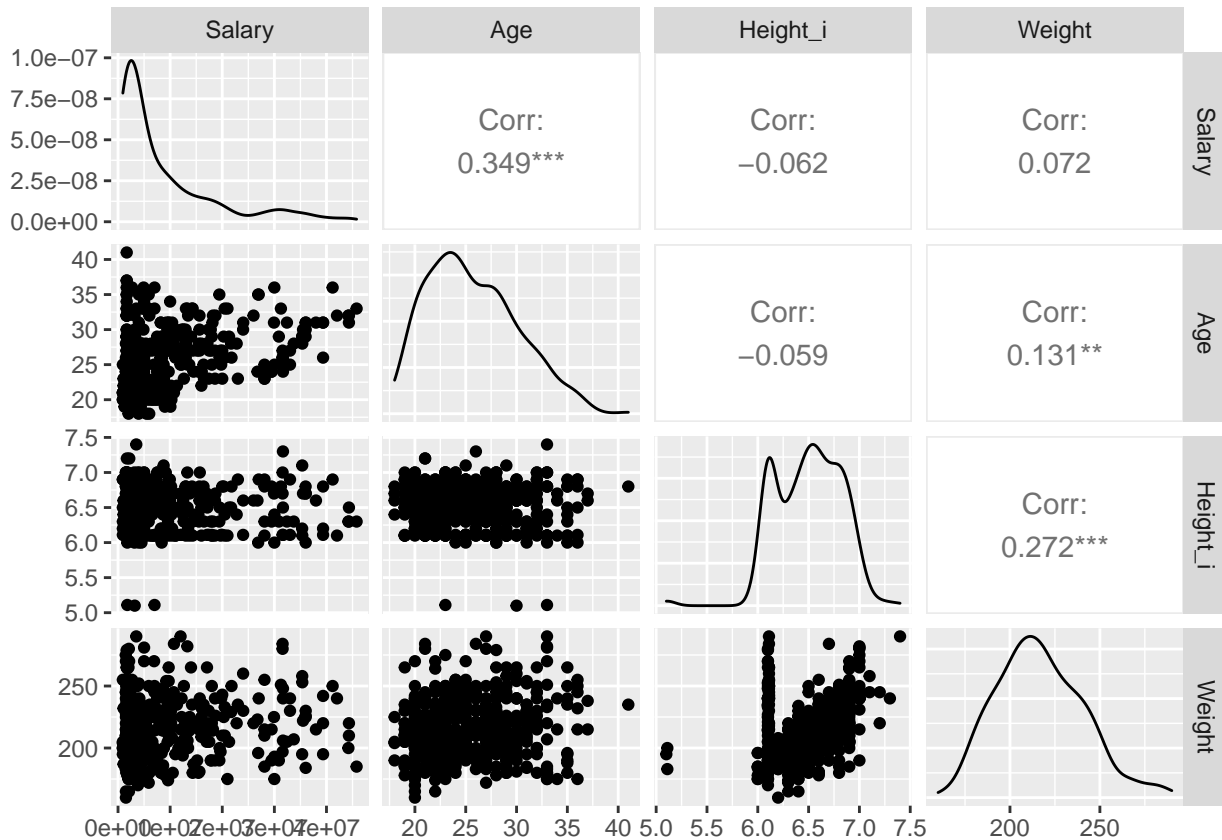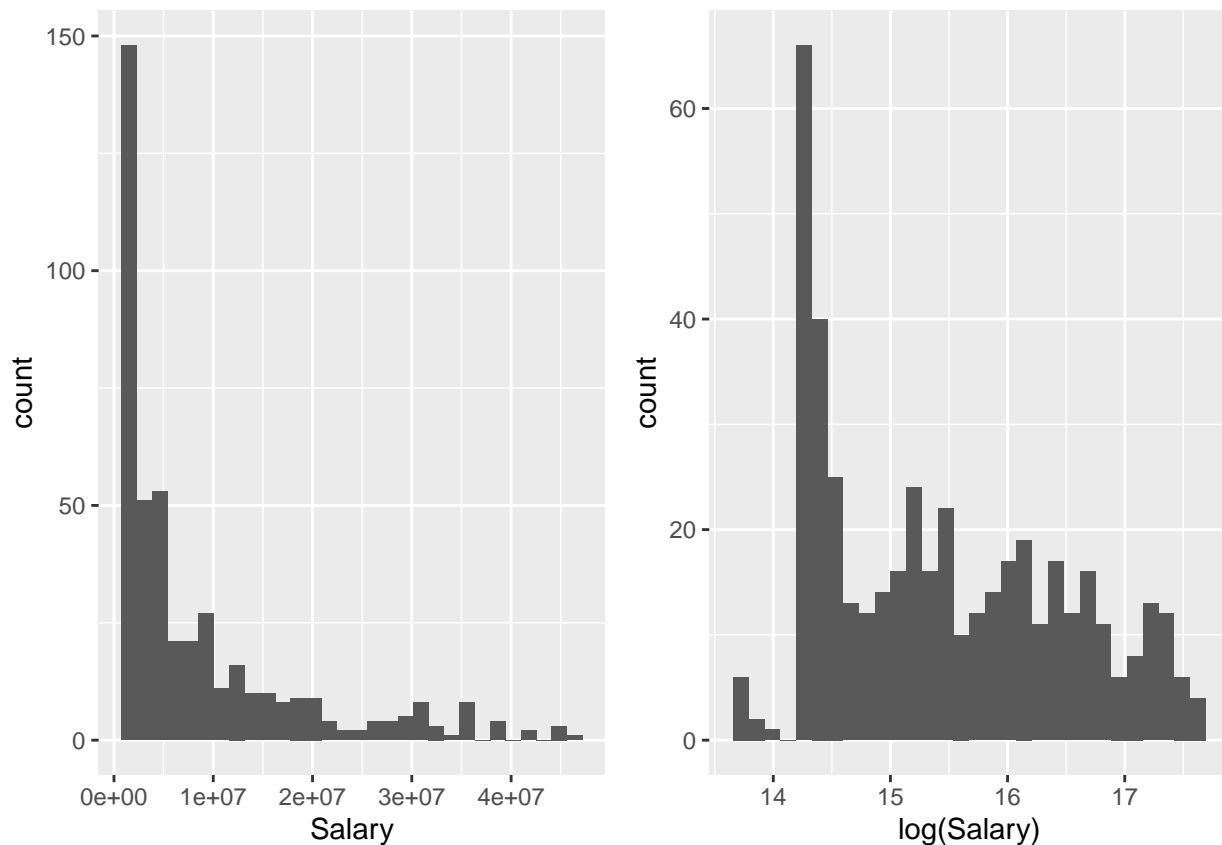


```
par(mfrow=c(1,2))
histo_full<- ggplot(ap_tibble, aes(Salary)) +
  geom_histogram(bins = 30)
histo_red <- ggplot(ap_tibble, aes(log(Salary))) +
  geom_histogram(bins = 30)
gridExtra::grid.arrange(histo_full, histo_red, ncol=2)
```

Full(Initial) Model

```
summary(lm1 <- lm(Salary ~ fTeam+fPosition+fCollege+Age+Height_i+Weight, data=ap_tibble))
```

```
##
## Call:
## lm(formula = Salary ~ fTeam + fPosition + fCollege + Age + Height_i +
##     Weight, data = ap_tibble)
##
## Residuals:
##       Min       1Q   Median       3Q      Max
## -18232129  -4355864        0  2782057 27394419
##
## Coefficients:
##                             Estimate Std. Error t value Pr(>|t|)
## (Intercept)                -43409716   16626942  -2.611 0.009506 **
## fTeamBoston Celtics         -2139600    3999655  -0.535 0.593100
## fTeamBrooklyn Nets           1376171    3812791   0.361 0.718412
## fTeamCharlotte Hornets      -2482487    3742196  -0.663 0.507620
## fTeamChicago Bulls           1451456    4130193   0.351 0.725526
## fTeamCleveland Cavaliers     2396367    4078738   0.588 0.557310
## fTeamDallas Mavericks       -2179304    3816160  -0.571 0.568396
## fTeamDenver Nuggets           618798    3904190   0.158 0.874177
## fTeamDetroit Pistons        -3902716    3911500  -0.998 0.319236
## fTeamGolden State Warriors  -1024287    3989880  -0.257 0.797577
## fTeamHouston Rockets        -2388664    3848381  -0.621 0.535292
```

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```
## fTeamIndiana Pacers               -391881   3957015  -0.099 0.921180
## fTeamLos Angeles Clippers        -1764702   4039118  -0.437 0.662509
## fTeamLos Angeles Lakers          -3269636   4131496  -0.791 0.429366
## fTeamMemphis Grizzlies           -2112003   3994901  -0.529 0.597438
## fTeamMiami Heat                  -3585954   4065171  -0.882 0.378449
## fTeamMilwaukee Bucks               965708   4021669   0.240 0.810403
## fTeamMinnesota Timberwolves       4551282   4220656   1.078 0.281786
## fTeamNew Orleans Pelicans         -647960   3745909  -0.173 0.862790
## fTeamNew York Knicks             -1878918   3824003  -0.491 0.623554
## fTeamOklahoma City Thunder       -2754850   3934686  -0.700 0.484402
## fTeamOrlando Magic               -1166824   3960187  -0.295 0.768482
## fTeamPhiladelphia Sixers           605822   3977677   0.152 0.879053
## fTeamPhoenix Suns                  917437   4004371   0.229 0.818947
## fTeamPortland Trail Blazers      -5390573   4402004  -1.225 0.221737
## fTeamSacramento Kings             1570102   4017930   0.391 0.696253
## fTeamSan Antonio Spurs            -473258   3895515  -0.121 0.903389
## fTeamToronto Raptors             -1433236   4269557  -0.336 0.737351
## fTeamUtah Jazz                    1116045   4098972   0.272 0.785606
## fTeamWashington Wizards          -1153886   3721264  -0.310 0.756725
## fPositionF                        1204828   4375387   0.275 0.783233
## fPositionG                       10656218   5190359   2.053 0.040968 *
## fPositionPF                       2889966   1929730   1.498 0.135332
## fPositionPG                      11138355   2996036   3.718 0.000242 ***
## fPositionSF                       6497102   2150070   3.022 0.002738 **
## fPositionSG                       7196111   2549099   2.823 0.005089 **
## fCollegeArizona                    660692   5617835   0.118 0.906462
## fCollegeArizona State             9982902   7299120   1.368 0.172477
## fCollegeArkansas                   469247   6682154   0.070 0.944064
## fCollegeAuburn                    1571889   7223599   0.218 0.827891
## fCollegeBaylor                   -2481774   6392019  -0.388 0.698109
## fCollegeBelmont                  -4855131  10707722  -0.453 0.650585
## fCollegeBoise State              -3368144  10882863  -0.309 0.757172
## fCollegeBoston College           -2494383  10912629  -0.229 0.819359
## fCollegeBowling Green             4292252  10993543   0.390 0.696504
## fCollegeBucknell                  -955784  11010106  -0.087 0.930883
## fCollegeButler                    5918936   8385665   0.706 0.480858
## fCollegeBYU                      -7249423  10885559  -0.666 0.505965
## fCollegeCal Poly                 -2510893  10854196  -0.231 0.817223
## fCollegeCalifornia               20654255  10910430   1.893 0.059350 .
## fCollegeCharleston               -7563826  10944739  -0.691 0.490064
## fCollegeCleveland State          -3436899  10754028  -0.320 0.749509
## fCollegeColorado                  3697341   7210164   0.513 0.608487
## fCollegeConnecticut               2729879   6316981   0.432 0.665956
## fCollegeCreighton                  117698   8236695   0.014 0.988609
## fCollegeDavidson                 33917971  10894796   3.113 0.002037 **
## fCollegeDayton                    4072786  10799793   0.377 0.706364
## fCollegeDePaul                   -3115672   8308080  -0.375 0.707924
## fCollegeDrexel                   -6131316  10875214  -0.564 0.573337
## fCollegeDuke                      3327920   4889327   0.681 0.496640
## fCollegeFlorida                   7222763   6360647   1.136 0.257094
## fCollegeFlorida State             2056866   5638667   0.365 0.715544
## fCollegeFresno State             28832960  10936707   2.636 0.008835 **
## fCollegeGeorge Washington        -4562823  10945256  -0.417 0.677079
## fCollegeGeorgetown               -4952188   7222440  -0.686 0.493475
```

```
## fCollegeGeorgia                  1704338   7265198   0.235 0.814694
## fCollegeGeorgia Tech             -162680   7296193  -0.022 0.982227
## fCollegeGonzaga                  3856775   5893987   0.654 0.513404
## fCollegeHouston                 -4382913   8216914  -0.533 0.594167
## fCollegeIllinois                -2109111   8695076  -0.243 0.808516
## fCollegeIndiana                  2041078   5902780   0.346 0.729759
## fCollegeIowa State              -1846631   6292715  -0.293 0.769385
## fCollegeIUPUI                  -11029514  11901368  -0.927 0.354836
## fCollegeKansas                   6022649   5599807   1.076 0.283047
## fCollegeKansas State            -3378939   7184555  -0.470 0.638492
## fCollegeKentucky                 7582646   4841408   1.566 0.118398
## fCollegeLehigh                  29182543  11042973   2.643 0.008676 **
## fCollegeLiberty                 -3208200  10817453  -0.297 0.767004
## fCollegeLouisiana-Lafayette     -9654690  10882355  -0.887 0.375718
## fCollegeLouisville               5632489   6343176   0.888 0.375303
## fCollegeLoyola (MD)              3748003  10921836   0.343 0.731724
## fCollegeLSU                       356961   6584833   0.054 0.956806
## fCollegeMarquette                6687787   7321909   0.913 0.361799
## fCollegeMarshall               -11070017  10986738  -1.008 0.314502
## fCollegeMaryland                -1916231   6356430  -0.301 0.763279
## fCollegeMemphis                  5812091   6643567   0.875 0.382387
## fCollegeMiami (FL)               -811418   8207611  -0.099 0.921317
## fCollegeMichigan                 3993331   5748518   0.695 0.487821
## fCollegeMichigan State           7610990   6394741   1.190 0.234950
## fCollegeMinnesota                2246389  10908141   0.206 0.836986
## fCollegeMississippi State       -7276374  10965548  -0.664 0.507498
## fCollegeMissouri                 -688399   7200677  -0.096 0.923903
## fCollegeMissouri State          -2738954  10820839  -0.253 0.800357
## fCollegeMurray State             1990539   8321722   0.239 0.811122
## fCollegenan                      3285715   4643254   0.708 0.479746
## fCollegeNebraska                -1116174   8350171  -0.134 0.893756
## fCollegeNevada                  -5189084   8364267  -0.620 0.535494
## fCollegeNew Mexico              -2333981  11045614  -0.211 0.832800
## fCollegeNew Mexico JC            5006924  11080370   0.452 0.651700
## fCollegeNew Mexico State        19434510  11053679   1.758 0.079777 .
## fCollegeNorth Carolina          -949428   5521054  -0.172 0.863586
## fCollegeNorth Carolina State     3651398  10887643   0.335 0.737590
## fCollegeNotre Dame              -4567492  10892999  -0.419 0.675306
## fCollegeOhio                    -3366614  10864360  -0.310 0.756879
## fCollegeOhio State               6567510   7284072   0.902 0.368009
## fCollegeOklahoma                  540170   7256431   0.074 0.940712
## fCollegeOklahoma State           4055621   8379129   0.484 0.628743
## fCollegeOld Dominion            -3988140  10922934  -0.365 0.715293
## fCollegeOle Miss                -2925069  10901041  -0.268 0.788638
## fCollegeOregon                    755727   6247375   0.121 0.903801
## fCollegeOregon State            -4591241  10728739  -0.428 0.669016
## fCollegePenn State              -4050789  11386818  -0.356 0.722293
## fCollegePittsburgh              10090316  11007453   0.917 0.360077
## fCollegeProvidence              -4574929  10858708  -0.421 0.673840
## fCollegePurdue                  -4613061  11090707  -0.416 0.677764
## fCollegeRadford                -12134400  10912877  -1.112 0.267094
## fCollegeSaint Joseph's          -1392672   8514159  -0.164 0.870183
## fCollegeSaint Mary's            -6101377   8244976  -0.740 0.459896
## fCollegeSalt Lake CC UT         -8037516  10865039  -0.740 0.460048
```

```
## fCollegeSan Diego State                9244590    7253561   1.274 0.203517
## fCollegeSMU                            -4825688    7272754  -0.664 0.507522
## fCollegeSouth Carolina                 -4588005   10681331  -0.430 0.667855
## fCollegeSt. John's                     -6903125   10934001  -0.631 0.528316
## fCollegeStanford                         781509    6103557   0.128 0.898206
## fCollegeSyracuse                       -1627849    6331447  -0.257 0.797281
## fCollegeTCU                            -2381903    8336740  -0.286 0.775304
## fCollegeTennessee                       6904659    6421508   1.075 0.283167
## fCollegeTennessee State                12472584   11084456   1.125 0.261428
## fCollegeTexas                           7193501    5372870   1.339 0.181673
## fCollegeTexas A&M                       6348154    6736758   0.942 0.346821
## fCollegeTexas Tech                       156150    8670496   0.018 0.985644
## fCollegeUC Santa Barbara               -4543256   10815854  -0.420 0.674758
## fCollegeUCLA                            8760281    5414101   1.618 0.106747
## fCollegeUNLV                            6960075    7410230   0.939 0.348388
## fCollegeUSC                             3612676    5610377   0.644 0.520135
## fCollegeUSC Upstate                    -5806804   10900473  -0.533 0.594644
## fCollegeUtah                            4123587    7198620   0.573 0.567207
## fCollegeUtah State                     -2882745   10855217  -0.266 0.790766
## fCollegeVanderbilt                     -1368396    6621199  -0.207 0.836414
## fCollegeVillanova                       -148498    5520203  -0.027 0.978558
## fCollegeVirginia                         522108    5781111   0.090 0.928102
## fCollegeVirginia Commonwealth           -561324   10687760  -0.053 0.958151
## fCollegeVirginia Tech                  -1338244   10510698  -0.127 0.898774
## fCollegeWake Forest                     4051041    6318899   0.641 0.521968
## fCollegeWashington                      2105986    5699779   0.369 0.712037
## fCollegeWashington State               15483585    8425597   1.838 0.067139 .
## fCollegeWeber State                    31799371   11072060   2.872 0.004381 **
## fCollegeWest Virginia                  -5678638    8274292  -0.686 0.493077
## fCollegeWestern Texas Coll. (J.C.)     -6332252   10759470  -0.589 0.556639
## fCollegeWichita State                   6661369    8415955   0.792 0.429294
## fCollegeWisconsin                      -4235075    8582977  -0.493 0.622087
## fCollegeWyoming                         1513570    8402762   0.180 0.857179
## fCollegeXavier                         -5456878    8094128  -0.674 0.500739
## fCollegeYale                           -5344975   10870850  -0.492 0.623320
## Age                                      632383     129540   4.882 1.74e-06 ***
## Height_i                                   -1394    1908175  -0.001 0.999418
## Weight                                   131345      38186   3.440 0.000669 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9385000 on 288 degrees of freedom
## Multiple R-squared:  0.4155, Adjusted R-squared:  0.09891
## F-statistic: 1.312 on 156 and 288 DF,  p-value: 0.02448
```

```
shapiro.test(resid(lm1))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  resid(lm1)
## W = 0.9352, p-value = 5.455e-13
```
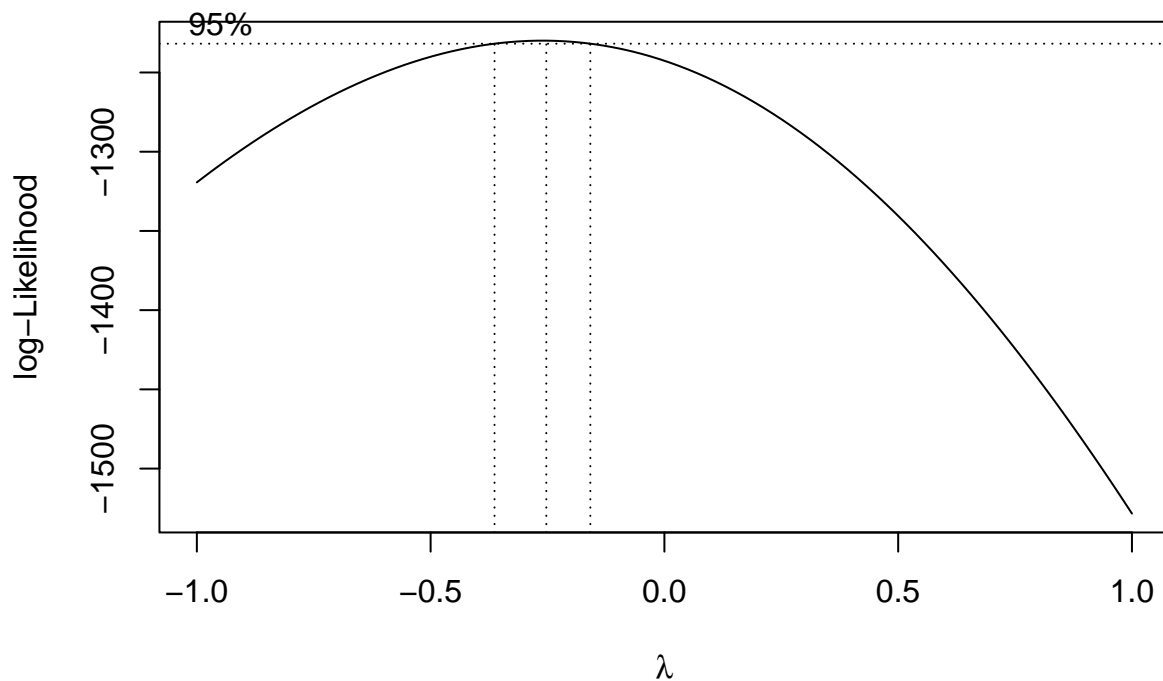
```
bptest(lm1)
```

```
##
##   studentized Breusch-Pagan test
##
## data:  lm1
## BP = 181.76, df = 156, p-value = 0.07744
```

Box Cox

```
boxcox(lm1,lambda=seq(-1, 1, by=0.05))
```



```
BoxCoxTrans(ap_tibble$Salary)
```

```
## Box-Cox Transformation
##
## 445 data points used to estimate Lambda
##
## Input data summary:
##     Min.  1st Qu.   Median     Mean  3rd Qu.      Max.
##   925258  1802057  4447896  8813696 12000000 45780966
##
## Largest/Smallest: 49.5
## Sample Skewness: 1.75
##
## Estimated Lambda: -0.2
```

With fudge factor, Lambda = 0 will be used for transformations

log(Full Model)

```
summary(lm_l1 <- lm(log(Salary) ~ fTeam+fPosition+fCollege+Age+Height_i+Weight, data=ap_tibble))
```

```
##
## Call:
## lm(formula = log(Salary) ~ fTeam + fPosition + fCollege + Age +
##     Height_i + Weight, data = ap_tibble)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.9390 -0.5096  0.0000  0.5006  2.0837
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                    1.019e+01  1.704e+00   5.981 6.57e-09 ***
## fTeamBoston Celtics           -3.519e-01  4.098e-01  -0.859 0.391211
## fTeamBrooklyn Nets            -3.157e-01  3.907e-01  -0.808 0.419695
## fTeamCharlotte Hornets        -2.616e-01  3.834e-01  -0.682 0.495661
## fTeamChicago Bulls             5.956e-02  4.232e-01   0.141 0.888167
## fTeamCleveland Cavaliers       3.029e-01  4.179e-01   0.725 0.469158
## fTeamDallas Mavericks         -2.849e-01  3.910e-01  -0.729 0.466886
## fTeamDenver Nuggets           -1.534e-01  4.000e-01  -0.384 0.701595
## fTeamDetroit Pistons          -4.307e-01  4.008e-01  -1.075 0.283378
## fTeamGolden State Warriors    -3.802e-01  4.088e-01  -0.930 0.353184
## fTeamHouston Rockets          -4.673e-01  3.943e-01  -1.185 0.236914
## fTeamIndiana Pacers            2.479e-05  4.054e-01   0.000 0.999951
## fTeamLos Angeles Clippers     -2.494e-01  4.138e-01  -0.603 0.547291
## fTeamLos Angeles Lakers       -9.898e-01  4.233e-01  -2.338 0.020058 *
## fTeamMemphis Grizzlies        -1.615e-01  4.093e-01  -0.395 0.693389
## fTeamMiami Heat               -7.197e-01  4.165e-01  -1.728 0.085068 .
## fTeamMilwaukee Bucks          -4.504e-01  4.121e-01  -1.093 0.275300
## fTeamMinnesota Timberwolves    3.236e-01  4.325e-01   0.748 0.454928
## fTeamNew Orleans Pelicans     -1.511e-01  3.838e-01  -0.394 0.694192
## fTeamNew York Knicks          -3.476e-01  3.918e-01  -0.887 0.375776
## fTeamOklahoma City Thunder    -3.002e-01  4.031e-01  -0.745 0.457064
## fTeamOrlando Magic            -3.362e-02  4.058e-01  -0.083 0.934023
## fTeamPhiladelphia Sixers      -2.516e-01  4.076e-01  -0.617 0.537461
## fTeamPhoenix Suns              4.483e-02  4.103e-01   0.109 0.913068
## fTeamPortland Trail Blazers   -7.391e-01  4.510e-01  -1.639 0.102380
## fTeamSacramento Kings         -1.278e-02  4.117e-01  -0.031 0.975255
## fTeamSan Antonio Spurs        -1.354e-01  3.991e-01  -0.339 0.734708
## fTeamToronto Raptors          -2.856e-01  4.375e-01  -0.653 0.514437
## fTeamUtah Jazz                -1.014e-01  4.200e-01  -0.241 0.809467
## fTeamWashington Wizards       -2.724e-01  3.813e-01  -0.714 0.475550
## fPositionF                    -1.160e-01  4.483e-01  -0.259 0.796030
## fPositionG                     1.439e+00  5.318e-01   2.705 0.007235 **
## fPositionPF                    2.784e-01  1.977e-01   1.408 0.160200
## fPositionPG                    1.122e+00  3.070e-01   3.655 0.000306 ***
## fPositionSF                    6.935e-01  2.203e-01   3.148 0.001816 **
## fPositionSG                    8.278e-01  2.612e-01   3.169 0.001692 **
## fCollegeArizona               -5.687e-03  5.756e-01  -0.010 0.992124
```

```
## fCollegeArizona State                2.313e-01  7.479e-01   0.309 0.757384
## fCollegeArkansas                     -1.152e-01  6.847e-01  -0.168 0.866477
## fCollegeAuburn                       -1.507e-01  7.401e-01  -0.204 0.838788
## fCollegeBaylor                       -3.934e-01  6.549e-01  -0.601 0.548492
## fCollegeBelmont                      -1.104e+00  1.097e+00  -1.006 0.315289
## fCollegeBoise State                  -3.856e-01  1.115e+00  -0.346 0.729723
## fCollegeBoston College                2.154e-03  1.118e+00   0.002 0.998464
## fCollegeBowling Green                 8.366e-01  1.126e+00   0.743 0.458233
## fCollegeBucknell                     -2.955e-01  1.128e+00  -0.262 0.793568
## fCollegeButler                       -1.978e-01  8.592e-01  -0.230 0.818121
## fCollegeBYU                          -1.074e+00  1.115e+00  -0.963 0.336431
## fCollegeCal Poly                     -7.272e-02  1.112e+00  -0.065 0.947907
## fCollegeCalifornia                    1.678e+00  1.118e+00   1.501 0.134481
## fCollegeCharleston                   -1.227e+00  1.121e+00  -1.095 0.274615
## fCollegeCleveland State              -3.873e-01  1.102e+00  -0.352 0.725461
## fCollegeColorado                      5.909e-01  7.388e-01   0.800 0.424476
## fCollegeConnecticut                   3.018e-02  6.472e-01   0.047 0.962846
## fCollegeCreighton                    -1.533e-01  8.439e-01  -0.182 0.855972
## fCollegeDavidson                      1.766e+00  1.116e+00   1.582 0.114654
## fCollegeDayton                        6.805e-01  1.107e+00   0.615 0.539034
## fCollegeDePaul                       -7.680e-01  8.512e-01  -0.902 0.367714
## fCollegeDrexel                       -1.065e+00  1.114e+00  -0.956 0.339791
## fCollegeDuke                          2.588e-01  5.010e-01   0.517 0.605780
## fCollegeFlorida                       3.140e-01  6.517e-01   0.482 0.630327
## fCollegeFlorida State                 8.523e-02  5.777e-01   0.148 0.882829
## fCollegeFresno State                  1.469e+00  1.121e+00   1.311 0.190801
## fCollegeGeorge Washington            -1.022e+00  1.121e+00  -0.911 0.363084
## fCollegeGeorgetown                   -7.592e-01  7.400e-01  -1.026 0.305807
## fCollegeGeorgia                       3.399e-01  7.444e-01   0.457 0.648330
## fCollegeGeorgia Tech                  1.457e-01  7.476e-01   0.195 0.845559
## fCollegeGonzaga                       4.516e-01  6.039e-01   0.748 0.455193
## fCollegeHouston                      -1.001e+00  8.419e-01  -1.189 0.235234
## fCollegeIllinois                     -6.296e-01  8.909e-01  -0.707 0.480322
## fCollegeIndiana                       7.484e-02  6.048e-01   0.124 0.901609
## fCollegeIowa State                    6.467e-02  6.448e-01   0.100 0.920171
## fCollegeIUPUI                        -1.109e+00  1.219e+00  -0.909 0.364023
## fCollegeKansas                        3.708e-01  5.738e-01   0.646 0.518624
## fCollegeKansas State                 -1.062e+00  7.361e-01  -1.443 0.150095
## fCollegeKentucky                      4.924e-01  4.961e-01   0.993 0.321723
## fCollegeLehigh                        2.263e+00  1.131e+00   2.000 0.046470 *
## fCollegeLiberty                      -1.035e+00  1.108e+00  -0.934 0.351132
## fCollegeLouisiana-Lafayette          -1.647e+00  1.115e+00  -1.477 0.140777
## fCollegeLouisville                    4.744e-01  6.499e-01   0.730 0.465988
## fCollegeLoyola (MD)                  -1.505e-01  1.119e+00  -0.134 0.893140
## fCollegeLSU                          -2.511e-01  6.747e-01  -0.372 0.710035
## fCollegeMarquette                     3.169e-01  7.502e-01   0.422 0.673011
## fCollegeMarshall                     -1.677e+00  1.126e+00  -1.490 0.137322
## fCollegeMaryland                     -2.306e-01  6.513e-01  -0.354 0.723507
## fCollegeMemphis                       8.919e-01  6.807e-01   1.310 0.191148
## fCollegeMiami (FL)                    1.562e-01  8.410e-01   0.186 0.852744
## fCollegeMichigan                      1.357e-01  5.890e-01   0.230 0.817940
## fCollegeMichigan State                6.134e-01  6.552e-01   0.936 0.349983
## fCollegeMinnesota                    -5.505e-01  1.118e+00  -0.493 0.622692
## fCollegeMississippi State            -1.327e+00  1.124e+00  -1.181 0.238645
```

```
## fCollegeMissouri                     -2.656e-02  7.378e-01  -0.036 0.971306
## fCollegeMissouri State               -4.607e-01  1.109e+00  -0.416 0.678059
## fCollegeMurray State                  4.170e-01  8.526e-01   0.489 0.625176
## fCollegenan                           2.281e-01  4.757e-01   0.479 0.631961
## fCollegeNebraska                     -9.216e-01  8.556e-01  -1.077 0.282321
## fCollegeNevada                       -8.471e-01  8.570e-01  -0.988 0.323790
## fCollegeNew Mexico                   -8.228e-01  1.132e+00  -0.727 0.467787
## fCollegeNew Mexico JC                 8.206e-01  1.135e+00   0.723 0.470359
## fCollegeNew Mexico State              1.207e+00  1.133e+00   1.066 0.287349
## fCollegeNorth Carolina               -1.272e-01  5.657e-01  -0.225 0.822241
## fCollegeNorth Carolina State          4.695e-01  1.116e+00   0.421 0.674188
## fCollegeNotre Dame                    4.433e-02  1.116e+00   0.040 0.968344
## fCollegeOhio                         -1.321e+00  1.113e+00  -1.187 0.236257
## fCollegeOhio State                    2.907e-01  7.463e-01   0.390 0.697179
## fCollegeOklahoma                     -1.639e-02  7.435e-01  -0.022 0.982432
## fCollegeOklahoma State                7.368e-01  8.585e-01   0.858 0.391469
## fCollegeOld Dominion                 -5.627e-01  1.119e+00  -0.503 0.615503
## fCollegeOle Miss                     -2.728e-01  1.117e+00  -0.244 0.807203
## fCollegeOregon                       -2.058e-02  6.401e-01  -0.032 0.974379
## fCollegeOregon State                 -9.986e-01  1.099e+00  -0.908 0.364412
## fCollegePenn State                   -9.945e-01  1.167e+00  -0.852 0.394691
## fCollegePittsburgh                    1.013e+00  1.128e+00   0.899 0.369657
## fCollegeProvidence                   -2.831e-01  1.113e+00  -0.254 0.799349
## fCollegePurdue                       -9.438e-01  1.136e+00  -0.831 0.406907
## fCollegeRadford                      -1.869e+00  1.118e+00  -1.671 0.095753 .
## fCollegeSaint Joseph's               -5.300e-01  8.724e-01  -0.608 0.543962
## fCollegeSaint Mary's                 -9.261e-01  8.448e-01  -1.096 0.273894
## fCollegeSalt Lake CC UT              -1.128e+00  1.113e+00  -1.014 0.311647
## fCollegeSan Diego State               2.396e-01  7.432e-01   0.322 0.747425
## fCollegeSMU                          -7.416e-01  7.452e-01  -0.995 0.320461
## fCollegeSouth Carolina               -9.239e-01  1.094e+00  -0.844 0.399259
## fCollegeSt. John's                   -6.082e-01  1.120e+00  -0.543 0.587648
## fCollegeStanford                      4.214e-02  6.254e-01   0.067 0.946317
## fCollegeSyracuse                     -5.396e-01  6.487e-01  -0.832 0.406254
## fCollegeTCU                          -8.616e-01  8.542e-01  -1.009 0.313972
## fCollegeTennessee                     4.604e-01  6.580e-01   0.700 0.484637
## fCollegeTennessee State               1.619e+00  1.136e+00   1.426 0.154963
## fCollegeTexas                         6.648e-01  5.505e-01   1.208 0.228190
## fCollegeTexas A&M                     5.730e-01  6.903e-01   0.830 0.407123
## fCollegeTexas Tech                   -4.151e-01  8.884e-01  -0.467 0.640655
## fCollegeUC Santa Barbara             -7.964e-01  1.108e+00  -0.719 0.472957
## fCollegeUCLA                          6.803e-01  5.547e-01   1.226 0.221071
## fCollegeUNLV                          1.039e+00  7.593e-01   1.369 0.172176
## fCollegeUSC                           2.117e-01  5.748e-01   0.368 0.712893
## fCollegeUSC Upstate                  -6.704e-01  1.117e+00  -0.600 0.548787
## fCollegeUtah                          6.648e-01  7.376e-01   0.901 0.368130
## fCollegeUtah State                   -1.221e+00  1.112e+00  -1.098 0.273143
## fCollegeVanderbilt                   -3.627e-01  6.784e-01  -0.535 0.593354
## fCollegeVillanova                    -1.298e-01  5.656e-01  -0.229 0.818650
## fCollegeVirginia                     -1.059e-01  5.923e-01  -0.179 0.858169
## fCollegeVirginia Commonwealth        -2.968e-01  1.095e+00  -0.271 0.786539
## fCollegeVirginia Tech                -3.159e-01  1.077e+00  -0.293 0.769470
## fCollegeWake Forest                   1.980e-01  6.474e-01   0.306 0.760007
## fCollegeWashington                    1.117e-01  5.840e-01   0.191 0.848389
```

```
## fCollegeWashington State            6.777e-01  8.633e-01   0.785 0.433087
## fCollegeWeber State                 1.994e+00  1.134e+00   1.758 0.079800 .
## fCollegeWest Virginia              -8.985e-01  8.478e-01  -1.060 0.290096
## fCollegeWestern Texas Coll. (J.C.) -1.320e+00  1.102e+00  -1.197 0.232158
## fCollegeWichita State               5.866e-01  8.623e-01   0.680 0.496855
## fCollegeWisconsin                  -9.329e-01  8.794e-01  -1.061 0.289640
## fCollegeWyoming                     8.380e-02  8.610e-01   0.097 0.922531
## fCollegeXavier                     -1.139e+00  8.293e-01  -1.373 0.170670
## fCollegeYale                       -1.058e+00  1.114e+00  -0.950 0.342838
## Age                                 7.574e-02  1.327e-02   5.706 2.87e-08 ***
## Height_i                            2.641e-03  1.955e-01   0.014 0.989234
## Weight                              1.312e-02  3.913e-03   3.352 0.000909 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9616 on 288 degrees of freedom
## Multiple R-squared:  0.4318, Adjusted R-squared:  0.1241
## F-statistic: 1.403 on 156 and 288 DF,  p-value: 0.007015
```

```
shapiro.test(resid(lm_l1))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  resid(lm_l1)
## W = 0.99129, p-value = 0.01014
```

```
bptest(lm_l1)
```
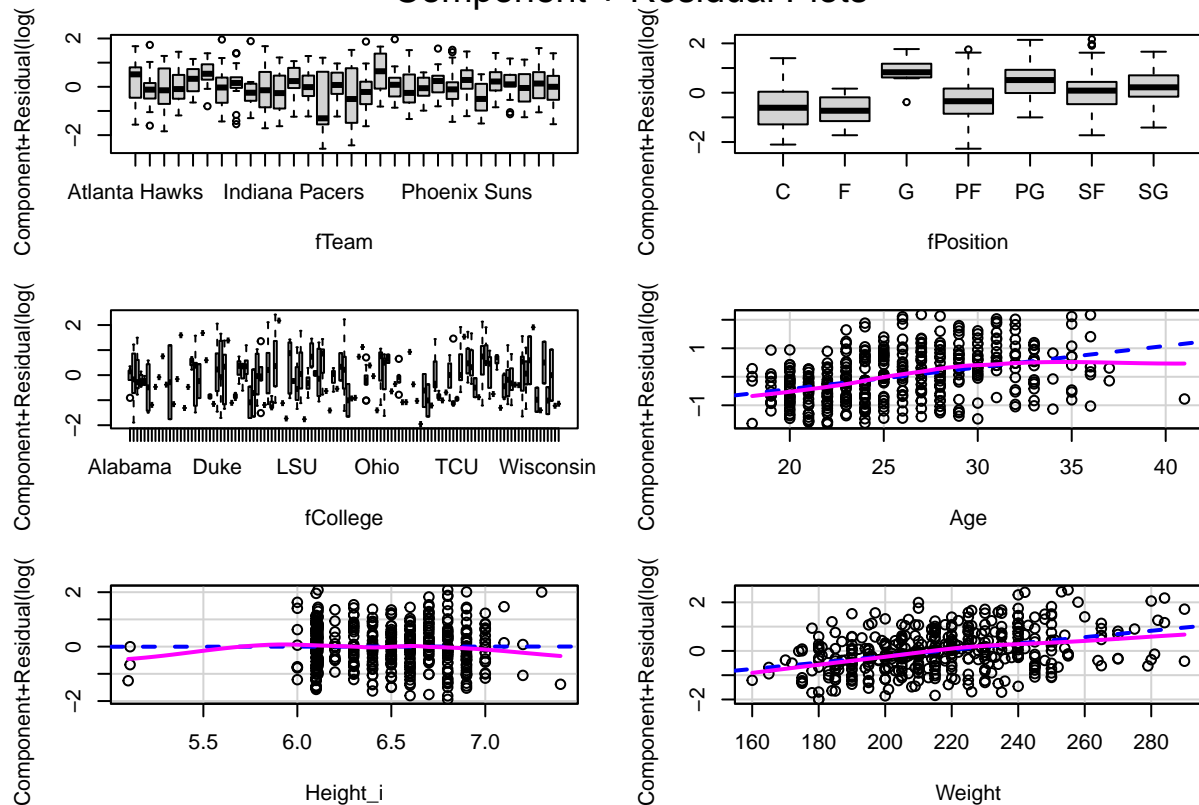
```
##
##  studentized Breusch-Pagan test
##
## data:  lm_l1
## BP = 183.73, df = 156, p-value = 0.06393
```

Check for Polynomial Terms

`Age`, `Height_i`, and `Weight` appear to be misspecified.

```
crPlots(lm_l1)
```

Component + Residual Plots


```
summary(lm(log(Salary) ~ fTeam+fPosition+fCollege+poly(Age,4)+poly(Height_i,4)+poly(Weight,4),data=ap_t
```

```
##
## Call:
## lm(formula = log(Salary) ~ fTeam + fPosition + fCollege + poly(Age,
##     4) + poly(Height_i, 4) + poly(Weight, 4), data = ap_tibble)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.1055 -0.4707  0.0000  0.4990  2.0111
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                14.985920   0.575932  26.020  < 2e-16 ***
## fTeamBoston Celtics        -0.334561   0.402752  -0.831  0.40686
## fTeamBrooklyn Nets         -0.344470   0.382860  -0.900  0.36904
## fTeamCharlotte Hornets     -0.227947   0.375239  -0.607  0.54403
## fTeamChicago Bulls          0.164216   0.419351   0.392  0.69566
## fTeamCleveland Cavaliers    0.317370   0.409392   0.775  0.43886
## fTeamDallas Mavericks      -0.441224   0.404041  -1.092  0.27576
## fTeamDenver Nuggets        -0.074952   0.398188  -0.188  0.85083
## fTeamDetroit Pistons       -0.440057   0.392050  -1.122  0.26264
## fTeamGolden State Warriors -0.365824   0.404455  -0.904  0.36652
## fTeamHouston Rockets       -0.367501   0.391924  -0.938  0.34922
## fTeamIndiana Pacers        -0.060367   0.398610  -0.151  0.87974
## fTeamLos Angeles Clippers  -0.352413   0.404887  -0.870  0.38483
```

```
## fTeamLos Angeles Lakers          -0.493325   0.430868   -1.145   0.25321
## fTeamMemphis Grizzlies           -0.153873   0.401888   -0.383   0.70210
## fTeamMiami Heat                   -0.414699   0.416831   -0.995   0.32065
## fTeamMilwaukee Bucks              -0.509732   0.403707   -1.263   0.20778
## fTeamMinnesota Timberwolves        0.361136   0.426151    0.847   0.39748
## fTeamNew Orleans Pelicans         -0.080034   0.378133   -0.212   0.83253
## fTeamNew York Knicks              -0.308336   0.384307   -0.802   0.42305
## fTeamOklahoma City Thunder        -0.250290   0.397859   -0.629   0.52980
## fTeamOrlando Magic                -0.019495   0.397165   -0.049   0.96089
## fTeamPhiladelphia Sixers          -0.291701   0.399637   -0.730   0.46605
## fTeamPhoenix Suns                  0.130230   0.402241    0.324   0.74636
## fTeamPortland Trail Blazers       -0.773598   0.448069   -1.727   0.08536 .
## fTeamSacramento Kings             -0.053402   0.403021   -0.133   0.89468
## fTeamSan Antonio Spurs            -0.099365   0.391240   -0.254   0.79970
## fTeamToronto Raptors              -0.139428   0.428791   -0.325   0.74530
## fTeamUtah Jazz                    -0.004998   0.410122   -0.012   0.99029
## fTeamWashington Wizards           -0.426259   0.374864   -1.137   0.25647
## fPositionF                        -0.016114   0.462802   -0.035   0.97225
## fPositionG                         1.172310   0.549417    2.134   0.03374 *
## fPositionPF                        0.206036   0.220796    0.933   0.35155
## fPositionPG                        1.119123   0.326097    3.432   0.00069 ***
## fPositionSF                        0.587899   0.268459    2.190   0.02936 *
## fPositionSG                        0.718515   0.313339    2.293   0.02259 *
## fCollegeArizona                    0.138030   0.566882    0.243   0.80780
## fCollegeArizona State              0.272155   0.736500    0.370   0.71202
## fCollegeArkansas                   0.074214   0.678607    0.109   0.91299
## fCollegeAuburn                    -0.074932   0.727253   -0.103   0.91801
## fCollegeBaylor                    -0.445013   0.650396   -0.684   0.49441
## fCollegeBelmont                   -0.935953   1.078433   -0.868   0.38620
## fCollegeBoise State               -0.467907   1.095396   -0.427   0.66959
## fCollegeBoston College            -0.170705   1.095452   -0.156   0.87628
## fCollegeBowling Green              0.582543   1.103884    0.528   0.59811
## fCollegeBucknell                  -0.614516   1.108070   -0.555   0.57962
## fCollegeButler                    -0.260556   0.843245   -0.309   0.75756
## fCollegeBYU                       -1.074582   1.092553   -0.984   0.32619
## fCollegeCal Poly                  -0.354920   1.094001   -0.324   0.74586
## fCollegeCalifornia                 1.743080   1.094629    1.592   0.11243
## fCollegeCharleston                -1.065971   1.116993   -0.954   0.34075
## fCollegeCleveland State           -0.646943   1.080032   -0.599   0.54966
## fCollegeColorado                   0.432665   0.730340    0.592   0.55405
## fCollegeConnecticut                0.216811   0.636699    0.341   0.73372
## fCollegeCreighton                 -0.338287   0.831430   -0.407   0.68441
## fCollegeDavidson                   1.954142   1.097462    1.781   0.07607 .
## fCollegeDayton                     0.647599   1.089139    0.595   0.55259
## fCollegeDePaul                    -0.847799   0.840091   -1.009   0.31376
## fCollegeDrexel                    -1.245004   1.091721   -1.140   0.25510
## fCollegeDuke                       0.348743   0.497794    0.701   0.48415
## fCollegeFlorida                    0.906625   0.669079    1.355   0.17650
## fCollegeFlorida State              0.167943   0.571200    0.294   0.76896
## fCollegeFresno State               1.393814   1.095295    1.273   0.20424
## fCollegeGeorge Washington         -1.357230   1.104749   -1.229   0.22028
## fCollegeGeorgetown                -0.623726   0.733069   -0.851   0.39559
## fCollegeGeorgia                    0.417385   0.732731    0.570   0.56939
## fCollegeGeorgia Tech               0.225802   0.733623    0.308   0.75847
```

```
## fCollegeGonzaga                     0.570543   0.597377    0.955   0.34036
## fCollegeHouston                     -0.960217   0.826208   -1.162   0.24615
## fCollegeIllinois                    -0.701977   0.874430   -0.803   0.42278
## fCollegeIndiana                     -0.015826   0.595313   -0.027   0.97881
## fCollegeIowa State                  -0.045290   0.636530   -0.071   0.94333
## fCollegeIUPUI                       -0.147250   1.215065   -0.121   0.90363
## fCollegeKansas                       0.388449   0.569704    0.682   0.49590
## fCollegeKansas State                -1.121567   0.726275   -1.544   0.12366
## fCollegeKentucky                     0.469333   0.494106    0.950   0.34300
## fCollegeLehigh                       2.229404   1.109371    2.010   0.04544 *
## fCollegeLiberty                     -0.768699   1.089769   -0.705   0.48116
## fCollegeLouisiana-Lafayette         -1.895728   1.098738   -1.725   0.08557 .
## fCollegeLouisville                   0.434428   0.639555    0.679   0.49753
## fCollegeLoyola (MD)                 -0.148011   1.097054   -0.135   0.89278
## fCollegeLSU                          0.024178   0.665433    0.036   0.97104
## fCollegeMarquette                    0.072079   0.739242    0.098   0.92240
## fCollegeMarshall                    -1.554231   1.104012   -1.408   0.16030
## fCollegeMaryland                    -0.256971   0.641576   -0.401   0.68907
## fCollegeMemphis                      0.813369   0.665848    1.222   0.22291
## fCollegeMiami (FL)                   0.298641   0.836539    0.357   0.72136
## fCollegeMichigan                     0.126565   0.582470    0.217   0.82814
## fCollegeMichigan State               0.688578   0.648394    1.062   0.28917
## fCollegeMinnesota                   -0.366206   1.099163   -0.333   0.73926
## fCollegeMississippi State           -0.983556   1.101422   -0.893   0.37263
## fCollegeMissouri                    -0.079400   0.726255   -0.109   0.91302
## fCollegeMissouri State              -0.495009   1.103204   -0.449   0.65400
## fCollegeMurray State                 0.433122   0.838196    0.517   0.60575
## fCollegenan                          0.291259   0.467052    0.624   0.53339
## fCollegeNebraska                    -0.984789   0.853372   -1.154   0.24949
## fCollegeNevada                      -0.688467   0.843178   -0.817   0.41490
## fCollegeNew Mexico                  -0.989357   1.107513   -0.893   0.37246
## fCollegeNew Mexico JC                0.421950   1.127670    0.374   0.70856
## fCollegeNew Mexico State             0.755132   1.118196    0.675   0.50004
## fCollegeNorth Carolina              -0.058423   0.557450   -0.105   0.91661
## fCollegeNorth Carolina State         0.276396   1.091863    0.253   0.80035
## fCollegeNotre Dame                  -0.057292   1.091000   -0.053   0.95816
## fCollegeOhio                        -0.942755   1.105306   -0.853   0.39443
## fCollegeOhio State                   0.278541   0.736414    0.378   0.70554
## fCollegeOklahoma                     0.052091   0.729940    0.071   0.94316
## fCollegeOklahoma State               0.563505   0.845068    0.667   0.50544
## fCollegeOld Dominion                -0.957466   1.109709   -0.863   0.38898
## fCollegeOle Miss                    -0.090820   1.097902   -0.083   0.93413
## fCollegeOregon                       0.030303   0.635824    0.048   0.96202
## fCollegeOregon State                -0.880901   1.085792   -0.811   0.41789
## fCollegePenn State                  -1.095124   1.142585   -0.958   0.33866
## fCollegePittsburgh                   1.057459   1.108243    0.954   0.34082
## fCollegeProvidence                  -0.542255   1.096725   -0.494   0.62139
## fCollegePurdue                       0.242111   1.304969    0.186   0.85295
## fCollegeRadford                     -2.228174   1.099710   -2.026   0.04370 *
## fCollegeSaint Joseph's              -0.628563   0.864200   -0.727   0.46763
## fCollegeSaint Mary's                -0.808418   0.829104   -0.975   0.33038
## fCollegeSalt Lake CC UT             -1.347884   1.095649   -1.230   0.21965
## fCollegeSan Diego State              0.212956   0.733059    0.291   0.77165
## fCollegeSMU                         -0.630106   0.741398   -0.850   0.39612
```

```
## fCollegeSouth Carolina          -0.889834   1.075320   -0.828   0.40866
## fCollegeSt. John's              -0.784208   1.094238   -0.717   0.47418
## fCollegeStanford                 0.181613   0.625109    0.291   0.77163
## fCollegeSyracuse                -0.412793   0.644589   -0.640   0.52244
## fCollegeTCU                     -0.849912   0.844415   -1.007   0.31504
## fCollegeTennessee                0.495235   0.650833    0.761   0.44734
## fCollegeTennessee State          1.429864   1.115301    1.282   0.20089
## fCollegeTexas                    0.833757   0.548537    1.520   0.12965
## fCollegeTexas A&M                0.468629   0.678238    0.691   0.49017
## fCollegeTexas Tech              -0.009494   0.875559   -0.011   0.99136
## fCollegeUC Santa Barbara        -1.167094   1.096715   -1.064   0.28817
## fCollegeUCLA                     0.655328   0.548624    1.194   0.23330
## fCollegeUNLV                     0.762040   0.757625    1.006   0.31537
## fCollegeUSC                      0.265507   0.566300    0.469   0.63955
## fCollegeUSC Upstate             -0.815112   1.090387   -0.748   0.45536
## fCollegeUtah                     0.619594   0.728772    0.850   0.39595
## fCollegeUtah State              -1.195397   1.091589   -1.095   0.27442
## fCollegeVanderbilt              -0.243635   0.667884   -0.365   0.71555
## fCollegeVillanova               -0.092257   0.561105   -0.164   0.86952
## fCollegeVirginia                -0.111260   0.588360   -0.189   0.85015
## fCollegeVirginia Commonwealth   -0.167486   1.134433   -0.148   0.88273
## fCollegeVirginia Tech           -0.202923   1.058351   -0.192   0.84809
## fCollegeWake Forest              0.390108   0.639770    0.610   0.54252
## fCollegeWashington               0.262641   0.577936    0.454   0.64986
## fCollegeWashington State         0.772123   0.848757    0.910   0.36376
## fCollegeWeber State              1.848409   1.113438    1.660   0.09802 .
## fCollegeWest Virginia           -0.955060   0.836227   -1.142   0.25439
## fCollegeWestern Texas Coll. (J.C.) -1.255040  1.086845   -1.155   0.24918
## fCollegeWichita State            0.498073   0.851107    0.585   0.55888
## fCollegeWisconsin               -1.381830   0.869141   -1.590   0.11299
## fCollegeWyoming                  0.210203   0.850663    0.247   0.80501
## fCollegeXavier                  -1.087908   0.821073   -1.325   0.18626
## fCollegeYale                    -1.038398   1.098861   -0.945   0.34549
## poly(Age, 4)1                    6.903962   1.207197    5.719 2.76e-08 ***
## poly(Age, 4)2                   -3.977404   1.232603   -3.227  0.00140 **
## poly(Age, 4)3                   -2.905055   1.140129   -2.548  0.01137 *
## poly(Age, 4)4                    1.101345   1.122062    0.982  0.32718
## poly(Height_i, 4)1               0.502565   1.307691    0.384  0.70104
## poly(Height_i, 4)2              -1.150971   1.312028   -0.877  0.38111
## poly(Height_i, 4)3               1.647264   1.348978    1.221  0.22307
## poly(Height_i, 4)4              -1.142729   1.316481   -0.868  0.38613
## poly(Weight, 4)1                 5.813612   2.068403    2.811  0.00529 **
## poly(Weight, 4)2                -1.929609   1.358915   -1.420  0.15673
## poly(Weight, 4)3                 0.568692   1.229359    0.463  0.64402
## poly(Weight, 4)4                 1.229289   1.273031    0.966  0.33506
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9364 on 279 degrees of freedom
## Multiple R-squared:  0.4781, Adjusted R-squared:  0.1694
## F-statistic: 1.549 on 165 and 279 DF,  p-value: 0.0006718
summary(lm(log(Salary) ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+poly(Weight,3),data=ap_tibble))

##
```

```
## Call:
## lm(formula = log(Salary) ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + Height_i + poly(Weight, 3), data = ap_tibble)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.0785 -0.4995  0.0000  0.4827  2.0443
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                   14.809809   1.379704  10.734  < 2e-16 ***
## fTeamBoston Celtics           -0.380075   0.401408  -0.947 0.344519
## fTeamBrooklyn Nets            -0.338640   0.381470  -0.888 0.375440
## fTeamCharlotte Hornets        -0.239260   0.374656  -0.639 0.523591
## fTeamChicago Bulls             0.091227   0.413576   0.221 0.825578
## fTeamCleveland Cavaliers       0.297135   0.408867   0.727 0.467992
## fTeamDallas Mavericks         -0.401035   0.382828  -1.048 0.295733
## fTeamDenver Nuggets           -0.172278   0.392286  -0.439 0.660876
## fTeamDetroit Pistons          -0.454556   0.391639  -1.161 0.246759
## fTeamGolden State Warriors    -0.358161   0.401645  -0.892 0.373290
## fTeamHouston Rockets          -0.456953   0.386464  -1.182 0.238038
## fTeamIndiana Pacers           -0.049226   0.396136  -0.124 0.901194
## fTeamLos Angeles Clippers     -0.321362   0.404253  -0.795 0.427305
## fTeamLos Angeles Lakers       -0.556980   0.426272  -1.307 0.192395
## fTeamMemphis Grizzlies        -0.161855   0.401145  -0.403 0.686898
## fTeamMiami Heat               -0.417330   0.414954  -1.006 0.315403
## fTeamMilwaukee Bucks          -0.515829   0.403643  -1.278 0.202316
## fTeamMinnesota Timberwolves    0.319350   0.424177   0.753 0.452152
## fTeamNew Orleans Pelicans     -0.091599   0.378058  -0.242 0.808731
## fTeamNew York Knicks          -0.318799   0.384333  -0.829 0.407526
## fTeamOklahoma City Thunder    -0.302577   0.395000  -0.766 0.444301
## fTeamOrlando Magic            -0.017101   0.396780  -0.043 0.965652
## fTeamPhiladelphia Sixers      -0.243457   0.398563  -0.611 0.541796
## fTeamPhoenix Suns              0.123298   0.402197   0.307 0.759402
## fTeamPortland Trail Blazers   -0.721240   0.445653  -1.618 0.106688
## fTeamSacramento Kings         -0.042519   0.402859  -0.106 0.916019
## fTeamSan Antonio Spurs        -0.134026   0.389351  -0.344 0.730929
## fTeamToronto Raptors          -0.157084   0.427361  -0.368 0.713470
## fTeamUtah Jazz                -0.038817   0.409661  -0.095 0.924577
## fTeamWashington Wizards       -0.398454   0.374618  -1.064 0.288401
## fPositionF                    -0.072886   0.446555  -0.163 0.870463
## fPositionG                     1.142549   0.532720   2.145 0.032821 *
## fPositionPF                    0.229397   0.202821   1.131 0.258995
## fPositionPG                    1.067762   0.310955   3.434 0.000684 ***
## fPositionSF                    0.560643   0.232773   2.409 0.016654 *
## fPositionSG                    0.662209   0.275680   2.402 0.016944 *
## fCollegeArizona                0.048479   0.564166   0.086 0.931583
## fCollegeArizona State          0.235090   0.732744   0.321 0.748571
## fCollegeArkansas               0.048476   0.671485   0.072 0.942500
## fCollegeAuburn                -0.172819   0.723245  -0.239 0.811317
## fCollegeBaylor                -0.535648   0.648242  -0.826 0.409322
## fCollegeBelmont               -1.102969   1.075426  -1.026 0.305947
## fCollegeBoise State           -0.587426   1.093080  -0.537 0.591409
## fCollegeBoston College        -0.201135   1.094308  -0.184 0.854300
```

```
## fCollegeBowling Green              0.613315   1.102651    0.556 0.578499
## fCollegeBucknell                  -0.551000   1.106200   -0.498 0.618798
## fCollegeButler                    -0.322330   0.841456   -0.383 0.701961
## fCollegeBYU                       -1.146697   1.092112   -1.050 0.294619
## fCollegeCal Poly                  -0.320299   1.091478   -0.293 0.769389
## fCollegeCalifornia                 1.691214   1.094441    1.545 0.123393
## fCollegeCharleston                -1.313540   1.102998   -1.191 0.234694
## fCollegeCleveland State           -0.586924   1.079110   -0.544 0.586940
## fCollegeColorado                   0.367249   0.726750    0.505 0.613718
## fCollegeConnecticut                0.117286   0.633378    0.185 0.853224
## fCollegeCreighton                 -0.318330   0.831106   -0.383 0.701992
## fCollegeDavidson                   1.767803   1.087929    1.625 0.105288
## fCollegeDayton                     0.546640   1.086996    0.503 0.615431
## fCollegeDePaul                    -0.963035   0.836664   -1.151 0.250683
## fCollegeDrexel                    -1.302987   1.091680   -1.194 0.233646
## fCollegeDuke                       0.247446   0.494743    0.500 0.617356
## fCollegeFlorida                    0.920876   0.662750    1.389 0.165776
## fCollegeFlorida State              0.062826   0.568786    0.110 0.912125
## fCollegeFresno State               1.363924   1.092893    1.248 0.213061
## fCollegeGeorge Washington         -1.335242   1.103843   -1.210 0.227427
## fCollegeGeorgetown                -0.754233   0.725753   -1.039 0.299576
## fCollegeGeorgia                    0.332616   0.729419    0.456 0.648737
## fCollegeGeorgia Tech               0.097783   0.730507    0.134 0.893611
## fCollegeGonzaga                    0.452207   0.593709    0.762 0.446893
## fCollegeHouston                   -1.064758   0.823884   -1.292 0.197282
## fCollegeIllinois                  -0.779280   0.873768   -0.892 0.373222
## fCollegeIndiana                   -0.048893   0.594230   -0.082 0.934482
## fCollegeIowa State                -0.119682   0.632356   -0.189 0.850021
## fCollegeIUPUI                     -0.422738   1.200655   -0.352 0.725032
## fCollegeKansas                     0.299327   0.566429    0.528 0.597602
## fCollegeKansas State              -1.217563   0.725172   -1.679 0.094252 .
## fCollegeKentucky                   0.376378   0.491530    0.766 0.444474
## fCollegeLehigh                     2.092190   1.104259    1.895 0.059154 .
## fCollegeLiberty                   -0.942454   1.086735   -0.867 0.386546
## fCollegeLouisiana-Lafayette       -1.973812   1.094078   -1.804 0.072277 .
## fCollegeLouisville                 0.394656   0.639186    0.617 0.537442
## fCollegeLoyola (MD)               -0.170647   1.095403   -0.156 0.876314
## fCollegeLSU                       -0.124094   0.660496   -0.188 0.851105
## fCollegeMarquette                 -0.031006   0.736089   -0.042 0.966431
## fCollegeMarshall                  -1.729902   1.097641   -1.576 0.116135
## fCollegeMaryland                  -0.334012   0.639315   -0.522 0.601762
## fCollegeMemphis                    0.749364   0.664371    1.128 0.260301
## fCollegeMiami (FL)                 0.146896   0.831634    0.177 0.859920
## fCollegeMichigan                   0.032993   0.579865    0.057 0.954667
## fCollegeMichigan State             0.549882   0.642540    0.856 0.392833
## fCollegeMinnesota                 -0.544810   1.091016   -0.499 0.617912
## fCollegeMississippi State         -1.180407   1.096155   -1.077 0.282456
## fCollegeMissouri                  -0.107526   0.723091   -0.149 0.881893
## fCollegeMissouri State            -0.648893   1.099361   -0.590 0.555495
## fCollegeMurray State               0.397596   0.836999    0.475 0.635134
## fCollegenan                        0.217208   0.465589    0.467 0.641199
## fCollegeNebraska                  -1.064285   0.848824   -1.254 0.210933
## fCollegeNevada                    -0.870334   0.837797   -1.039 0.299764
## fCollegeNew Mexico                -1.105855   1.106286   -1.000 0.318350
```

```
## fCollegeNew Mexico JC                0.358664   1.126138   0.318 0.750347
## fCollegeNew Mexico State             0.818091   1.116631   0.733 0.464381
## fCollegeNorth Carolina              -0.180289   0.553736  -0.326 0.744977
## fCollegeNorth Carolina State         0.270826   1.090356   0.248 0.804017
## fCollegeNotre Dame                  -0.105588   1.090641  -0.097 0.922943
## fCollegeOhio                        -1.211489   1.091325  -1.110 0.267891
## fCollegeOhio State                   0.247559   0.733719   0.337 0.736062
## fCollegeOklahoma                    -0.043336   0.727780  -0.060 0.952560
## fCollegeOklahoma State               0.597181   0.842500   0.709 0.479017
## fCollegeOld Dominion                -1.087634   1.103461  -0.986 0.325141
## fCollegeOle Miss                    -0.258574   1.094292  -0.236 0.813376
## fCollegeOregon                      -0.046748   0.631698  -0.074 0.941060
## fCollegeOregon State                -1.024640   1.081630  -0.947 0.344286
## fCollegePenn State                  -1.183250   1.139295  -1.039 0.299883
## fCollegePittsburgh                   0.948480   1.100845   0.862 0.389639
## fCollegeProvidence                  -0.536660   1.093568  -0.491 0.623988
## fCollegePurdue                      -0.933888   1.117782  -0.835 0.404148
## fCollegeRadford                     -2.218833   1.098870  -2.019 0.044406 *
## fCollegeSaint Joseph's              -0.722193   0.862646  -0.837 0.403193
## fCollegeSaint Mary's                -0.881696   0.826474  -1.067 0.286961
## fCollegeSalt Lake CC UT             -1.431114   1.092770  -1.310 0.191383
## fCollegeSan Diego State              0.146699   0.732404   0.200 0.841391
## fCollegeSMU                         -0.796936   0.734277  -1.085 0.278694
## fCollegeSouth Carolina              -0.938457   1.072226  -0.875 0.382182
## fCollegeSt. John's                  -0.821901   1.094226  -0.751 0.453199
## fCollegeStanford                     0.185369   0.615315   0.301 0.763438
## fCollegeSyracuse                    -0.536655   0.641629  -0.836 0.403636
## fCollegeTCU                         -0.938488   0.841386  -1.115 0.265619
## fCollegeTennessee                    0.394081   0.642700   0.613 0.540259
## fCollegeTennessee State              1.257801   1.112527   1.131 0.259186
## fCollegeTexas                        0.629596   0.540110   1.166 0.244721
## fCollegeTexas A&M                    0.427801   0.677872   0.631 0.528487
## fCollegeTexas Tech                  -0.215530   0.868119  -0.248 0.804103
## fCollegeUC Santa Barbara            -1.271273   1.093240  -1.163 0.245867
## fCollegeUCLA                         0.569353   0.546706   1.041 0.298565
## fCollegeUNLV                         0.772476   0.756118   1.022 0.307823
## fCollegeUSC                          0.180765   0.562985   0.321 0.748384
## fCollegeUSC Upstate                 -0.864956   1.089805  -0.794 0.428045
## fCollegeUtah                         0.575333   0.725706   0.793 0.428561
## fCollegeUtah State                  -1.298610   1.088945  -1.193 0.234045
## fCollegeVanderbilt                  -0.335306   0.664792  -0.504 0.614387
## fCollegeVillanova                   -0.192626   0.558173  -0.345 0.730274
## fCollegeVirginia                    -0.201038   0.586470  -0.343 0.732007
## fCollegeVirginia Commonwealth        0.081879   1.102800   0.074 0.940867
## fCollegeVirginia Tech               -0.360218   1.055788  -0.341 0.733217
## fCollegeWake Forest                  0.333666   0.633397   0.527 0.598752
## fCollegeWashington                   0.105590   0.572313   0.184 0.853755
## fCollegeWashington State             0.612052   0.843702   0.725 0.468782
## fCollegeWeber State                  1.737909   1.109867   1.566 0.118492
## fCollegeWest Virginia               -0.986491   0.835061  -1.181 0.238456
## fCollegeWestern Texas Coll. (J.C.)  -1.324479   1.083579  -1.222 0.222600
## fCollegeWichita State                0.433860   0.848903   0.511 0.609690
## fCollegeWisconsin                   -1.358455   0.865976  -1.569 0.117832
## fCollegeWyoming                      0.003562   0.844217   0.004 0.996637
```

```
## fCollegeXavier                       -1.230794   0.817607  -1.505 0.133342
## fCollegeYale                         -1.151266   1.097508  -1.049 0.295078
## poly(Age, 3)1                         6.687217   1.201732   5.565 6.07e-08 ***
## poly(Age, 3)2                        -3.885756   1.228970  -3.162 0.001738 **
## poly(Age, 3)3                        -2.789428   1.137655  -2.452 0.014812 *
## Height_i                              0.046791   0.192589   0.243 0.808214
## poly(Weight, 3)1                      5.896807   2.058519   2.865 0.004487 **
## poly(Weight, 3)2                     -1.794283   1.321939  -1.357 0.175760
## poly(Weight, 3)3                      0.516757   1.192484   0.433 0.665093
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9369 on 284 degrees of freedom
## Multiple R-squared:  0.4681, Adjusted R-squared:  0.1685
## F-statistic: 1.562 on 160 and 284 DF,  p-value: 0.0005652
```

```r
summary(lm(log(Salary) ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+Weight,data=ap_tibble))
```

```
##
## Call:
## lm(formula = log(Salary) ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + Height_i + Weight, data = ap_tibble)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.0695 -0.4836  0.0000  0.4824  2.0273
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 12.043683   1.618465   7.441 1.17e-12 ***
## fTeamBoston Celtics         -0.374141   0.401161  -0.933 0.351789
## fTeamBrooklyn Nets          -0.340770   0.381275  -0.894 0.372199
## fTeamCharlotte Hornets      -0.233372   0.373607  -0.625 0.532702
## fTeamChicago Bulls           0.087408   0.412825   0.212 0.832467
## fTeamCleveland Cavaliers     0.313679   0.408627   0.768 0.443334
## fTeamDallas Mavericks       -0.400137   0.382434  -1.046 0.296310
## fTeamDenver Nuggets         -0.160452   0.390948  -0.410 0.681806
## fTeamDetroit Pistons        -0.419976   0.390679  -1.075 0.283286
## fTeamGolden State Warriors  -0.315033   0.398640  -0.790 0.430025
## fTeamHouston Rockets        -0.425153   0.385569  -1.103 0.271099
## fTeamIndiana Pacers         -0.054030   0.395798  -0.137 0.891514
## fTeamLos Angeles Clippers   -0.283448   0.403258  -0.703 0.482693
## fTeamLos Angeles Lakers     -0.558302   0.426090  -1.310 0.191149
## fTeamMemphis Grizzlies      -0.143422   0.400772  -0.358 0.720708
## fTeamMiami Heat             -0.389433   0.414397  -0.940 0.348135
## fTeamMilwaukee Bucks        -0.500471   0.402448  -1.244 0.214677
## fTeamMinnesota Timberwolves  0.320329   0.421986   0.759 0.448419
## fTeamNew Orleans Pelicans   -0.114140   0.375081  -0.304 0.761115
## fTeamNew York Knicks        -0.270026   0.382483  -0.706 0.480774
## fTeamOklahoma City Thunder  -0.344376   0.393016  -0.876 0.381635
## fTeamOrlando Magic          -0.002917   0.395950  -0.007 0.994127
## fTeamPhiladelphia Sixers    -0.256713   0.397496  -0.646 0.518909
## fTeamPhoenix Suns            0.134262   0.401398   0.334 0.738259
## fTeamPortland Trail Blazers -0.746262   0.439902  -1.696 0.090893 .
## fTeamSacramento Kings       -0.030373   0.402664  -0.075 0.939925
```

```
## fTeamSan Antonio Spurs        -0.116766  0.388850  -0.300 0.764178
## fTeamToronto Raptors          -0.166230  0.427117  -0.389 0.697424
## fTeamUtah Jazz                 -0.055919  0.409409  -0.137 0.891455
## fTeamWashington Wizards        -0.359851  0.372541  -0.966 0.334892
## fPositionF                      0.026966  0.438897   0.061 0.951052
## fPositionG                      1.201822  0.521891   2.303 0.022007 *
## fPositionPF                     0.313371  0.193428   1.620 0.106314
## fPositionPG                     1.080926  0.299544   3.609 0.000363 ***
## fPositionSF                     0.669712  0.214689   3.119 0.001997 **
## fPositionSG                     0.745132  0.255238   2.919 0.003786 **
## fCollegeArizona                 0.085742  0.563429   0.152 0.879153
## fCollegeArizona State           0.325108  0.729729   0.446 0.656282
## fCollegeArkansas               -0.008287  0.667780  -0.012 0.990107
## fCollegeAuburn                 -0.115713  0.721079  -0.160 0.872623
## fCollegeBaylor                 -0.471312  0.645839  -0.730 0.466130
## fCollegeBelmont                -1.090632  1.073431  -1.016 0.310476
## fCollegeBoise State            -0.544291  1.091196  -0.499 0.618302
## fCollegeBoston College         -0.078651  1.089848  -0.072 0.942520
## fCollegeBowling Green           0.731551  1.099119   0.666 0.506216
## fCollegeBucknell               -0.398495  1.100104  -0.362 0.717444
## fCollegeButler                 -0.268787  0.839275  -0.320 0.749004
## fCollegeBYU                    -1.080330  1.090871  -0.990 0.322846
## fCollegeCal Poly               -0.294131  1.090829  -0.270 0.787632
## fCollegeCalifornia              1.762453  1.093011   1.612 0.107961
## fCollegeCharleston             -1.337265  1.102472  -1.213 0.226142
## fCollegeCleveland State        -0.527030  1.077495  -0.489 0.625128
## fCollegeColorado                0.432306  0.725008   0.596 0.551462
## fCollegeConnecticut             0.053908  0.631152   0.085 0.931993
## fCollegeCreighton              -0.277264  0.830394  -0.334 0.738704
## fCollegeDavidson                1.750097  1.087678   1.609 0.108715
## fCollegeDayton                  0.574159  1.085014   0.529 0.597097
## fCollegeDePaul                 -0.901192  0.834788  -1.080 0.281254
## fCollegeDrexel                 -1.263824  1.091128  -1.158 0.247719
## fCollegeDuke                    0.260423  0.493076   0.528 0.597798
## fCollegeFlorida                 0.980413  0.661083   1.483 0.139165
## fCollegeFlorida State           0.100377  0.567921   0.177 0.859834
## fCollegeFresno State            1.408751  1.092144   1.290 0.198129
## fCollegeGeorge Washington      -1.274873  1.100918  -1.158 0.247826
## fCollegeGeorgetown             -0.802373  0.723236  -1.109 0.268180
## fCollegeGeorgia                 0.394645  0.727542   0.542 0.587941
## fCollegeGeorgia Tech            0.122449  0.730174   0.168 0.866939
## fCollegeGonzaga                 0.471640  0.593426   0.795 0.427404
## fCollegeHouston                -1.017824  0.822399  -1.238 0.216869
## fCollegeIllinois               -0.740160  0.872024  -0.849 0.396712
## fCollegeIndiana                -0.005835  0.593214  -0.010 0.992159
## fCollegeIowa State             -0.094649  0.631855  -0.150 0.881032
## fCollegeIUPUI                  -0.419290  1.200436  -0.349 0.727135
## fCollegeKansas                  0.287996  0.563945   0.511 0.609968
## fCollegeKansas State           -1.193704  0.723151  -1.651 0.099898 .
## fCollegeKentucky                0.411688  0.490453   0.839 0.401944
## fCollegeLehigh                  2.108315  1.103957   1.910 0.057162 .
## fCollegeLiberty                -0.911002  1.086100  -0.839 0.402292
## fCollegeLouisiana-Lafayette    -1.888017  1.091309  -1.730 0.084700 .
## fCollegeLouisville              0.440683  0.638201   0.691 0.490435
```

```
## fCollegeLoyola (MD)              -0.087411   1.090567   -0.080 0.936172
## fCollegeLSU                      -0.074724   0.659185   -0.113 0.909826
## fCollegeMarquette                -0.014981   0.735882   -0.020 0.983772
## fCollegeMarshall                 -1.768418   1.097019   -1.612 0.108060
## fCollegeMaryland                 -0.308302   0.638628   -0.483 0.629638
## fCollegeMemphis                   0.765476   0.664057    1.153 0.249985
## fCollegeMiami (FL)                0.194588   0.828388    0.235 0.814455
## fCollegeMichigan                  0.070056   0.578836    0.121 0.903753
## fCollegeMichigan State            0.586704   0.641745    0.914 0.361364
## fCollegeMinnesota                -0.463466   1.089123   -0.426 0.670763
## fCollegeMississippi State        -1.174394   1.095252   -1.072 0.284507
## fCollegeMissouri                 -0.048929   0.721458   -0.068 0.945976
## fCollegeMissouri State           -0.567238   1.093369   -0.519 0.604302
## fCollegeMurray State              0.315173   0.834678    0.378 0.706009
## fCollegenan                       0.231327   0.465192    0.497 0.619379
## fCollegeNebraska                 -0.901567   0.839858   -1.073 0.283963
## fCollegeNevada                   -0.898709   0.836135   -1.075 0.283353
## fCollegeNew Mexico               -1.022391   1.104434   -0.926 0.355375
## fCollegeNew Mexico JC             0.410371   1.115735    0.368 0.713292
## fCollegeNew Mexico State          0.947580   1.111711    0.852 0.394726
## fCollegeNorth Carolina           -0.127039   0.552020   -0.230 0.818152
## fCollegeNorth Carolina State      0.326403   1.089318    0.300 0.764670
## fCollegeNotre Dame               -0.040278   1.089423   -0.037 0.970533
## fCollegeOhio                     -1.214985   1.089890   -1.115 0.265882
## fCollegeOhio State                0.247982   0.733578    0.338 0.735578
## fCollegeOklahoma                 -0.044424   0.727575   -0.061 0.951356
## fCollegeOklahoma State            0.735074   0.836376    0.879 0.380204
## fCollegeOld Dominion             -1.077595   1.097835   -0.982 0.327144
## fCollegeOle Miss                 -0.211418   1.092271   -0.194 0.846659
## fCollegeOregon                    0.018247   0.628634    0.029 0.976864
## fCollegeOregon State             -1.060304   1.080628   -0.981 0.327327
## fCollegePenn State               -1.158480   1.138953   -1.017 0.309944
## fCollegePittsburgh                0.883148   1.099561    0.803 0.422537
## fCollegeProvidence               -0.398284   1.086973   -0.366 0.714325
## fCollegePurdue                   -0.787739   1.109700   -0.710 0.478365
## fCollegeRadford                  -2.072153   1.093241   -1.895 0.059045 .
## fCollegeSaint Joseph's           -0.644945   0.859084   -0.751 0.453429
## fCollegeSaint Mary's             -0.894140   0.826235   -1.082 0.280082
## fCollegeSalt Lake CC UT          -1.376906   1.091550   -1.261 0.208184
## fCollegeSan Diego State           0.135275   0.731456    0.185 0.853408
## fCollegeSMU                      -0.750477   0.733385   -1.023 0.307028
## fCollegeSouth Carolina           -0.880228   1.071066   -0.822 0.411862
## fCollegeSt. John's               -0.781249   1.093349   -0.715 0.475472
## fCollegeStanford                  0.072780   0.609349    0.119 0.905011
## fCollegeSyracuse                 -0.484707   0.638895   -0.759 0.448678
## fCollegeTCU                      -0.855784   0.838656   -1.020 0.308390
## fCollegeTennessee                 0.442793   0.640969    0.691 0.490240
## fCollegeTennessee State           1.361532   1.108954    1.228 0.220546
## fCollegeTexas                     0.698902   0.537613    1.300 0.194644
## fCollegeTexas A&M                 0.457468   0.677298    0.675 0.499948
## fCollegeTexas Tech               -0.206779   0.866866   -0.239 0.811636
## fCollegeUC Santa Barbara         -1.173666   1.088908   -1.078 0.282014
## fCollegeUCLA                      0.630161   0.544640    1.157 0.248228
## fCollegeUNLV                      0.885205   0.749335    1.181 0.238457
```

```
## fCollegeUSC                         0.241331    0.560813    0.430 0.667284
## fCollegeUSC Upstate                -0.805572    1.088740   -0.740 0.459961
## fCollegeUtah                        0.577608    0.725571    0.796 0.426650
## fCollegeUtah State                 -1.243961    1.087253   -1.144 0.253526
## fCollegeVanderbilt                 -0.295474    0.663197   -0.446 0.656274
## fCollegeVillanova                  -0.139847    0.556525   -0.251 0.801774
## fCollegeVirginia                   -0.135298    0.584445   -0.231 0.817094
## fCollegeVirginia Commonwealth      -0.216397    1.066977   -0.203 0.839425
## fCollegeVirginia Tech              -0.266175    1.053418   -0.253 0.800699
## fCollegeWake Forest                 0.320538    0.633125    0.506 0.613051
## fCollegeWashington                  0.116028    0.571790    0.203 0.839341
## fCollegeWashington State            0.675958    0.842035    0.803 0.422776
## fCollegeWeber State                 1.868116    1.105667    1.690 0.092197 .
## fCollegeWest Virginia              -0.876868    0.829673   -1.057 0.291457
## fCollegeWestern Texas Coll. (J.C.) -1.266890    1.081735   -1.171 0.242507
## fCollegeWichita State               0.449096    0.846889    0.530 0.596323
## fCollegeWisconsin                  -1.327434    0.865514   -1.534 0.126210
## fCollegeWyoming                    -0.006288    0.843848   -0.007 0.994060
## fCollegeXavier                     -1.138664    0.814496   -1.398 0.163197
## fCollegeYale                       -1.059210    1.094291   -0.968 0.333891
## poly(Age, 3)1                       6.632580    1.200878    5.523 7.49e-08 ***
## poly(Age, 3)2                      -4.034700    1.223344   -3.298 0.001097 **
## poly(Age, 3)3                      -2.816061    1.135647   -2.480 0.013725 *
## Height_i                            0.067048    0.191933    0.349 0.727098
## Weight                             0.011685    0.003831    3.050 0.002500 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9368 on 286 degrees of freedom
## Multiple R-squared:  0.4646, Adjusted R-squared:  0.1688
## F-statistic: 1.571 on 158 and 286 DF,  p-value: 0.0005046
```

The end result is that only `Age` has been misspecified, and has been re-specified as `poly(Age,3)`.

```
# Resulting Full model with polynomial terms
summary(lm_log1 <- lm(log(Salary) ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+Weight, data=ap_tibbl
```

```
##
## Call:
## lm(formula = log(Salary) ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + Height_i + Weight, data = ap_tibble)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.0695 -0.4836  0.0000  0.4824  2.0273
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 12.043683   1.618465   7.441 1.17e-12 ***
## fTeamBoston Celtics         -0.374141   0.401161  -0.933 0.351789
## fTeamBrooklyn Nets          -0.340770   0.381275  -0.894 0.372199
## fTeamCharlotte Hornets      -0.233372   0.373607  -0.625 0.532702
## fTeamChicago Bulls           0.087408   0.412825   0.212 0.832467
## fTeamCleveland Cavaliers     0.313679   0.408627   0.768 0.443334
## fTeamDallas Mavericks       -0.400137   0.382434  -1.046 0.296310
```

```
## fTeamDenver Nuggets              -0.160452   0.390948   -0.410 0.681806
## fTeamDetroit Pistons             -0.419976   0.390679   -1.075 0.283286
## fTeamGolden State Warriors       -0.315033   0.398640   -0.790 0.430025
## fTeamHouston Rockets             -0.425153   0.385569   -1.103 0.271099
## fTeamIndiana Pacers              -0.054030   0.395798   -0.137 0.891514
## fTeamLos Angeles Clippers        -0.283448   0.403258   -0.703 0.482693
## fTeamLos Angeles Lakers          -0.558302   0.426090   -1.310 0.191149
## fTeamMemphis Grizzlies           -0.143422   0.400772   -0.358 0.720708
## fTeamMiami Heat                  -0.389433   0.414397   -0.940 0.348135
## fTeamMilwaukee Bucks             -0.500471   0.402448   -1.244 0.214677
## fTeamMinnesota Timberwolves       0.320329   0.421986    0.759 0.448419
## fTeamNew Orleans Pelicans        -0.114140   0.375081   -0.304 0.761115
## fTeamNew York Knicks             -0.270026   0.382483   -0.706 0.480774
## fTeamOklahoma City Thunder       -0.344376   0.393016   -0.876 0.381635
## fTeamOrlando Magic               -0.002917   0.395950   -0.007 0.994127
## fTeamPhiladelphia Sixers         -0.256713   0.397496   -0.646 0.518909
## fTeamPhoenix Suns                 0.134262   0.401398    0.334 0.738259
## fTeamPortland Trail Blazers      -0.746262   0.439902   -1.696 0.090893 .
## fTeamSacramento Kings            -0.030373   0.402664   -0.075 0.939925
## fTeamSan Antonio Spurs           -0.116766   0.388850   -0.300 0.764178
## fTeamToronto Raptors             -0.166230   0.427117   -0.389 0.697424
## fTeamUtah Jazz                   -0.055919   0.409409   -0.137 0.891455
## fTeamWashington Wizards          -0.359851   0.372541   -0.966 0.334892
## fPositionF                        0.026966   0.438897    0.061 0.951052
## fPositionG                        1.201822   0.521891    2.303 0.022007 *
## fPositionPF                       0.313371   0.193428    1.620 0.106314
## fPositionPG                       1.080926   0.299544    3.609 0.000363 ***
## fPositionSF                       0.669712   0.214689    3.119 0.001997 **
## fPositionSG                       0.745132   0.255238    2.919 0.003786 **
## fCollegeArizona                   0.085742   0.563429    0.152 0.879153
## fCollegeArizona State             0.325108   0.729729    0.446 0.656282
## fCollegeArkansas                 -0.008287   0.667780   -0.012 0.990107
## fCollegeAuburn                   -0.115713   0.721079   -0.160 0.872623
## fCollegeBaylor                   -0.471312   0.645839   -0.730 0.466130
## fCollegeBelmont                  -1.090632   1.073431   -1.016 0.310476
## fCollegeBoise State              -0.544291   1.091196   -0.499 0.618302
## fCollegeBoston College           -0.078651   1.089848   -0.072 0.942520
## fCollegeBowling Green             0.731551   1.099119    0.666 0.506216
## fCollegeBucknell                 -0.398495   1.100104   -0.362 0.717444
## fCollegeButler                   -0.268787   0.839275   -0.320 0.749004
## fCollegeBYU                      -1.080330   1.090871   -0.990 0.322846
## fCollegeCal Poly                 -0.294131   1.090829   -0.270 0.787632
## fCollegeCalifornia                1.762453   1.093011    1.612 0.107961
## fCollegeCharleston               -1.337265   1.102472   -1.213 0.226142
## fCollegeCleveland State          -0.527030   1.077495   -0.489 0.625128
## fCollegeColorado                  0.432306   0.725008    0.596 0.551462
## fCollegeConnecticut               0.053908   0.631152    0.085 0.931993
## fCollegeCreighton                -0.277264   0.830394   -0.334 0.738704
## fCollegeDavidson                  1.750097   1.087678    1.609 0.108715
## fCollegeDayton                    0.574159   1.085014    0.529 0.597097
## fCollegeDePaul                   -0.901192   0.834788   -1.080 0.281254
## fCollegeDrexel                   -1.263824   1.091128   -1.158 0.247719
## fCollegeDuke                      0.260423   0.493076    0.528 0.597798
## fCollegeFlorida                   0.980413   0.661083    1.483 0.139165
```

```
## fCollegeFlorida State              0.100377   0.567921    0.177 0.859834
## fCollegeFresno State               1.408751   1.092144    1.290 0.198129
## fCollegeGeorge Washington         -1.274873   1.100918   -1.158 0.247826
## fCollegeGeorgetown                -0.802373   0.723236   -1.109 0.268180
## fCollegeGeorgia                    0.394645   0.727542    0.542 0.587941
## fCollegeGeorgia Tech               0.122449   0.730174    0.168 0.866939
## fCollegeGonzaga                    0.471640   0.593426    0.795 0.427404
## fCollegeHouston                   -1.017824   0.822399   -1.238 0.216869
## fCollegeIllinois                  -0.740160   0.872024   -0.849 0.396712
## fCollegeIndiana                   -0.005835   0.593214   -0.010 0.992159
## fCollegeIowa State                -0.094649   0.631855   -0.150 0.881032
## fCollegeIUPUI                     -0.419290   1.200436   -0.349 0.727135
## fCollegeKansas                     0.287996   0.563945    0.511 0.609968
## fCollegeKansas State              -1.193704   0.723151   -1.651 0.099898 .
## fCollegeKentucky                   0.411688   0.490453    0.839 0.401944
## fCollegeLehigh                     2.108315   1.103957    1.910 0.057162 .
## fCollegeLiberty                   -0.911002   1.086100   -0.839 0.402292
## fCollegeLouisiana-Lafayette       -1.888017   1.091309   -1.730 0.084700 .
## fCollegeLouisville                 0.440683   0.638201    0.691 0.490435
## fCollegeLoyola (MD)               -0.087411   1.090567   -0.080 0.936172
## fCollegeLSU                       -0.074724   0.659185   -0.113 0.909826
## fCollegeMarquette                 -0.014981   0.735882   -0.020 0.983772
## fCollegeMarshall                  -1.768418   1.097019   -1.612 0.108060
## fCollegeMaryland                  -0.308302   0.638628   -0.483 0.629638
## fCollegeMemphis                    0.765476   0.664057    1.153 0.249985
## fCollegeMiami (FL)                 0.194588   0.828388    0.235 0.814455
## fCollegeMichigan                   0.070056   0.578836    0.121 0.903753
## fCollegeMichigan State             0.586704   0.641745    0.914 0.361364
## fCollegeMinnesota                 -0.463466   1.089123   -0.426 0.670763
## fCollegeMississippi State         -1.174394   1.095252   -1.072 0.284507
## fCollegeMissouri                  -0.048929   0.721458   -0.068 0.945976
## fCollegeMissouri State            -0.567238   1.093369   -0.519 0.604302
## fCollegeMurray State               0.315173   0.834678    0.378 0.706009
## fCollegenan                        0.231327   0.465192    0.497 0.619379
## fCollegeNebraska                  -0.901567   0.839858   -1.073 0.283963
## fCollegeNevada                    -0.898709   0.836135   -1.075 0.283353
## fCollegeNew Mexico                -1.022391   1.104434   -0.926 0.355375
## fCollegeNew Mexico JC              0.410371   1.115735    0.368 0.713292
## fCollegeNew Mexico State           0.947580   1.111711    0.852 0.394726
## fCollegeNorth Carolina            -0.127039   0.552020   -0.230 0.818152
## fCollegeNorth Carolina State       0.326403   1.089318    0.300 0.764670
## fCollegeNotre Dame                -0.040278   1.089423   -0.037 0.970533
## fCollegeOhio                      -1.214985   1.089890   -1.115 0.265882
## fCollegeOhio State                 0.247982   0.733578    0.338 0.735578
## fCollegeOklahoma                  -0.044424   0.727575   -0.061 0.951356
## fCollegeOklahoma State             0.735074   0.836376    0.879 0.380204
## fCollegeOld Dominion              -1.077595   1.097835   -0.982 0.327144
## fCollegeOle Miss                  -0.211418   1.092271   -0.194 0.846659
## fCollegeOregon                     0.018247   0.628634    0.029 0.976864
## fCollegeOregon State              -1.060304   1.080628   -0.981 0.327327
## fCollegePenn State                -1.158480   1.138953   -1.017 0.309944
## fCollegePittsburgh                 0.883148   1.099561    0.803 0.422537
## fCollegeProvidence                -0.398284   1.086973   -0.366 0.714325
## fCollegePurdue                    -0.787739   1.109700   -0.710 0.478365
```

```
## fCollegeRadford                      -2.072153   1.093241  -1.895 0.059045 .
## fCollegeSaint Joseph's               -0.644945   0.859084  -0.751 0.453429
## fCollegeSaint Mary's                 -0.894140   0.826235  -1.082 0.280082
## fCollegeSalt Lake CC UT              -1.376906   1.091550  -1.261 0.208184
## fCollegeSan Diego State               0.135275   0.731456   0.185 0.853408
## fCollegeSMU                          -0.750477   0.733385  -1.023 0.307028
## fCollegeSouth Carolina               -0.880228   1.071066  -0.822 0.411862
## fCollegeSt. John's                   -0.781249   1.093349  -0.715 0.475472
## fCollegeStanford                      0.072780   0.609349   0.119 0.905011
## fCollegeSyracuse                     -0.484707   0.638895  -0.759 0.448678
## fCollegeTCU                          -0.855784   0.838656  -1.020 0.308390
## fCollegeTennessee                     0.442793   0.640969   0.691 0.490240
## fCollegeTennessee State               1.361532   1.108954   1.228 0.220546
## fCollegeTexas                         0.698902   0.537613   1.300 0.194644
## fCollegeTexas A&M                     0.457468   0.677298   0.675 0.499948
## fCollegeTexas Tech                   -0.206779   0.866866  -0.239 0.811636
## fCollegeUC Santa Barbara             -1.173666   1.088908  -1.078 0.282014
## fCollegeUCLA                          0.630161   0.544640   1.157 0.248228
## fCollegeUNLV                          0.885205   0.749335   1.181 0.238457
## fCollegeUSC                           0.241331   0.560813   0.430 0.667284
## fCollegeUSC Upstate                  -0.805572   1.088740  -0.740 0.459961
## fCollegeUtah                          0.577608   0.725571   0.796 0.426650
## fCollegeUtah State                   -1.243961   1.087253  -1.144 0.253526
## fCollegeVanderbilt                   -0.295474   0.663197  -0.446 0.656274
## fCollegeVillanova                    -0.139847   0.556525  -0.251 0.801774
## fCollegeVirginia                     -0.135298   0.584445  -0.231 0.817094
## fCollegeVirginia Commonwealth        -0.216397   1.066977  -0.203 0.839425
## fCollegeVirginia Tech                -0.266175   1.053418  -0.253 0.800699
## fCollegeWake Forest                   0.320538   0.633125   0.506 0.613051
## fCollegeWashington                    0.116028   0.571790   0.203 0.839341
## fCollegeWashington State              0.675958   0.842035   0.803 0.422776
## fCollegeWeber State                   1.868116   1.105667   1.690 0.092197 .
## fCollegeWest Virginia                -0.876868   0.829673  -1.057 0.291457
## fCollegeWestern Texas Coll. (J.C.) -1.266890   1.081735  -1.171 0.242507
## fCollegeWichita State                 0.449096   0.846889   0.530 0.596323
## fCollegeWisconsin                    -1.327434   0.865514  -1.534 0.126210
## fCollegeWyoming                      -0.006288   0.843848  -0.007 0.994060
## fCollegeXavier                       -1.138664   0.814496  -1.398 0.163197
## fCollegeYale                         -1.059210   1.094291  -0.968 0.333891
## poly(Age, 3)1                         6.632580   1.200878   5.523 7.49e-08 ***
## poly(Age, 3)2                        -4.034700   1.223344  -3.298 0.001097 **
## poly(Age, 3)3                        -2.816061   1.135647  -2.480 0.013725 *
## Height_i                              0.067048   0.191933   0.349 0.727098
## Weight                                0.011685   0.003831   3.050 0.002500 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9368 on 286 degrees of freedom
## Multiple R-squared:  0.4646, Adjusted R-squared:  0.1688
## F-statistic: 1.571 on 158 and 286 DF,  p-value: 0.0005046
```

Check for Outliers and High Leverage

```
outlierTest(lm_log1)
```

```
## No Studentized residuals with Bonferroni p < 0.05
## Largest |rstudent|:
##     rstudent unadjusted p-value Bonferroni p
## 153 -2.532025          0.011878          NA
```

```
highleverage <- function(x) {
  p <- length(coefficients(x))
  n <- length(fitted(x))
  ratio <- p/n
  plot(hatvalues(x), main="Index Plot of Ratio")
  abline(h=c(2,3)*ratio, col="red", lty=2)
  identify(1:n, hatvalues(x), names(hatvalues(x)))
}
highleverage(lm_log1)
```

Index Plot of Ratio
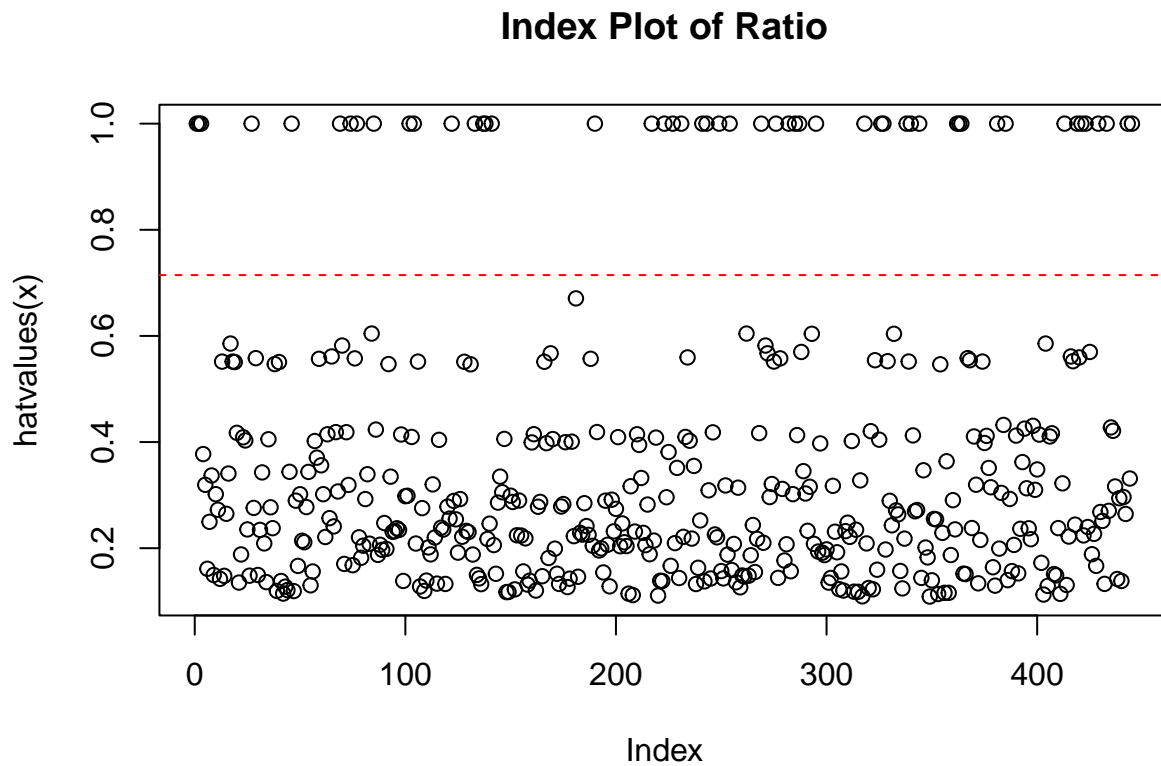

```
## integer(0)
```

```
cutoff <- 4/(nrow(ap_tibble)-length(lm_log1$coefficients)-2)
plot(lm_log1, which=4,cook.levels=cutoff)
abline(h=cutoff, lty=2, col="red")
```

Cook's distance

Obs. number
lm(log(Salary) ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i + W ...
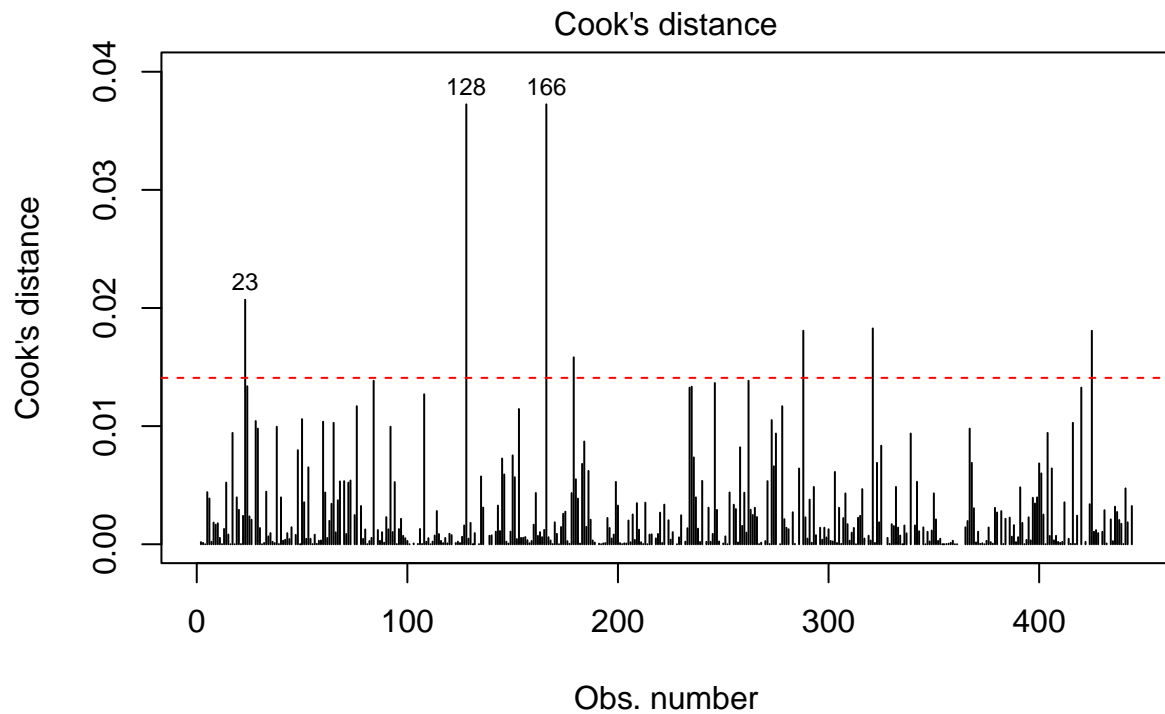
```
#avPlots(lm_log1, ask=FALSE, id="identify")

influencePlot(lm_log1,main="Influence Plot", sub="Circle size is proportional to Cook's distance")
```

Influence Plot

Hat−Values

Circle size is proportional to Cook's distance
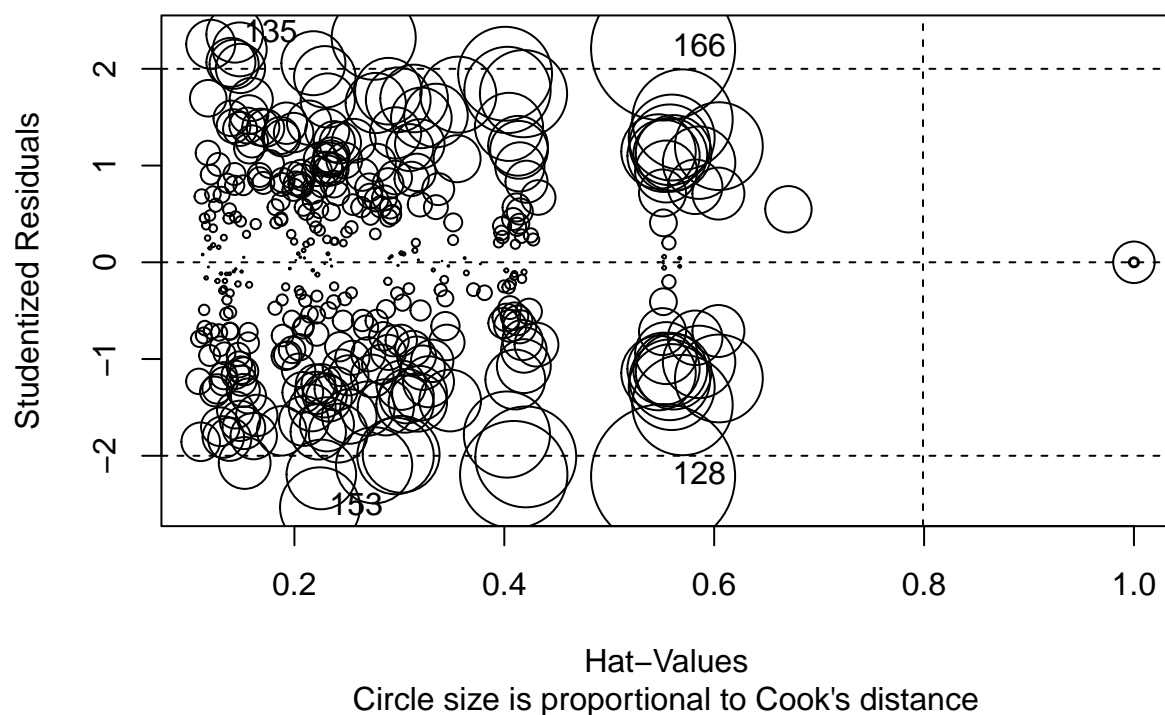
```
##         StudRes       Hat        CookD
## 1           NaN 1.0000000          NaN
## 27          NaN 1.0000000          NaN
## 128  -2.210127 0.5513065 0.037241025
## 135   2.356405 0.1430491 0.005738168
## 153  -2.532025 0.2243390 0.011445416
## 166   2.210127 0.5513065 0.037241025
```

```r
# Removal of outliers and high leverage points
ap_tibble <- ap_tibble[-which(abs(rstandard(lm_log1)) > 2 | hatvalues(lm_log1) > .8),]
```

```r
# Resulting Full model with polynomial terms
summary(lm_log1 <- lm(log(Salary) ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+Weight, data=ap_tibble
```

```
##
## Call:
## lm(formula = log(Salary) ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + Height_i + Weight, data = ap_tibble)
##
## Residuals:
##      Min      1Q   Median      3Q      Max
## -1.54459 -0.51808  0.04767  0.53071  1.68621
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)              11.176566   1.478385   7.560 6.20e-13 ***
## fTeamBoston Celtics       -0.666996   0.379028  -1.760  0.07957 .
```

```
## fTeamBrooklyn Nets          -0.112821   0.371574  -0.304   0.76164
## fTeamCharlotte Hornets      -0.422631   0.346836  -1.219   0.22408
## fTeamChicago Bulls          -0.032415   0.379767  -0.085   0.93204
## fTeamCleveland Cavaliers     0.184051   0.378134   0.487   0.62684
## fTeamDallas Mavericks       -0.676003   0.361298  -1.871   0.06241 .
## fTeamDenver Nuggets         -0.150769   0.376696  -0.400   0.68929
## fTeamDetroit Pistons        -0.707260   0.366086  -1.932   0.05440 .
## fTeamGolden State Warriors  -0.630222   0.377559  -1.669   0.09623 .
## fTeamHouston Rockets        -0.389134   0.361197  -1.077   0.28228
## fTeamIndiana Pacers          0.006626   0.371861   0.018   0.98580
## fTeamLos Angeles Clippers   -0.368187   0.371016  -0.992   0.32190
## fTeamLos Angeles Lakers     -0.734320   0.391916  -1.874   0.06205 .
## fTeamMemphis Grizzlies      -0.239948   0.367922  -0.652   0.51484
## fTeamMiami Heat             -0.593949   0.401383  -1.480   0.14010
## fTeamMilwaukee Bucks        -0.859189   0.380993  -2.255   0.02492 *
## fTeamMinnesota Timberwolves  0.205606   0.390395   0.527   0.59886
## fTeamNew Orleans Pelicans   -0.287294   0.353297  -0.813   0.41683
## fTeamNew York Knicks        -0.328152   0.353043  -0.929   0.35346
## fTeamOklahoma City Thunder  -0.329881   0.361725  -0.912   0.36259
## fTeamOrlando Magic          -0.079574   0.364920  -0.218   0.82755
## fTeamPhiladelphia Sixers    -0.394274   0.366067  -1.077   0.28241
## fTeamPhoenix Suns           -0.051844   0.371394  -0.140   0.88909
## fTeamPortland Trail Blazers -0.840615   0.403580  -2.083   0.03820 *
## fTeamSacramento Kings       -0.194403   0.368692  -0.527   0.59843
## fTeamSan Antonio Spurs      -0.192984   0.357218  -0.540   0.58947
## fTeamToronto Raptors        -0.257975   0.391634  -0.659   0.51064
## fTeamUtah Jazz              -0.238036   0.378530  -0.629   0.52998
## fTeamWashington Wizards     -0.393659   0.344054  -1.144   0.25356
## fPositionF                   0.209748   0.396838   0.529   0.59755
## fPositionG                   1.558195   0.475481   3.277   0.00119 **
## fPositionPF                  0.494921   0.178330   2.775   0.00590 **
## fPositionPG                  1.322079   0.272614   4.850 2.08e-06 ***
## fPositionSF                  0.796633   0.196827   4.047 6.76e-05 ***
## fPositionSG                  1.044913   0.234221   4.461 1.19e-05 ***
## fCollegeArizona              0.333534   0.522761   0.638   0.52399
## fCollegeArizona State        0.005412   0.660466   0.008   0.99347
## fCollegeArkansas             0.038909   0.602360   0.065   0.94854
## fCollegeAuburn              -0.120204   0.650812  -0.185   0.85360
## fCollegeBaylor              -0.458239   0.582867  -0.786   0.43245
## fCollegeColorado             0.317168   0.653775   0.485   0.62797
## fCollegeConnecticut         -0.032320   0.569415  -0.057   0.95478
## fCollegeCreighton           -0.410028   0.750324  -0.546   0.58519
## fCollegeDePaul              -0.830836   0.754781  -1.101   0.27197
## fCollegeDuke                 0.121583   0.456327   0.266   0.79010
## fCollegeFlorida              0.984553   0.597255   1.648   0.10041
## fCollegeFlorida State        0.055708   0.512785   0.109   0.91357
## fCollegeGeorgetown          -0.784002   0.654506  -1.198   0.23202
## fCollegeGeorgia              0.228709   0.657203   0.348   0.72811
## fCollegeGeorgia Tech         0.012984   0.658691   0.020   0.98429
## fCollegeGonzaga              0.380625   0.536399   0.710   0.47856
## fCollegeHouston             -1.116005   0.741242  -1.506   0.13333
## fCollegeIllinois            -0.754912   0.786211  -0.960   0.33781
## fCollegeIndiana             -0.044044   0.536379  -0.082   0.93462
## fCollegeIowa State          -0.098305   0.569619  -0.173   0.86311
```

```
## fCollegeKansas            0.295139   0.534993    0.552  0.58163
## fCollegeKansas State     -1.094658   0.652747   -1.677  0.09469 .
## fCollegeKentucky          0.367513   0.443621    0.828  0.40815
## fCollegeLouisville        0.474713   0.577341    0.822  0.41166
## fCollegeLSU              -0.212121   0.595242   -0.356  0.72185
## fCollegeMarquette         0.054968   0.666599    0.082  0.93434
## fCollegeMaryland         -0.251837   0.576499   -0.437  0.66258
## fCollegeMemphis           0.787839   0.598976    1.315  0.18951
## fCollegeMiami (FL)        0.052450   0.748164    0.070  0.94416
## fCollegeMichigan          0.139480   0.523425    0.266  0.79007
## fCollegeMichigan State    0.589567   0.579750    1.017  0.31009
## fCollegeMissouri         -0.086459   0.650271   -0.133  0.89432
## fCollegeMurray State      0.451106   0.752318    0.600  0.54926
## fCollegenan               0.108606   0.420320    0.258  0.79630
## fCollegeNebraska         -0.896261   0.757187   -1.184  0.23758
## fCollegeNevada           -0.834505   0.754448   -1.106  0.26965
## fCollegeNorth Carolina   -0.128921   0.498518   -0.259  0.79613
## fCollegeOhio State        1.027605   0.757730    1.356  0.17617
## fCollegeOklahoma          0.688057   0.751384    0.916  0.36063
## fCollegeOklahoma State    0.801994   0.756127    1.061  0.28979
## fCollegeOregon            0.071534   0.567477    0.126  0.89978
## fCollegeSaint Joseph's   -0.869055   0.775850   -1.120  0.26365
## fCollegeSaint Mary's     -1.078439   0.746257   -1.445  0.14957
## fCollegeSan Diego State   0.208059   0.659996    0.315  0.75282
## fCollegeSMU              -0.625120   0.663826   -0.942  0.34719
## fCollegeStanford          0.139721   0.551532    0.253  0.80020
## fCollegeSyracuse         -0.963871   0.608311   -1.585  0.11424
## fCollegeTCU              -0.918175   0.756234   -1.214  0.22575
## fCollegeTennessee         0.443801   0.579597    0.766  0.44451
## fCollegeTexas             0.661003   0.485641    1.361  0.17461
## fCollegeTexas A&M         0.565391   0.613098    0.922  0.35725
## fCollegeTexas Tech       -0.241241   0.782438   -0.308  0.75807
## fCollegeUCLA              0.685358   0.491877    1.393  0.16465
## fCollegeUNLV              0.973960   0.676912    1.439  0.15135
## fCollegeUSC               0.201738   0.506831    0.398  0.69091
## fCollegeUtah              0.543188   0.655381    0.829  0.40794
## fCollegeVanderbilt       -0.125363   0.599564   -0.209  0.83453
## fCollegeVillanova        -0.079131   0.502487   -0.157  0.87499
## fCollegeVirginia         -0.243369   0.528336   -0.461  0.64543
## fCollegeWake Forest       0.699046   0.602448    1.160  0.24693
## fCollegeWashington        0.128365   0.515805    0.249  0.80365
## fCollegeWashington State  0.650565   0.759358    0.857  0.39235
## fCollegeWest Virginia    -1.073430   0.749489   -1.432  0.15323
## fCollegeWichita State     0.467479   0.763279    0.612  0.54074
## fCollegeWisconsin        -1.354259   0.780148   -1.736  0.08371 .
## fCollegeWyoming          -0.040901   0.760641   -0.054  0.95716
## fCollegeXavier           -1.132261   0.734533   -1.541  0.12437
## poly(Age, 3)1            6.656392   1.040846    6.395  6.96e-10 ***
## poly(Age, 3)2           -3.310328   1.069847   -3.094  0.00218 **
## poly(Age, 3)3           -3.248946   1.005019   -3.233  0.00138 **
## Height_i                 0.045917   0.177391    0.259  0.79595
## Weight                   0.015974   0.003529    4.526  8.98e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.8431 on 272 degrees of freedom
## Multiple R-squared:  0.4847, Adjusted R-squared:  0.282
## F-statistic: 2.391 on 107 and 272 DF,  p-value: 6.099e-09
```

```
shapiro.test(resid(lm_log1))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  resid(lm_log1)
## W = 0.98788, p-value = 0.002966
```

```
bptest(lm_log1)
```

```
##
##  studentized Breusch-Pagan test
##
## data:  lm_log1
## BP = 149.86, df = 107, p-value = 0.003972
```

Reduced Model

```
# Removal of `fTeam` due to no significance
summary(lm_log2 <- lm(log(Salary) ~ fPosition+fCollege+poly(Age,3)+Height_i+Weight,data=ap_tibble))
```

```
##
## Call:
## lm(formula = log(Salary) ~ fPosition + fCollege + poly(Age, 3) +
##     Height_i + Weight, data = ap_tibble)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.71930 -0.54951  0.03869  0.54214  1.84730
##
## Coefficients:
##                        Estimate Std. Error t value Pr(>|t|)
## (Intercept)           11.482065   1.374447   8.354 2.45e-15 ***
## fPositionF             0.049314   0.371767   0.133 0.894561
## fPositionG             1.576201   0.448887   3.511 0.000514 ***
## fPositionPF            0.462322   0.175106   2.640 0.008717 **
## fPositionPG            1.268930   0.255871   4.959 1.18e-06 ***
## fPositionSF            0.775423   0.191895   4.041 6.77e-05 ***
## fPositionSG            0.970125   0.222456   4.361 1.78e-05 ***
## fCollegeArizona        0.307252   0.502728   0.611 0.541548
## fCollegeArizona State -0.094135   0.624377  -0.151 0.880262
## fCollegeArkansas      -0.116076   0.570549  -0.203 0.838924
## fCollegeAuburn        -0.096642   0.623074  -0.155 0.876842
## fCollegeBaylor        -0.470646   0.541497  -0.869 0.385454
## fCollegeColorado       0.172094   0.628092   0.274 0.784277
## fCollegeConnecticut   -0.129466   0.540814  -0.239 0.810966
## fCollegeCreighton     -0.556658   0.716399  -0.777 0.437755
## fCollegeDePaul        -1.188798   0.715085  -1.662 0.097462 .
## fCollegeDuke          -0.082598   0.430233  -0.192 0.847884
## fCollegeFlorida        0.680801   0.561112   1.213 0.225964
## fCollegeFlorida State  0.087464   0.489318   0.179 0.858256
```

```
## fCollegeGeorgetown         -1.060010   0.626640   -1.692 0.091761 .
## fCollegeGeorgia             0.260432   0.622045    0.419 0.675756
## fCollegeGeorgia Tech        0.077114   0.625003    0.123 0.901888
## fCollegeGonzaga             0.227369   0.506883    0.449 0.654070
## fCollegeHouston            -1.026737   0.716928   -1.432 0.153143
## fCollegeIllinois           -1.041212   0.738212   -1.410 0.159439
## fCollegeIndiana            -0.405973   0.504240   -0.805 0.421386
## fCollegeIowa State         -0.240909   0.542915   -0.444 0.657554
## fCollegeKansas             -0.032123   0.508813   -0.063 0.949702
## fCollegeKansas State       -1.269791   0.625028   -2.032 0.043075 *
## fCollegeKentucky            0.099765   0.418688    0.238 0.811826
## fCollegeLouisville          0.222972   0.544766    0.409 0.682612
## fCollegeLSU                -0.187140   0.572629   -0.327 0.744040
## fCollegeMarquette          -0.205205   0.628194   -0.327 0.744153
## fCollegeMaryland           -0.235430   0.544882   -0.432 0.665996
## fCollegeMemphis             0.630553   0.575511    1.096 0.274112
## fCollegeMiami (FL)          0.016873   0.714600    0.024 0.981178
## fCollegeMichigan           -0.156540   0.488024   -0.321 0.748612
## fCollegeMichigan State      0.405437   0.541665    0.749 0.454742
## fCollegeMissouri           -0.177116   0.623332   -0.284 0.776496
## fCollegeMurray State        0.409329   0.715012    0.572 0.567425
## fCollegenan               -0.084224   0.397961   -0.212 0.832531
## fCollegeNebraska           -1.061431   0.715475   -1.484 0.138979
## fCollegeNevada             -0.906048   0.715907   -1.266 0.206637
## fCollegeNorth Carolina     -0.296921   0.467500   -0.635 0.525829
## fCollegeOhio State          1.164464   0.714858    1.629 0.104371
## fCollegeOklahoma            0.726393   0.712335    1.020 0.308672
## fCollegeOklahoma State      0.276906   0.721546    0.384 0.701421
## fCollegeOregon             -0.026658   0.541004   -0.049 0.960732
## fCollegeSaint Joseph's     -0.894070   0.734043   -1.218 0.224175
## fCollegeSaint Mary's       -1.089883   0.714604   -1.525 0.128270
## fCollegeSan Diego State    -0.016822   0.621989   -0.027 0.978441
## fCollegeSMU                -1.139399   0.627498   -1.816 0.070399 .
## fCollegeStanford           -0.208386   0.517438   -0.403 0.687435
## fCollegeSyracuse           -1.052837   0.575063   -1.831 0.068116 .
## fCollegeTCU                -1.073883   0.715740   -1.500 0.134564
## fCollegeTennessee           0.108821   0.536550    0.203 0.839416
## fCollegeTexas               0.494747   0.463915    1.066 0.287070
## fCollegeTexas A&M           0.212340   0.575755    0.369 0.712533
## fCollegeTexas Tech         -0.351496   0.737188   -0.477 0.633846
## fCollegeUCLA                0.392200   0.462619    0.848 0.397233
## fCollegeUNLV                0.841837   0.630733    1.335 0.182984
## fCollegeUSC                 0.190139   0.478025    0.398 0.691090
## fCollegeUtah                0.474458   0.626101    0.758 0.449165
## fCollegeVanderbilt         -0.367068   0.571949   -0.642 0.521502
## fCollegeVillanova          -0.341601   0.479328   -0.713 0.476604
## fCollegeVirginia           -0.377353   0.503672   -0.749 0.454320
## fCollegeWake Forest         0.723260   0.575192    1.257 0.209574
## fCollegeWashington          0.143073   0.484783    0.295 0.768100
## fCollegeWashington State    0.107434   0.715901    0.150 0.880811
## fCollegeWest Virginia      -1.173340   0.714547   -1.642 0.101619
## fCollegeWichita State       0.446309   0.720242    0.620 0.535947
## fCollegeWisconsin          -1.289870   0.738383   -1.747 0.081677 .
## fCollegeWyoming            -0.406487   0.716697   -0.567 0.571023
```

```
## fCollegeXavier            -1.159174   0.714507  -1.622 0.105777
## poly(Age, 3)1              6.081960    0.946296   6.427 5.08e-10 ***
## poly(Age, 3)2             -3.897324    0.961161  -4.055 6.40e-05 ***
## poly(Age, 3)3             -3.169827    0.945966  -3.351 0.000908 ***
## Height_i                   0.003167   0.169273   0.019 0.985083
## Weight                     0.015342   0.003317   4.625 5.57e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8441 on 301 degrees of freedom
## Multiple R-squared:  0.4285, Adjusted R-squared:  0.2804
## F-statistic: 2.894 on 78 and 301 DF,  p-value: 4.186e-11
```

```
summary(lm_log3 <- lm(log(Salary) ~ fPosition+fCollege+poly(Age,3)+Weight,data=ap_tibble))
```

```
##
## Call:
## lm(formula = log(Salary) ~ fPosition + fCollege + poly(Age, 3) +
##     Weight, data = ap_tibble)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.7203 -0.5497  0.0389  0.5415  1.8460
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)            11.501478   0.900061  12.779  < 2e-16 ***
## fPositionF              0.049832   0.370119   0.135 0.892987
## fPositionG              1.576384   0.448037   3.518 0.000501 ***
## fPositionPF             0.462472   0.174632   2.648 0.008516 **
## fPositionPG             1.268186   0.252340   5.026 8.61e-07 ***
## fPositionSF             0.775834   0.190316   4.077 5.85e-05 ***
## fPositionSG             0.970155   0.222082   4.368 1.72e-05 ***
## fCollegeArizona         0.307293   0.501890   0.612 0.540819
## fCollegeArizona State  -0.094673   0.622682  -0.152 0.879257
## fCollegeArkansas       -0.116684   0.568680  -0.205 0.837567
## fCollegeAuburn         -0.097513   0.620307  -0.157 0.875192
## fCollegeBaylor         -0.470694   0.540594  -0.871 0.384610
## fCollegeColorado        0.172743   0.626092   0.276 0.782808
## fCollegeConnecticut    -0.129785   0.539651  -0.240 0.810108
## fCollegeCreighton      -0.556820   0.715160  -0.779 0.436828
## fCollegeDePaul         -1.188444   0.713651  -1.665 0.096889 .
## fCollegeDuke           -0.082866   0.429281  -0.193 0.847061
## fCollegeFlorida         0.681117   0.559929   1.216 0.224770
## fCollegeFlorida State   0.087453   0.488507   0.179 0.858042
## fCollegeGeorgetown     -1.059136   0.623861  -1.698 0.090592 .
## fCollegeGeorgia         0.259591   0.619390   0.419 0.675436
## fCollegeGeorgia Tech    0.077478   0.623665   0.124 0.901216
## fCollegeGonzaga         0.226827   0.505216   0.449 0.653775
## fCollegeHouston        -1.026801   0.715733  -1.435 0.152432
## fCollegeIllinois       -1.041772   0.736383  -1.415 0.158182
## fCollegeIndiana        -0.406619   0.502225  -0.810 0.418787
## fCollegeIowa State     -0.240973   0.542005  -0.445 0.656931
## fCollegeKansas         -0.032127   0.507970  -0.063 0.949613
## fCollegeKansas State   -1.269480   0.623772  -2.035 0.042707 *
```

```
## fCollegeKentucky             0.099610    0.417912    0.238 0.811770
## fCollegeLouisville           0.222414    0.543049    0.410 0.682415
## fCollegeLSU                 -0.187342    0.571579   -0.328 0.743318
## fCollegeMarquette           -0.205036    0.627089   -0.327 0.743921
## fCollegeMaryland            -0.235097    0.543689   -0.432 0.665752
## fCollegeMemphis              0.630920    0.574223    1.099 0.272758
## fCollegeMiami (FL)           0.016330    0.712829    0.023 0.981738
## fCollegeMichigan           -0.156667    0.487169   -0.322 0.747989
## fCollegeMichigan State       0.405144    0.540542    0.750 0.454131
## fCollegeMissouri           -0.178078    0.620178   -0.287 0.774202
## fCollegeMurray State         0.409296    0.713825    0.573 0.566812
## fCollegenan                -0.084347    0.397248   -0.212 0.831994
## fCollegeNebraska           -1.060132    0.710917   -1.491 0.136948
## fCollegeNevada             -0.905531    0.714189   -1.268 0.205805
## fCollegeNorth Carolina     -0.297200    0.466489   -0.637 0.524542
## fCollegeOhio State           1.164653    0.713602    1.632 0.103706
## fCollegeOklahoma             0.726020    0.710875    1.021 0.307928
## fCollegeOklahoma State       0.277449    0.719768    0.385 0.700161
## fCollegeOregon             -0.026306    0.539781   -0.049 0.961163
## fCollegeSaint Joseph's     -0.894097    0.732825   -1.220 0.223391
## fCollegeSaint Mary's       -1.090717    0.712033   -1.532 0.126610
## fCollegeSan Diego State    -0.016492    0.620708   -0.027 0.978821
## fCollegeSMU                -1.139498    0.626436   -1.819 0.069899 .
## fCollegeStanford           -0.208031    0.516232   -0.403 0.687249
## fCollegeSyracuse           -1.052595    0.573966   -1.834 0.067653 .
## fCollegeTCU                -1.073949    0.714546   -1.503 0.133889
## fCollegeTennessee           0.108928    0.535631    0.203 0.838988
## fCollegeTexas               0.494061    0.461697    1.070 0.285430
## fCollegeTexas A&M           0.212578    0.574662    0.370 0.711702
## fCollegeTexas Tech         -0.351882    0.735677   -0.478 0.632775
## fCollegeUCLA                0.392686    0.461123    0.852 0.395118
## fCollegeUNLV                0.841710    0.629652    1.337 0.182298
## fCollegeUSC                 0.190411    0.477012    0.399 0.690047
## fCollegeUtah                0.474579    0.625030    0.759 0.448271
## fCollegeVanderbilt         -0.367775    0.569754   -0.645 0.519094
## fCollegeVillanova          -0.341730    0.478485   -0.714 0.475660
## fCollegeVirginia           -0.376811    0.502006   -0.751 0.453472
## fCollegeWake Forest         0.723433    0.574165    1.260 0.208651
## fCollegeWashington          0.143360    0.483738    0.296 0.767160
## fCollegeWashington State    0.107708    0.714566    0.151 0.880288
## fCollegeWest Virginia      -1.173778    0.712981   -1.646 0.100743
## fCollegeWichita State       0.445640    0.718162    0.621 0.535378
## fCollegeWisconsin          -1.288758    0.734771   -1.754 0.080452 .
## fCollegeWyoming            -0.405917    0.714863   -0.568 0.570576
## fCollegeXavier             -1.158847    0.713111   -1.625 0.105193
## poly(Age, 3)1               6.079228    0.933409    6.513 3.07e-10 ***
## poly(Age, 3)2              -3.895270    0.953286   -4.086 5.63e-05 ***
## poly(Age, 3)3              -3.169915    0.944388   -3.357 0.000890 ***
## Weight                      0.015348    0.003298    4.654 4.87e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8427 on 302 degrees of freedom
## Multiple R-squared:  0.4285, Adjusted R-squared:  0.2828
```

```
## F-statistic: 2.941 on 77 and 302 DF,  p-value: 2.412e-11
```

```
summary(lm_log4 <- lm(log(Salary) ~ fPosition+poly(Age,3)+Weight,data=ap_tibble))
```

```
##
## Call:
## lm(formula = log(Salary) ~ fPosition + poly(Age, 3) + Weight,
##     data = ap_tibble)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.83473 -0.65342  0.03578  0.61875  1.96734
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)   12.406721   0.782369  15.858  < 2e-16 ***
## fPositionF    -0.318547   0.337164  -0.945 0.345388
## fPositionG     1.098637   0.413133   2.659 0.008172 **
## fPositionPF    0.361549   0.163128   2.216 0.027277 *
## fPositionPG    1.023472   0.232988   4.393 1.46e-05 ***
## fPositionSF    0.474506   0.179534   2.643 0.008568 **
## fPositionSG    0.692310   0.204574   3.384 0.000791 ***
## poly(Age, 3)1  6.685044   0.887958   7.529 3.97e-13 ***
## poly(Age, 3)2 -3.140491   0.884334  -3.551 0.000433 ***
## poly(Age, 3)3 -3.284844   0.879152  -3.736 0.000216 ***
## Weight         0.011765   0.003102   3.792 0.000174 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.873 on 369 degrees of freedom
## Multiple R-squared:  0.2506, Adjusted R-squared:  0.2302
## F-statistic: 12.34 on 10 and 369 DF,  p-value: < 2.2e-16
```

```
anova(lm_log4,lm_log3,lm_log2,lm_log1)
```

```
## Analysis of Variance Table
##
## Model 1: log(Salary) ~ fPosition + poly(Age, 3) + Weight
## Model 2: log(Salary) ~ fPosition + fCollege + poly(Age, 3) + Weight
## Model 3: log(Salary) ~ fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
## Model 4: log(Salary) ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##   Res.Df    RSS Df Sum of Sq      F  Pr(>F)
## 1    369 281.22
## 2    302 214.45 67    66.776 1.4021 0.03242 *
## 3    301 214.45  1     0.000 0.0004 0.98507
## 4    272 193.35 29    21.096 1.0233 0.43723
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Stepwise Model Selection

```
summary(lm_step <- step(lm_logsm <- lm(log(Salary) ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+Weig
```

```
## Start:  AIC=-40.75
## log(Salary) ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##
##                 Df Sum of Sq    RSS     AIC
## - fCollege      67    65.279 258.63 -64.212
## - fTeam         29    21.096 214.45 -59.399
## - Height_i       1     0.048 193.40 -42.656
## <none>                        193.35 -40.750
## - fPosition      6    19.812 213.16 -15.681
## - Weight         1    14.564 207.92 -15.153
## - poly(Age, 3)   3    47.877 241.23  37.319
##
## Step:  AIC=-64.21
## log(Salary) ~ fTeam + fPosition + poly(Age, 3) + Height_i + Weight
##
##                 Df Sum of Sq    RSS     AIC
## - fTeam         29    22.453 281.08 -90.577
## - Height_i       1     0.035 258.67 -66.161
## <none>                        258.63 -64.212
## - fPosition      6    20.274 278.90 -47.534
## - Weight         1    13.447 272.08 -46.951
## - poly(Age, 3)   3    62.661 321.29  12.229
##
## Step:  AIC=-90.58
## log(Salary) ~ fPosition + poly(Age, 3) + Height_i + Weight
##
##                 Df Sum of Sq    RSS     AIC
## - Height_i       1     0.140 281.22 -92.387
## <none>                        281.08 -90.577
## - fPosition      6    18.670 299.75 -78.140
## - Weight         1    11.092 292.18 -77.869
## - poly(Age, 3)   3    61.477 342.56 -21.414
##
## Step:  AIC=-92.39
## log(Salary) ~ fPosition + poly(Age, 3) + Weight
##
##                 Df Sum of Sq    RSS     AIC
## <none>                        281.22 -92.387
## - Weight         1    10.961 292.19 -79.858
## - fPosition      6    20.201 301.43 -78.026
## - poly(Age, 3)   3    63.351 344.58 -21.186
##
## Call:
## lm(formula = log(Salary) ~ fPosition + poly(Age, 3) + Weight,
##     data = ap_tibble)
##
## Residuals:
##      Min      1Q   Median      3Q     Max
## -1.83473 -0.65342  0.03578  0.61875  1.96734
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
```

```
## (Intercept)    12.406721   0.782369  15.858  < 2e-16 ***
## fPositionF     -0.318547   0.337164  -0.945 0.345388
## fPositionG      1.098637   0.413133   2.659 0.008172 **
## fPositionPF     0.361549   0.163128   2.216 0.027277 *
## fPositionPG     1.023472   0.232988   4.393 1.46e-05 ***
## fPositionSF     0.474506   0.179534   2.643 0.008568 **
## fPositionSG     0.692310   0.204574   3.384 0.000791 ***
## poly(Age, 3)1   6.685044   0.887958   7.529 3.97e-13 ***
## poly(Age, 3)2  -3.140491   0.884334  -3.551 0.000433 ***
## poly(Age, 3)3  -3.284844   0.879152  -3.736 0.000216 ***
## Weight          0.011765   0.003102   3.792 0.000174 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.873 on 369 degrees of freedom
## Multiple R-squared:  0.2506, Adjusted R-squared:  0.2302
## F-statistic: 12.34 on 10 and 369 DF,  p-value: < 2.2e-16
```

```
shapiro.test(resid(lm_log3))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  resid(lm_log3)
## W = 0.9908, p-value = 0.01796
```

```
bptest(lm_log3)
```

```
##
##  studentized Breusch-Pagan test
##
## data:  lm_log3
## BP = 96.864, df = 77, p-value = 0.0626
```

```
shapiro.test(resid(lm_step))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  resid(lm_step)
## W = 0.98555, p-value = 0.0007663
```

```
bptest(lm_step)
```

```
##
##  studentized Breusch-Pagan test
##
## data:  lm_step
## BP = 35.338, df = 10, p-value = 0.0001093
```

Logistic Regression

```
# Calculate quantiles of Salary for good cutoff point
quantile(ap_tibble$Salary, probs = seq(0,1,1/20))
```

Recoding for Logistic Regression

```
##       0%      5%     10%     15%     20%     25%     30%     35%
##   925258 1517981 1669178 1701593 1782621 2006780 2318872 2937822
##      40%     45%     50%     55%     60%     65%     70%     75%
##  3479760 4000000 4672995 5479487 6952016 8401762 9720900 11711496
##      80%     85%     90%     95%    100%
## 14038000 17363572 20533929 31582951 44310840
```

```r
# Used 65% as cutoff
ap_tibble <- ap_tibble %>% mutate(Salary.Dummy = if_else(Salary >= 8401762, 1, 0))

# Transforming Team,Position,College into factors
ap_tibble <- transform (
  ap_tibble,
  nTeam = as.numeric(fTeam),
  nPosition = as.numeric(fPosition),
  nCollege = as.numeric(fCollege),
  fSalary.Dummy = as.factor(Salary.Dummy)
)
```

```r
#cross validation
set.seed(999)
n <-nrow(ap_tibble)
n
```

Model Selection (glm)

```
## [1] 380
```

```r
floor(0.7*n)
```

```
## [1] 266
```

```r
train <- sample(1:n, 311)

tn <- ap_tibble[train,]
test <- ap_tibble[-train,]
```

```r
set.seed(999)
summary(glmFit_full <- train(fSalary.Dummy ~ nTeam+nPosition+nCollege+poly(Age,3)+Height_i+Weight, data=
```

```
##
## Call:
## NULL
##
## Deviance Residuals:
##     Min      1Q  Median      3Q     Max
## -1.8589  -0.8005  -0.4584   0.8844  2.5539
##
## Coefficients:
##                 Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -1.072629   2.713558  -0.395  0.69263
## nTeam           0.019530   0.014313   1.364  0.17243
## nPosition       0.244457   0.083045   2.944  0.00324 **
## nCollege        0.001570   0.004031   0.390  0.69689
## `poly(Age, 3)1` 15.169035   2.941159   5.158 2.50e-07 ***
## `poly(Age, 3)2` -13.523898   2.952984  -4.580 4.66e-06 ***
```

```
## `poly(Age, 3)3`  -9.788944    3.693551  -2.650  0.00804 **
## Height_i           -0.990023    0.427320  -2.317  0.02051 *
## Weight              0.023574    0.007172   3.287  0.00101 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 492.06  on 379  degrees of freedom
## Residual deviance: 391.65  on 371  degrees of freedom
## AIC: 409.65
##
## Number of Fisher Scoring iterations: 5
```

```
confusionMatrix(glmFit_full)
```

```
## Bootstrapped (25 reps) Confusion Matrix
##
## (entries are percentual average cell counts across resamples)
##
##           Reference
## Prediction    0    1
##          0 52.0 15.7
##          1 13.0 19.2
##
##  Accuracy (average) : 0.713
```

```
set.seed(999)
summary(glmFit_reduced <- train(fSalary.Dummy ~ nTeam+nPosition+nCollege+poly(Age,3)+Height_i+Weight, da
```

```
##
## Call:
## NULL
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.8941  -0.7807  -0.4548   0.8874   2.4994
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)      -0.910312   2.699504  -0.337 0.735955
## nPosition         0.240541   0.082358   2.921 0.003493 **
## `poly(Age, 3)1`  15.213163   2.916835   5.216 1.83e-07 ***
## `poly(Age, 3)2` -13.594206   2.944578  -4.617 3.90e-06 ***
## `poly(Age, 3)3`  -9.410427   3.679292  -2.558 0.010538 *
## Height_i         -0.948495   0.423789  -2.238 0.025213 *
## Weight            0.023519   0.007113   3.307 0.000945 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 492.06  on 379  degrees of freedom
## Residual deviance: 393.65  on 373  degrees of freedom
## AIC: 407.65
```

```
## 
## Number of Fisher Scoring iterations: 5
```

```
confusionMatrix(glmFit_reduced)
```

```
## Bootstrapped (25 reps) Confusion Matrix
## 
## (entries are percentual average cell counts across resamples)
## 
##            Reference
## Prediction    0    1
##          0 52.2 15.6
##          1 12.9 19.3
## 
##   Accuracy (average) : 0.715
```

```
#comparing the plots
# Rename variables

plot(lm_log1, 1:2)
```


Residuals vs Fitted

Fitted values
lm(log(Salary) ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i + W ...

Normal Q–Q

lm(log(Salary) ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i + W ...

```
plot(lm_log4, 1:2)
```

Residuals vs Fitted

Residuals

Fitted values
lm(log(Salary) ~ fPosition + poly(Age, 3) + Weight)

Normal Q–Q

Theoretical Quantiles
lm(log(Salary) ~ fPosition + poly(Age, 3) + Weight)
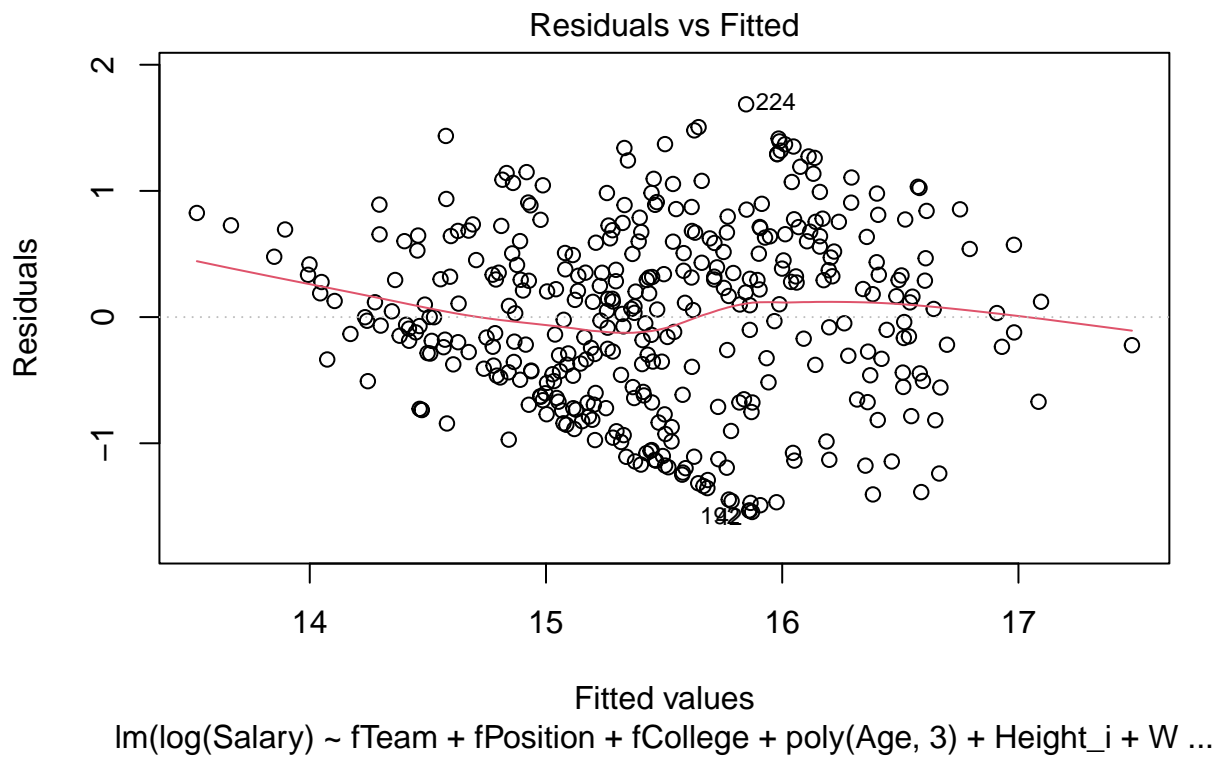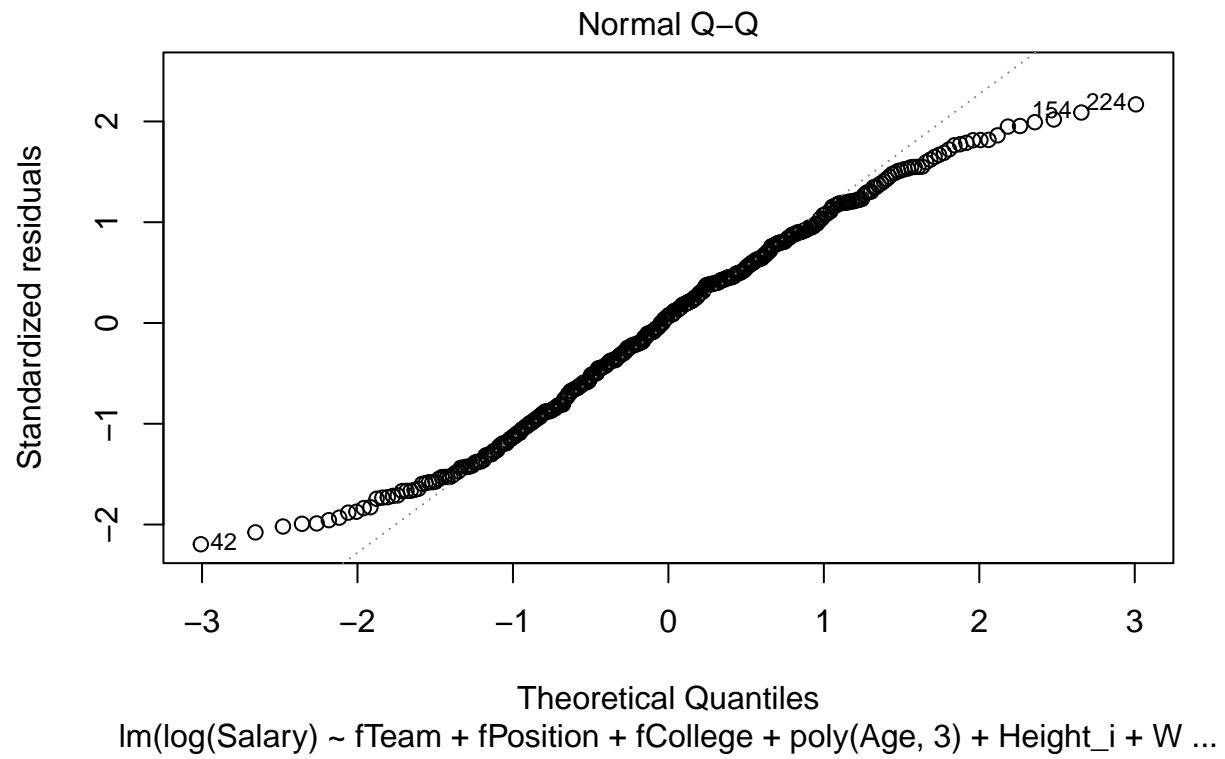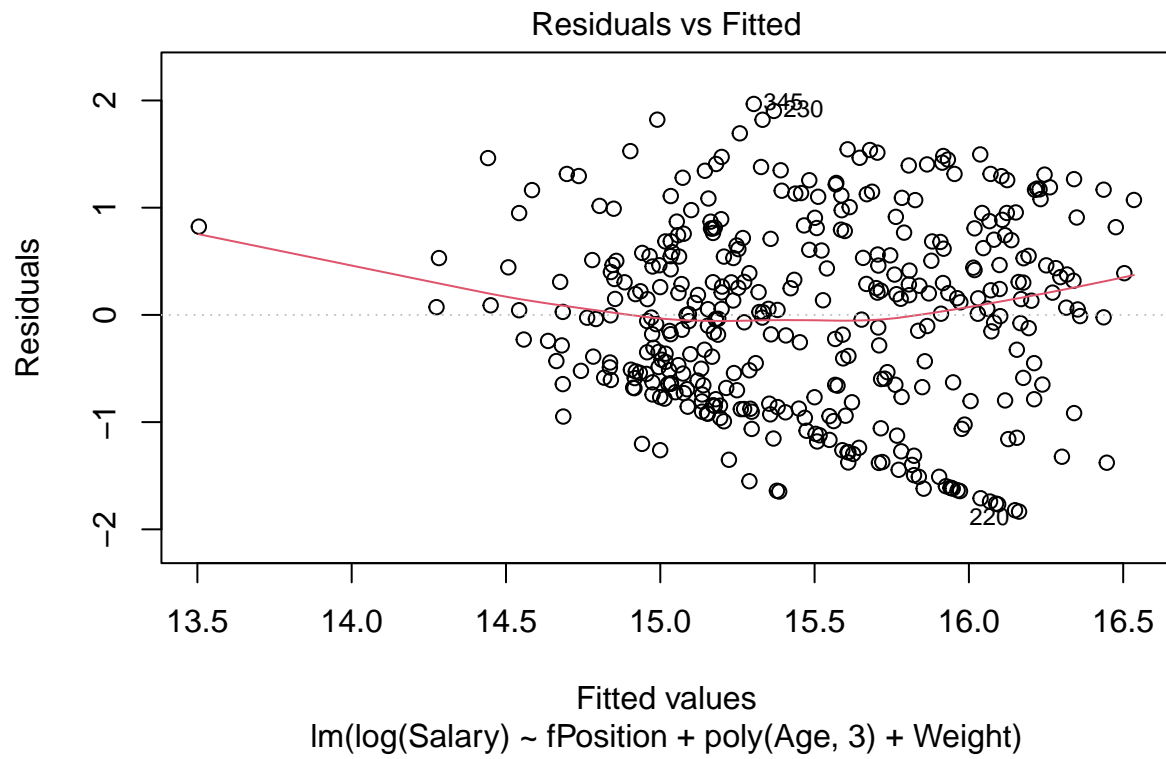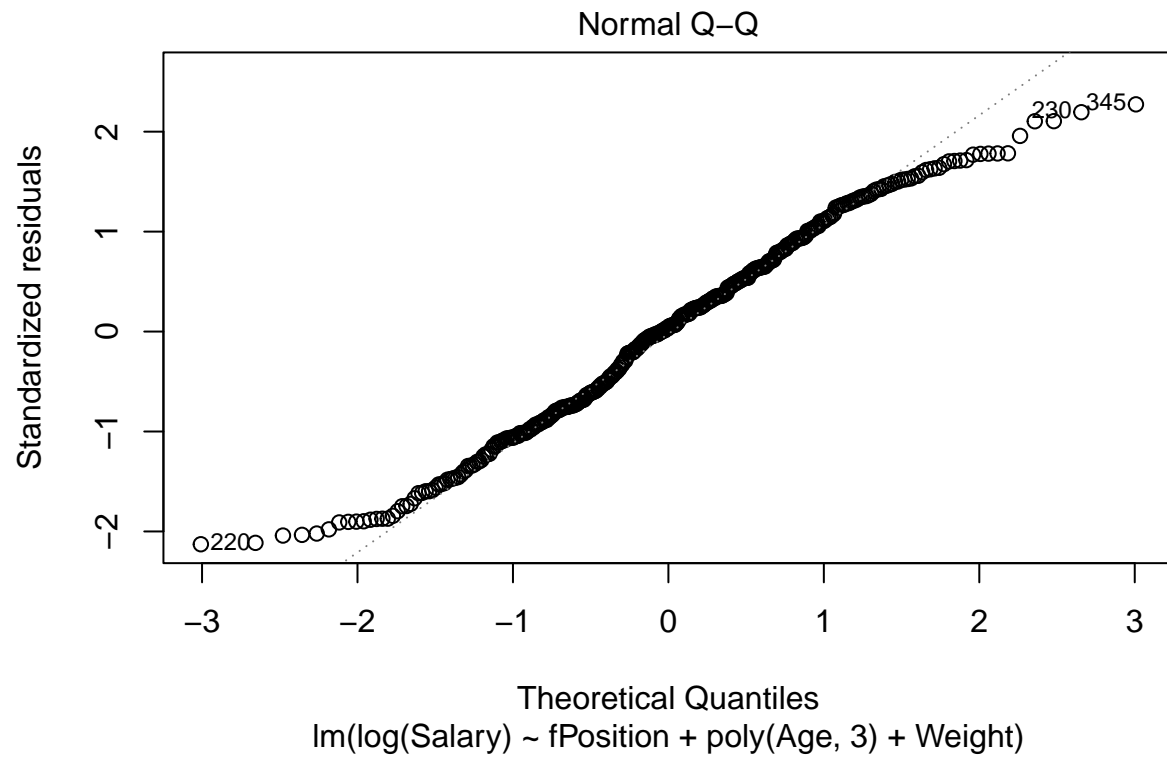
```
hist(resid(lm_log1))
```

Histogram of resid(lm_log1)
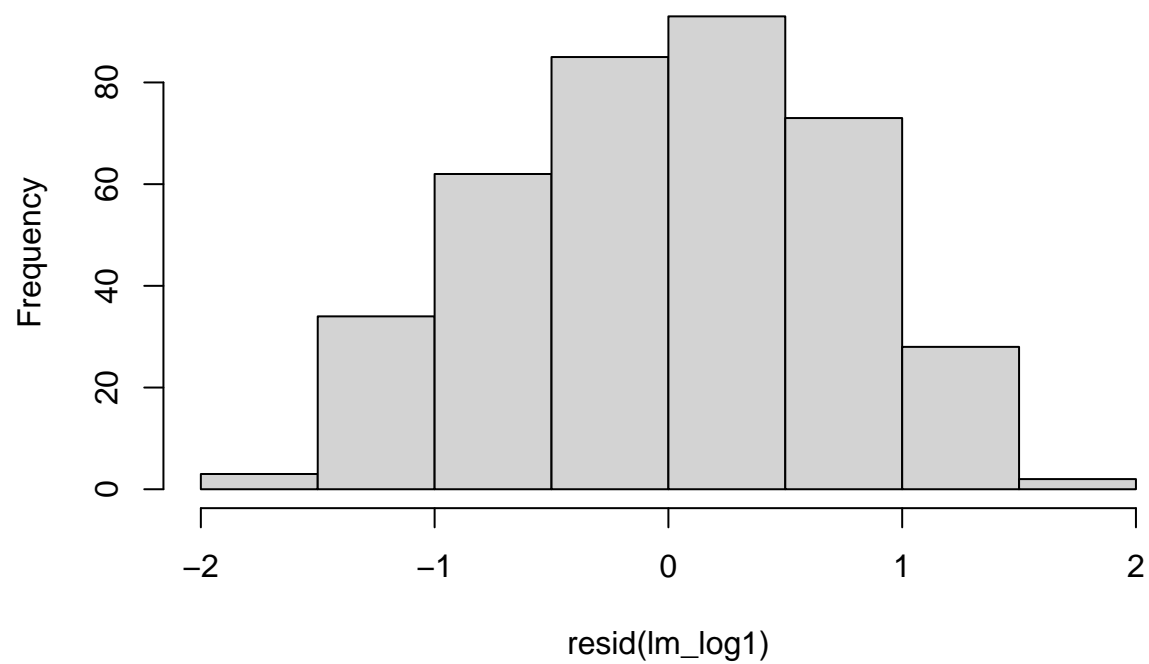

```
hist(resid(lm_log4))
```

Histogram of resid(lm_log4)
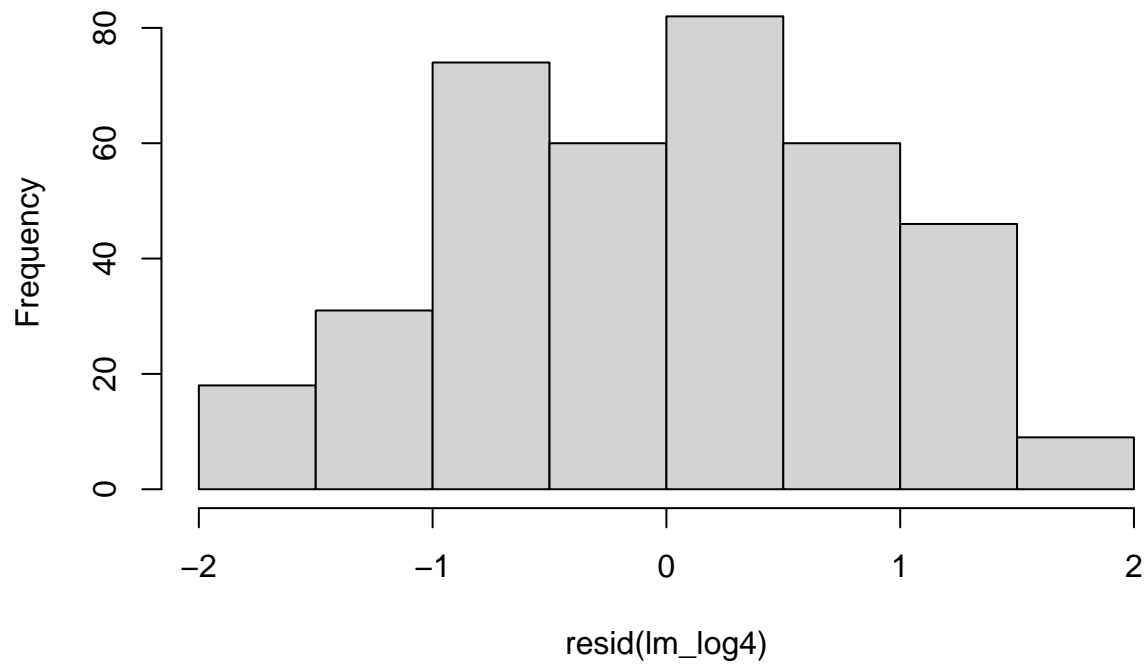

```
par(mfrow=c(1,3), mar=c(4.5, 4.5, 2, 2))

plot(ap_tibble$fPosition, rstandard(lm_log1), xlab ="fposition", ylab = "residuals")
plot(ap_tibble$fPosition, rstandard(lm_log4), xlab ="fposition", ylab = "residuals")

plot(ap_tibble$Age, rstandard(lm_log1), xlab ="fposition", ylab = "residuals")
```
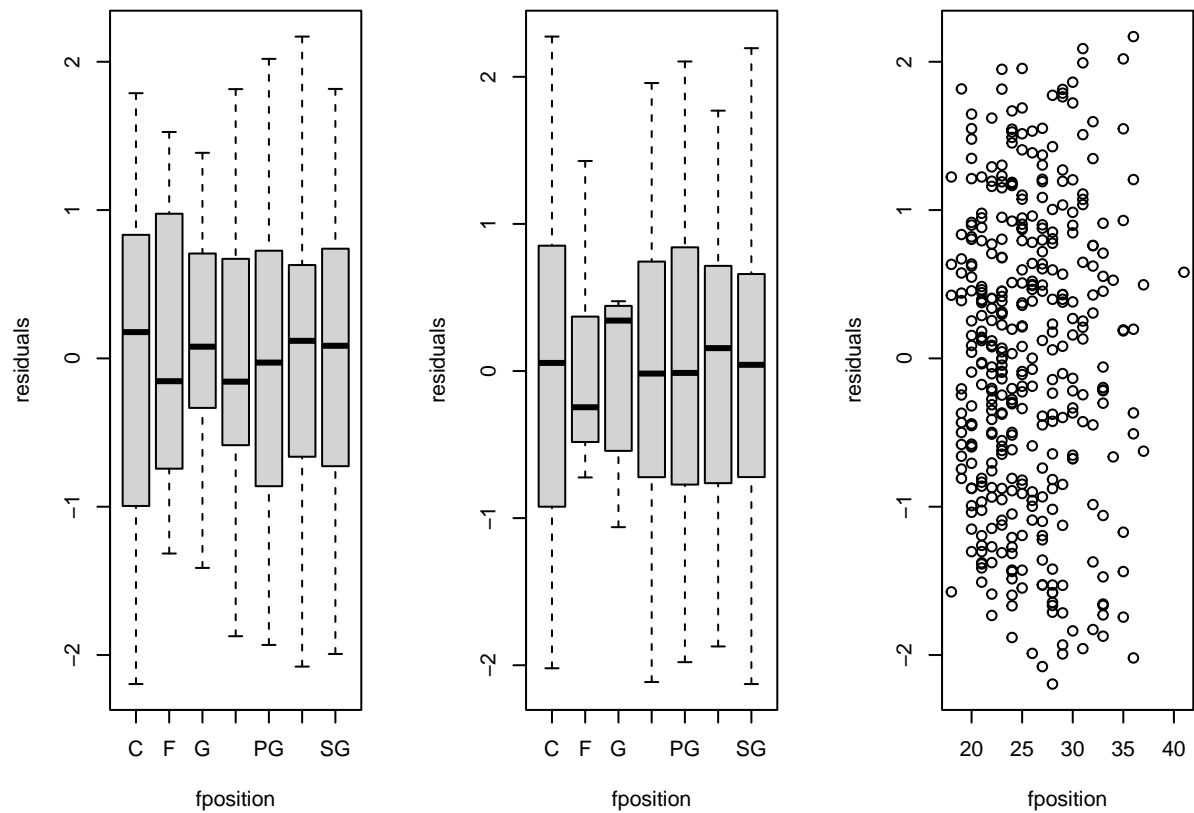
```
plot(ap_tibble$Age, rstandard(lm_log4), xlab ="fposition", ylab = "residuals")

plot(ap_tibble$Weight, rstandard(lm_log1), xlab ="fposition", ylab = "residuals")
plot(ap_tibble$Weight, rstandard(lm_log4), xlab ="fposition", ylab = "residuals")
```
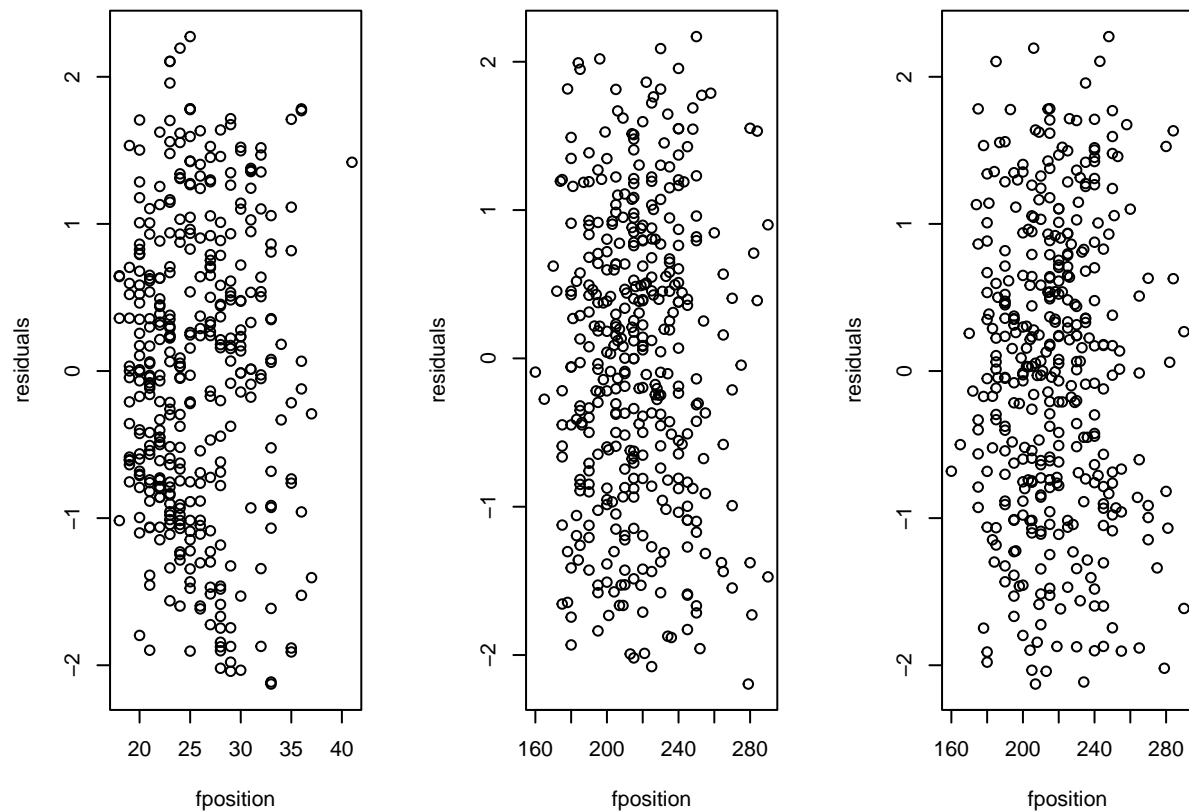
```
#normality check
par(mfrow=c(1,2), mar=c(4.5, 4.5, 2, 2))
plot(predict(lm_log1), ap_tibble$Salary,
        xlab = "Fitted Values", ylab = "Salary")
abline()
lines(lowess(predict(lm_log1), ap_tibble$Salary), col='red')

plot(predict(lm_log4), sqrt(ap_tibble$Salary),
        xlab = "Fitted Values", ylab = "Salary")
lines(lowess(predict(lm_log4), sqrt(ap_tibble$Salary)), col='red')
```
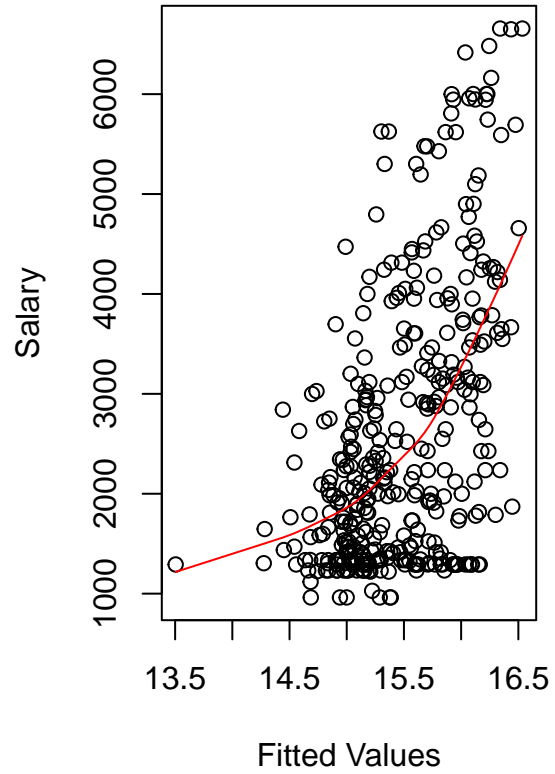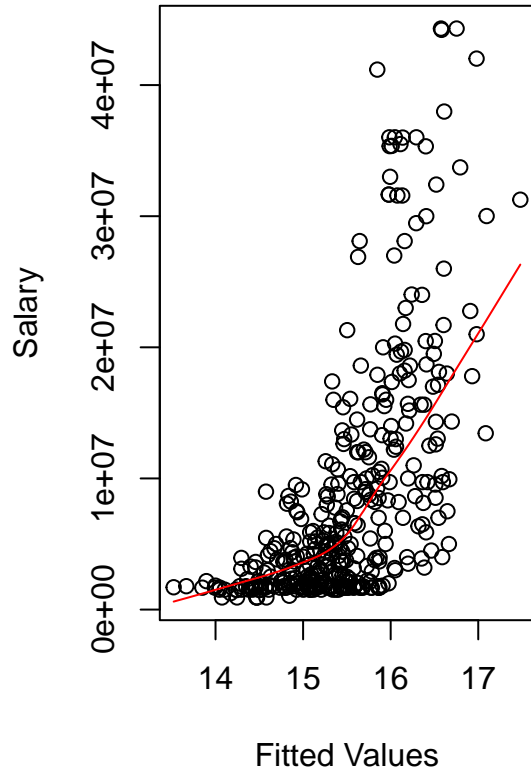
```
plot(predict(lm_log1), ap_tibble$Weight,
     xlab = "Fitted Values", ylab = "Weight")

plot(predict(lm_log4), sqrt(ap_tibble$Weight),
     xlab = "Fitted Values", ylab = "Weight")
```
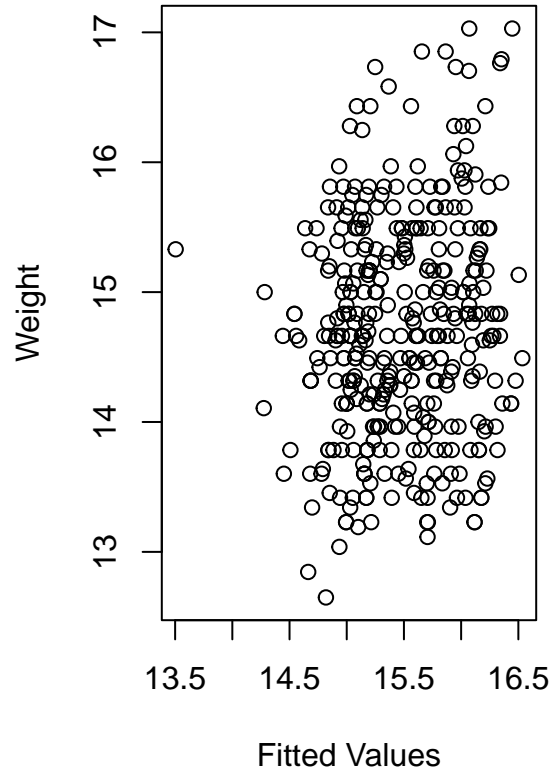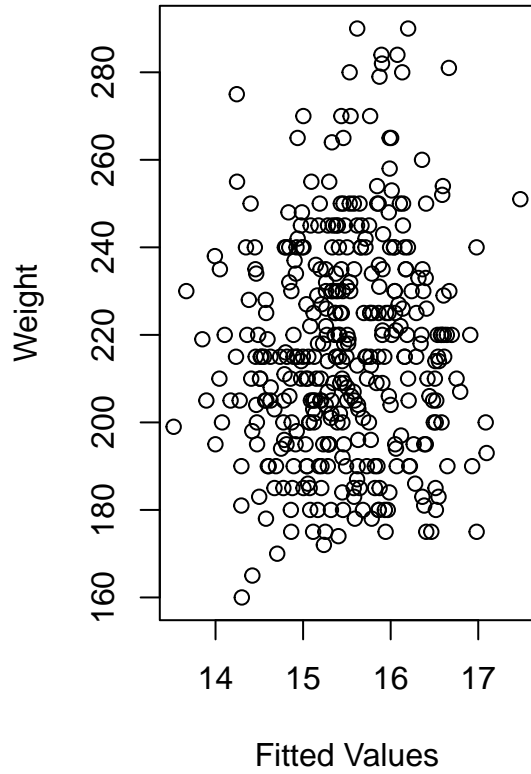
```
plot(predict(lm_log1), ap_tibble$Age,
     xlab = "Fitted Values", ylab = "Age")

plot(predict(lm_log4), sqrt(ap_tibble$Age),
     xlab = "Fitted Values", ylab = "Age")
```
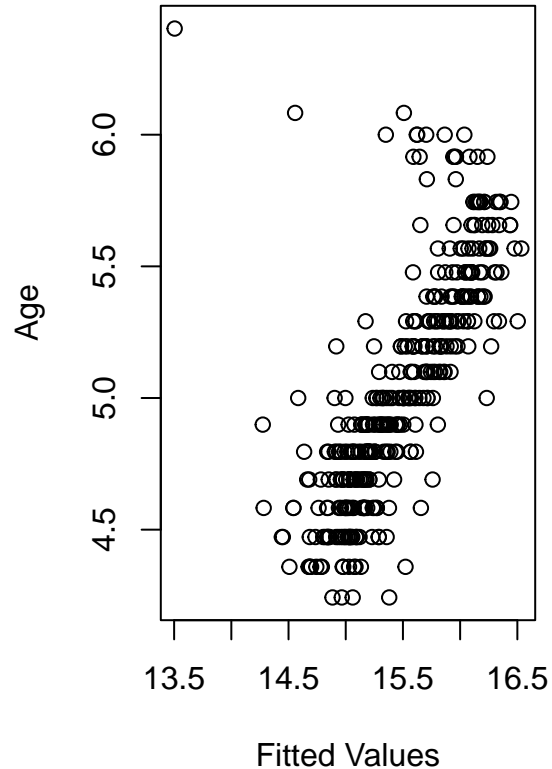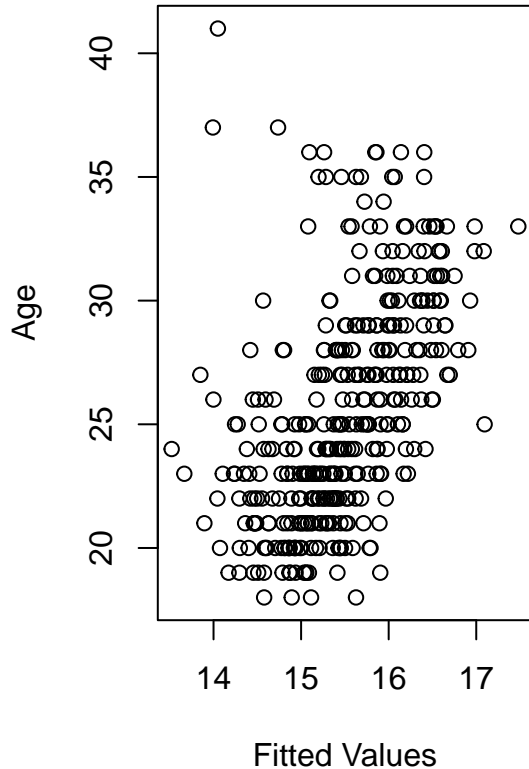
Model Checking

Comparing Models

`lm_log3` has smaller `R2` than `lm_log1` but has larger `adj.R2` than `lm_log1`.

```
performance::compare_performance(lm_log1,lm_log2,lm_log3,lm_step, rank = TRUE)
```

```
## # Comparison of Model Performance Indices
##
## Name     | Model |    R2 | R2 (adj.) |  RMSE | Sigma | AIC weights | BIC weights | Performance-Score
## ---------------------------------------------------------------------------------------------------------
## lm_log1 |    lm | 0.485 |     0.282 | 0.713 | 0.843 |     < 0.001 |     < 0.001 |            66.18%
## lm_log3 |    lm | 0.429 |     0.283 | 0.751 | 0.843 |     < 0.001 |     < 0.001 |            58.37%
## lm_log2 |    lm | 0.429 |     0.280 | 0.751 | 0.844 |     < 0.001 |     < 0.001 |            56.84%
## lm_step |    lm | 0.251 |     0.230 | 0.860 | 0.873 |       1.000 |        1.00 |            33.33%
```

VIF

```
round(vif(lm_step),2)
```

```
##              GVIF Df GVIF^(1/(2*Df))
## fPosition    3.05  6            1.10
## poly(Age, 3) 1.08  3            1.01
## Weight       2.97  1            1.72
```

```
round(vif(lm_log3),2)
```

```
##                GVIF Df GVIF^(1/(2*Df))
## fPosition     11.18  6            1.22
## fCollege       7.65 67            1.02
## poly(Age, 3)   1.97  3            1.12
## Weight         3.60  1            1.90
```

ROC/AUC

```
set.seed(999)

train <- sample(1:n, 311)

glm_train1 <- glm(fSalary.Dummy ~ nTeam+nPosition+nCollege+poly(Age,3)+Height_i+Weight, data=ap_tibble,

summary(glm_train1)
```

```
##
## Call:
## glm(formula = fSalary.Dummy ~ nTeam + nPosition + nCollege +
##     poly(Age, 3) + Height_i + Weight, family = binomial, data = ap_tibble,
##     subset = train)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.7338  -0.8494  -0.4766   0.9310   2.5544
##
## Coefficients:
##                 Estimate Std. Error z value Pr(>|z|)
## (Intercept)    9.135e-01  2.959e+00   0.309   0.7576
## nTeam          2.405e-02  1.564e-02   1.538   0.1241
## nPosition      2.073e-01  8.892e-02   2.331   0.0197 *
## nCollege       2.751e-04  4.475e-03   0.061   0.9510
## poly(Age, 3)1  1.488e+01  3.122e+00   4.766 1.88e-06 ***
## poly(Age, 3)2 -1.263e+01  3.082e+00  -4.099 4.14e-05 ***
## poly(Age, 3)3 -8.020e+00  3.937e+00  -2.037   0.0417 *
## Height_i      -1.018e+00  4.650e-01  -2.188   0.0287 *
## Weight         1.627e-02  7.701e-03   2.113   0.0346 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 402.9  on 310  degrees of freedom
## Residual deviance: 330.1  on 302  degrees of freedom
## AIC: 348.1
##
## Number of Fisher Scoring iterations: 5
```

```
ap_test <- ap_tibble[-train,]
head(ap_test)
```

```
##                    Name        Team Position Age Height Height_i Weight
```

```
## 1        Bruno Fernando   Boston Celtics         F   23  6' 9"     6.9     240
## 12 Robert Williams III   Boston Celtics         C   23  6' 8"     6.8     237
## 15        Jevon Carter    Brooklyn Nets        PG   25  6' 1"     6.1     200
## 20          Joe Harris    Brooklyn Nets        SF   30  6' 6"     6.6     220
## 25      Cameron Thomas    Brooklyn Nets        SG   19  6' 4"     6.4     210
## 30          Taj Gibson New York Knicks         C   36  6' 9"     6.9     232
##          College   Salary           fTeam fPosition       fCollege Salary.Dummy
## 1        Maryland  1782621  Boston Celtics         F       Maryland           0
## 12      Texas A&M  3661976  Boston Celtics         C      Texas A&M           0
## 15 West Virginia  3650000   Brooklyn Nets        PG  West Virginia           0
## 20        Virginia 17357143   Brooklyn Nets        SF        Virginia           1
## 25            LSU  2036280   Brooklyn Nets        SG            LSU           0
## 30            USC  4910000 New York Knicks         C            USC           0
##     nTeam nPosition nCollege fSalary.Dummy
## 1       2         2       50             0
## 12      2         1       95             0
## 15      3         5      113             0
## 20      3         6      106             1
## 25      3         7       47             0
## 30     20         1      100             0
```

```r
probs_test <- predict(glm_train1, newdata = ap_test,
                      type = "response")

head(probs_test)
```

```
##          1          12          15          20          25          30
## 0.09311594 0.08179884 0.32281506 0.64232452 0.10225082 0.12519537
```

```r
length(probs_test)
```

```
## [1] 69
```

```r
preds_test <- rep(0,12)
preds_test[probs_test > 0.5] <- 1

length(probs_test)
```

```
## [1] 69
```

```r
length(preds_test)
```

```
## [1] 69
```

```r
head(probs_test)
```

```
##          1          12          15          20          25          30
## 0.09311594 0.08179884 0.32281506 0.64232452 0.10225082 0.12519537
```

```r
head(preds_test)
```

```
## [1] 0 0 0 1 0 0
```

```r
tb1<- table(prediction = preds_test, actual = ap_test$fSalary.Dummy)
addmargins(tb1)
```

```
##           actual
## prediction  0  1 Sum
##          0  10  1  11
```

```
##        1     5 18  23
##        Sum 15 19  34
```

```r
#Accuracy
(tb1[1,1] + tb1[2,2]) / 36
```

```
## [1] 0.7777778
```

```r
#Sensitivity
tb1[2,2] / 19
```

```
## [1] 0.9473684
```

```r
#Specificity
tb1[1,1] / 17
```

```
## [1] 0.5882353
```

```r
library(pROC)
```

```
## Type 'citation("pROC")' for a citation.
```

```
##
## Attaching package: 'pROC'
```

```
## The following objects are masked from 'package:stats':
##
##     cov, smooth, var
```

```r
roc_full <- roc(ap_test$fSalary.Dummy, probs_test)
```

```
## Setting levels: control = 0, case = 1
```

```
## Setting direction: controls < cases
```

```r
plot(1 - roc_full$specificities, roc_full$sensitivities, type="l",
     xlab = "1 - Specificity", ylab = "Sensitivity")
# plot red point corresponding to 0.5 threshold:
points(x = 1-(tb1[1,1] / 17), y = tb1[2,2] / 19, col="red", pch=19)
abline(0, 1, lty=2)
```
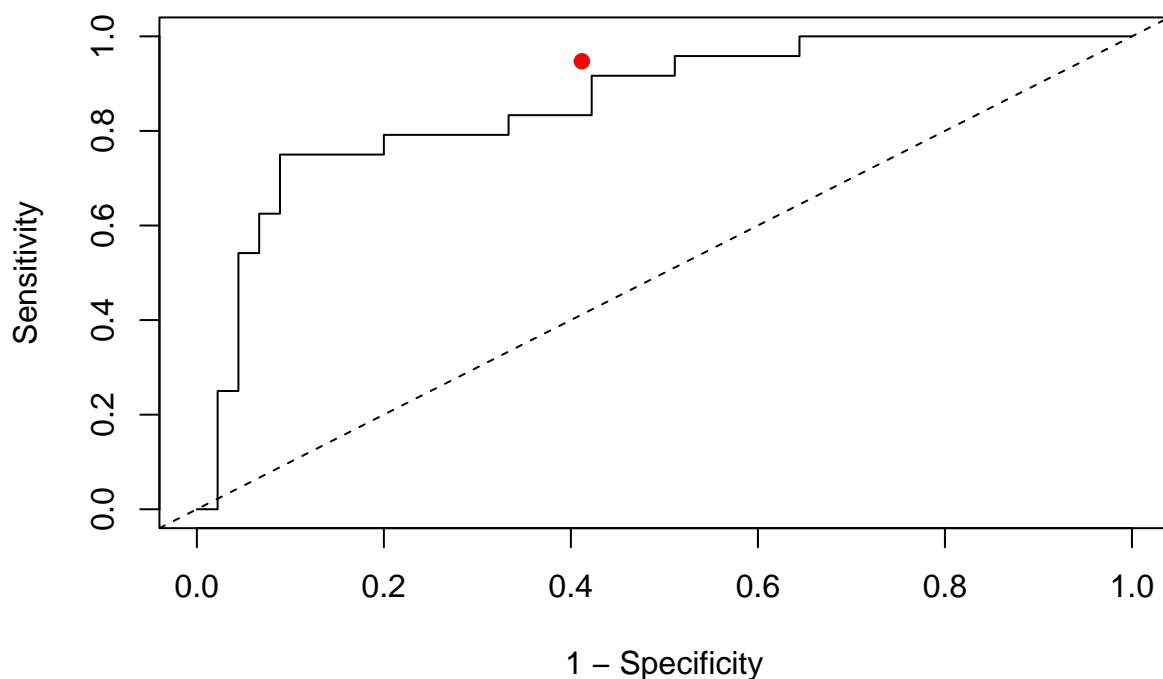
```
set.seed(999)

glm_train2 <- glm(fSalary.Dummy ~ nPosition+poly(Age,3)+Height_i+Weight, data=ap_tibble, subset = train

summary(glm_train2)
```

```
##
## Call:
## glm(formula = fSalary.Dummy ~ nPosition + poly(Age, 3) + Height_i +
##     Weight, family = binomial, data = ap_tibble, subset = train)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.7505  -0.8342  -0.4885   0.9424   2.4826
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)   1.079950   2.941566   0.367   0.7135
## nPosition     0.203221   0.088244   2.303   0.0213 *
## poly(Age, 3)1 14.733017   3.088543   4.770 1.84e-06 ***
## poly(Age, 3)2 -12.627900   3.062515  -4.123 3.73e-05 ***
## poly(Age, 3)3 -7.797480   3.924839  -1.987   0.0470 *
## Height_i      -0.988818   0.459384  -2.152   0.0314 *
## Weight         0.016588   0.007613   2.179   0.0293 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 402.90  on 310  degrees of freedom
## Residual deviance: 332.49  on 304  degrees of freedom
## AIC: 346.49
##
## Number of Fisher Scoring iterations: 5
```

```
ap_test <- ap_tibble[-train,]
head(ap_test)
```

```
##                  Name           Team Position Age Height Height_i Weight
## 1      Bruno Fernando  Boston Celtics        F  23  6' 9"      6.9    240
## 12 Robert Williams III  Boston Celtics        C  23  6' 8"      6.8    237
## 15       Jevon Carter   Brooklyn Nets       PG  25  6' 1"      6.1    200
## 20         Joe Harris   Brooklyn Nets       SF  30  6' 6"      6.6    220
## 25     Cameron Thomas   Brooklyn Nets       SG  19  6' 4"      6.4    210
## 30         Taj Gibson New York Knicks        C  36  6' 9"      6.9    232
##        College    Salary           fTeam fPosition        fCollege Salary.Dummy
## 1      Maryland  1782621  Boston Celtics         F        Maryland            0
## 12    Texas A&M  3661976  Boston Celtics         C       Texas A&M            0
## 15 West Virginia  3650000   Brooklyn Nets        PG West Virginia            0
## 20     Virginia 17357143   Brooklyn Nets        SF        Virginia            1
## 25          LSU  2036280   Brooklyn Nets        SG             LSU            0
## 30          USC  4910000 New York Knicks         C             USC            0
##    nTeam nPosition nCollege fSalary.Dummy
## 1      2         2       50             0
## 12     2         1       95             0
## 15     3         5      113             0
## 20     3         6      106             1
## 25     3         7       47             0
## 30    20         1      100             0
```

```
probs_test <- predict(glm_train2, newdata = ap_test,
                      type = "response")

head(probs_test)
```

```
##         1        12        15        20        25        30
## 0.1310472 0.1144739 0.3891356 0.7042890 0.1328949 0.1167010
```

```
length(probs_test)
```

```
## [1] 69
```

```
preds_test <- rep(0,12)
preds_test[probs_test > 0.5] <- 1

length(probs_test)
```

```
## [1] 69
```

```
length(preds_test)
```

```
## [1] 69
```

```
head(probs_test)
```

```
##         1        12        15        20        25        30
## 0.1310472 0.1144739 0.3891356 0.7042890 0.1328949 0.1167010
```

```
head(preds_test)
```

```
## [1] 0 0 0 1 0 0
```

```
tb2<- table(prediction = preds_test, actual = ap_test$fSalary.Dummy)
addmargins(tb2)
```

```
##           actual
## prediction  0  1 Sum
##        0   10  1  11
##        1    7 18  25
##        Sum 17 19  36
```

```
#Accuracy
(tb2[1,1] + tb2[2,2]) / 36
```

```
## [1] 0.7777778
```

```
#Sensitivity
tb2[2,2] / 19
```

```
## [1] 0.9473684
```

```
#Specificity
tb2[1,1] / 17
```

```
## [1] 0.5882353
```

```
library(pROC)
roc_reduced <- roc(ap_test$fSalary.Dummy, probs_test)
```

```
## Setting levels: control = 0, case = 1
```

```
## Setting direction: controls < cases
```

```
plot(1 - roc_reduced$specificities, roc_reduced$sensitivities, type="l",
     xlab = "1 - Specificity", ylab = "Sensitivity")
# plot red point corresponding to 0.5 threshold:
points(x = 1-(tb2[1,1] / 17), y = tb2[2,2] / 19, col="red", pch=19)
abline(0, 1, lty=2)
```
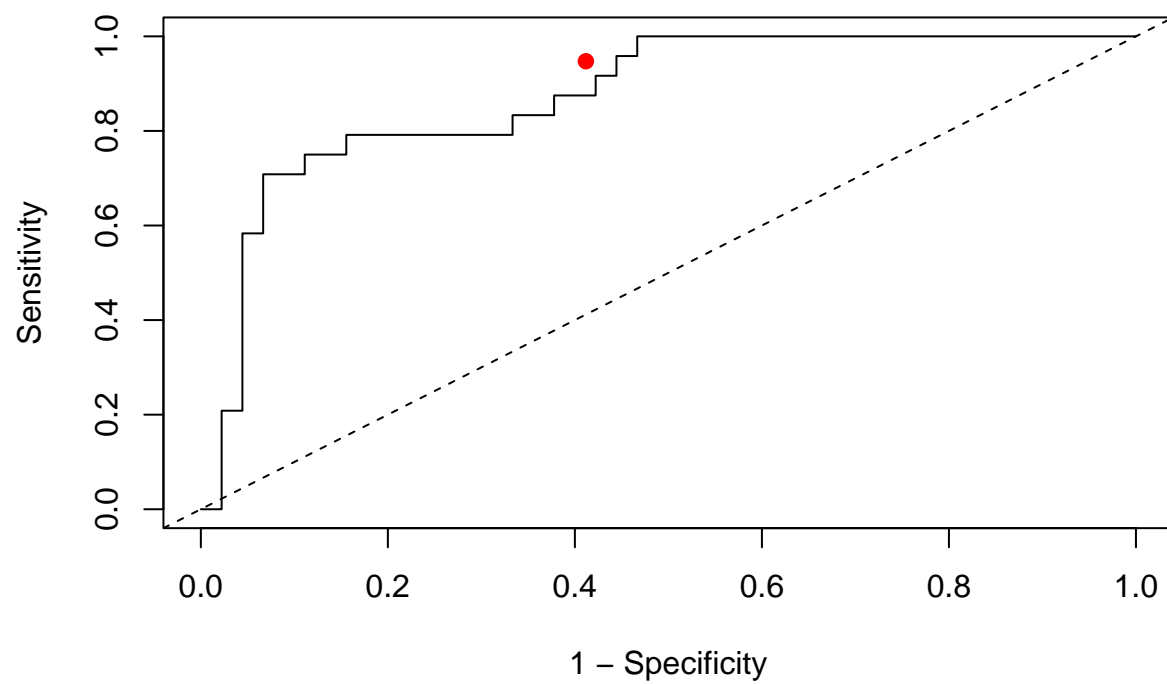
```
auc(roc_full)
```

```
## Area under the curve: 0.8593
```

```
auc(roc_reduced)
```

```
## Area under the curve: 0.8741
```

Plots

```
par(mfrow=c(2,2), mar=c(4.5, 4.5, 2, 2))
plot(lm_log3, 1:2)
plot(lm_step, 1:2)
```

Residuals vs Fitted · Normal Q–Q · Residuals vs Fitted · Normal Q–Q
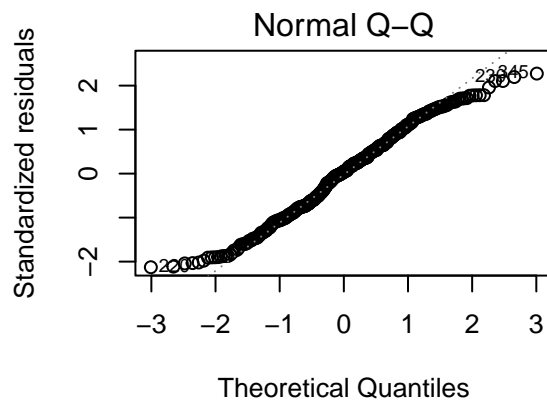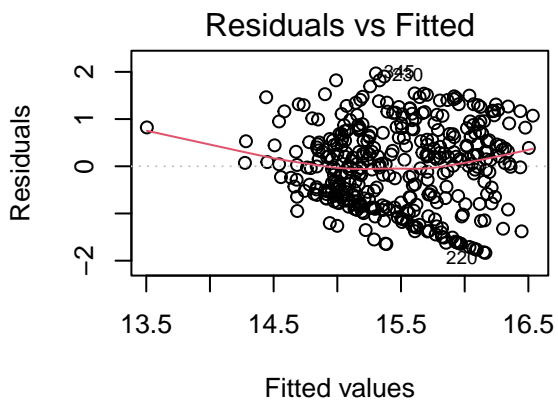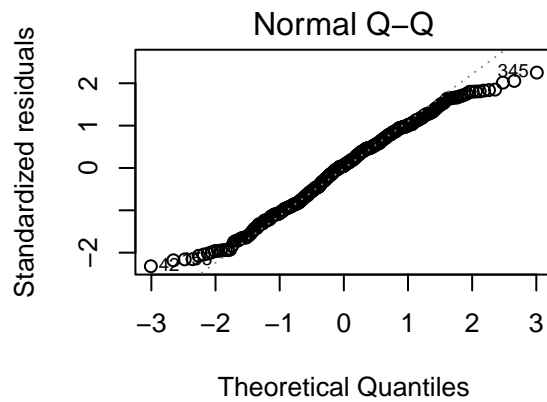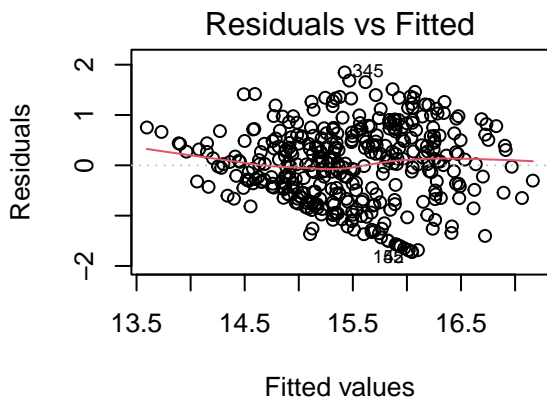
```
performance::check_model(lm_log3)
```

Posterior Predictive Check
Model–predicted lines should resemble observed data

Density

1.0e−07
7.5e−08
5.0e−08
2.5e−08
0.0e+00

0e+00 1e+08 2e+08 3e+08 4e+08 5e+08

log(Salary)

— Model–predicted data — Observed data

Linearity
Reference line should be flat and horizontal

Residuals

2
1
0
−1

14   15   16   17

Fitted values

Homogeneity of Variance
Reference line should be flat and horizontal

Std. residuals

1.2
0.8
0.4
0.0

14   15   16   17

Fitted values

Influential Observations
Points should be inside the contour lines

Std. Residuals

50
25
0
−25
−50

1.0

204   30 847

1.0

0.0   0.2   0.4   0.6

Leverage (h_{ii})

Collinearity
Higher bars (>5) indicate potential collinearity issues

Variance Inflation Factor (VIF)

fCollege fPosition poly(Age, 3) Weight

■ low (< 5) ■ moderate (< 10) ■ high (>

Normality of Residuals
Dots should fall along the line

Sample Quantiles

2
0
−2

−2   0   2

Standard Normal Distribution Quantiles

```
plot(hatvalues(lm_log3), rstandard(lm_log3),xlab='Leverage', ylab='Standardized Residuals')
```
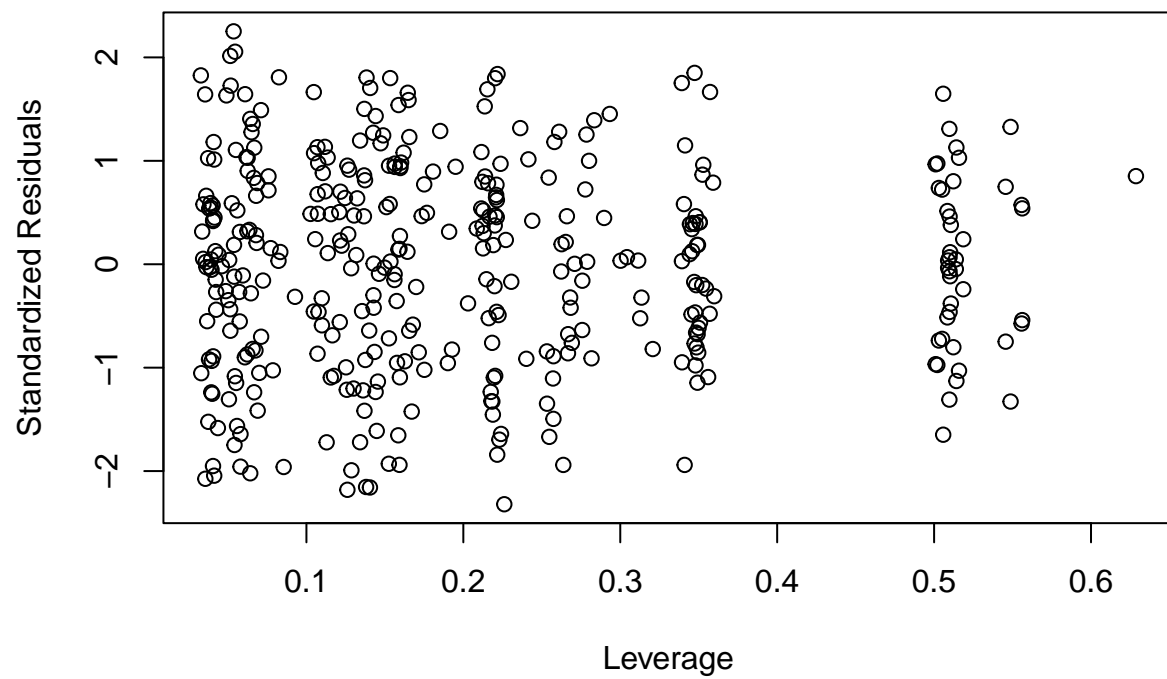
```
performance::check_model(lm_step)
```

Posterior Predictive Check
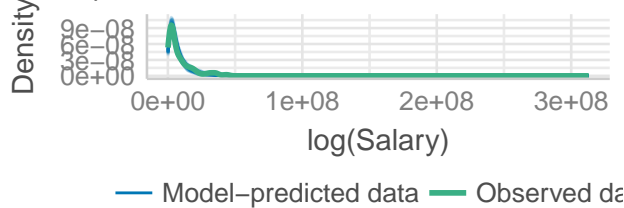
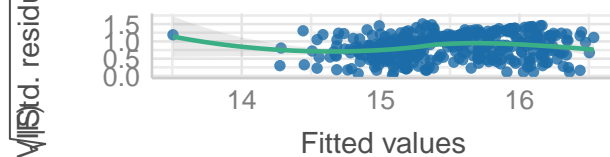Model–predicted lines should resemble observed data

Linearity

Reference line should be flat and horizontal

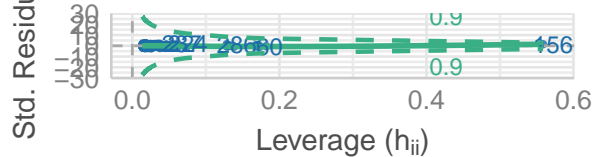── Model–predicted data ── Observed data
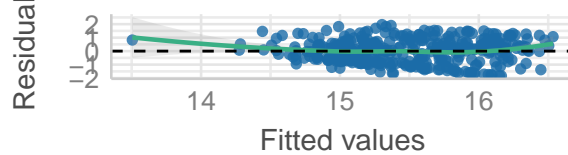
Homogeneity of Variance
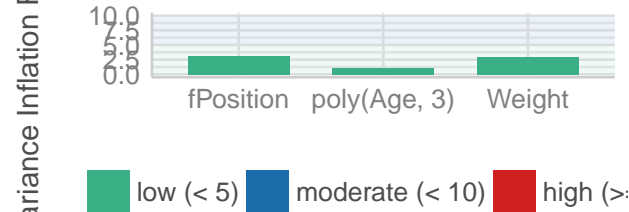
Reference line should be flat and horizontal

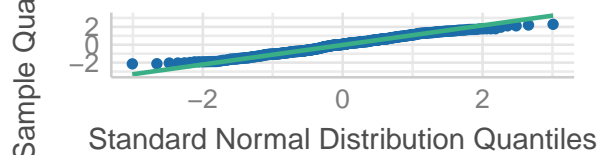## Influential Observations

Points should be inside the contour lines

Collinearity

Higher bars (>5) indicate potential collinearity issues

Normality of Residuals

Dots should fall along the line

low (< 5) moderate (< 10) high (>=

```
anova(lm_log4,lm_step,lm_log3,lm_log2,lm_log1)
```

```
## Analysis of Variance Table
##
## Model 1: log(Salary) ~ fPosition + poly(Age, 3) + Weight
## Model 2: log(Salary) ~ fPosition + poly(Age, 3) + Weight
## Model 3: log(Salary) ~ fPosition + fCollege + poly(Age, 3) + Weight
## Model 4: log(Salary) ~ fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
## Model 5: log(Salary) ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##   Res.Df    RSS Df Sum of Sq      F  Pr(>F)
## 1    369 281.22
## 2    369 281.22  0     0.000
## 3    302 214.45 67    66.776 1.4021 0.03242 *
## 4    301 214.45  1     0.000 0.0004 0.98507
## 5    272 193.35 29    21.096 1.0233 0.43723
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Final Model

Backwards Elimination Reduced Model:

$$log(\widehat{Salary}) = 11.50148 + fPosition \pm fCollege + 6.07923Age - 3.89527Age^2 - 3.16991Age^3 + 0.01535Weight$$

Step() Reduced Model:

$$log(\widehat{Salary}) = 12.40672 \pm fPosition + 6.68504Age - 3.14049Age^2 - 3.28484Age^3 + 0.01176Weight$$

Loigistic Regression Model:

$$fSalary.Dummy = 1.07995 + 0.20322nPosition + 14.73302Age - 12.62790Age^2 - 7.79748Age^3 - 0.98882Height_i + 0.01659Weig$$

Prediction

```
# James Harden SG 32 6.5 220 "Arizona State" 44310840

newdata <- data.frame(fPosition='SG', Age=32, Weight = 220, fCollege='Arizona State')
cat("lm_log3 prediction = $", exp(predict(lm_log3, newdata, type='response')), "\n")
```

```
## lm_log3 prediction = $ 12575341
```

```
newdata <- data.frame(fPosition='SG', Age=32, Weight = 220, fCollege='Arizona State')
cat("lm_step prediction = $", exp(predict(lm_step, newdata, type='response')), "\n")
```

```
## lm_step prediction = $ 12493430
```

```
cat("Actual Salary = $ 44310840")
```

```
## Actual Salary = $ 44310840
```

```
# Miles McBride Age = 20, Weight = 200, fPosition = PG fCollege = West Virginia, Salary = 925258
newdata <- data.frame(fPosition='PG', Age=20, Weight = 200, fCollege = 'West Virginia')
cat("lm_log3 prediction = $", exp(predict(lm_log3, newdata, type='response')), "\n")
```

```
## lm_log3 prediction = $ 1419429
```

```
newdata <- data.frame(fPosition='PG', Age=20, Weight = 200, fCollege = 'West Virginia')
cat("lm_step prediction = $",exp(predict(lm_step, newdata, type='response')), "\n")
```

```
## lm_step prediction = $ 4363351
```

```
cat("Actual Salary = $ 925258")
```

```
## Actual Salary = $ 925258
```