Salary MLR 2nd Draft

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Contents


```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.5     v purrr   0.3.4
## v tibble  3.1.6     v dplyr   1.0.8
## v tidyr   1.2.0     v stringr 1.4.0
## v readr   2.1.2     v forcats 0.5.1
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(randomForest)
```

```
## randomForest 4.7-1
```

```
## Type rfNews() to see new features/changes/bug fixes.
##
## Attaching package: 'randomForest'
## The following object is masked from 'package:dplyr':
##
##     combine
## The following object is masked from 'package:ggplot2':
##
##     margin
```

```
library(parallel)
library(rpart)
library(readr)
library(janitor)
```

```
##
## Attaching package: 'janitor'
## The following objects are masked from 'package:stats':
##
##     chisq.test, fisher.test
```

```
library(car)
```

```
## Loading required package: carData
##
## Attaching package: 'car'
## The following object is masked from 'package:dplyr':
##
##     recode
## The following object is masked from 'package:purrr':
##
##     some
```

```
library(MASS)
```

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

```
library(Hmisc)
```

```
## Loading required package: lattice
## Loading required package: survival
## Loading required package: Formula
##
## Attaching package: 'Hmisc'
## The following objects are masked from 'package:dplyr':
##
##     src, summarize
```

```
## The following objects are masked from 'package:base':
##
##     format.pval, units
```

```
library(rstatix)
```

```
##
## Attaching package: 'rstatix'
```

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

```
## The following object is masked from 'package:janitor':
##
##     make_clean_names
```

```
## The following object is masked from 'package:stats':
##
##     filter
```

```
library(forcats)
library(GGally)
```

```
## Registered S3 method overwritten by 'GGally':
##   method from
##   +.gg   ggplot2
```

```
library(performance)
library(caret)
```

```
##
## Attaching package: 'caret'
```

```
## The following object is masked from 'package:survival':
##
##     cluster
```

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

```
library(lmtest)
```

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

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

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

```
library(corrplot)
```

```
## corrplot 0.92 loaded
```

```
library(PerformanceAnalytics)
```

```
## Loading required package: xts
```

```
##
```

```
## Attaching package: 'xts'

## The following objects are masked from 'package:dplyr':
##
##     first, last

##
## Attaching package: 'PerformanceAnalytics'

## The following object is masked from 'package:graphics':
##
##     legend
```

```
library(plotly)
```

```
##
## Attaching package: 'plotly'

## The following object is masked from 'package:Hmisc':
##
##     subplot

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

## The following object is masked from 'package:ggplot2':
##
##     last_plot

## The following object is masked from 'package:stats':
##
##     filter

## The following object is masked from 'package:graphics':
##
##     layout
```

Intro

blahblahblah Hi

Question - How do the various stats from the ESPN website explain the salaries of NBA players?

Where data is from

Variables explained

Data Exploration

```
# 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.
```

```
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.
```

```
# 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>
```

```
# 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

```
#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"
```

```
#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 ...
```

Recoding for Logistic Regression

```
# 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"
```

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

```
##       0%       5%      10%      15%      20%      25%      30%      35%
##   925258  1517981  1669178  1669178  1778656  1802057  2103509  2573040
##      40%      45%      50%      55%      60%      65%      70%      75%
##  3242760  3900751  4447896  5027304  6412964  8222063  9697392 12000000
```

```
##      80%      85%      90%      95%     100%
## 14324647 17943158 23600000 31650600 45780966
```

```
ap_tibble <- ap_tibble %>% mutate(Salary.Dummy = if_else(Salary >= 8222063, 1, 0))
```

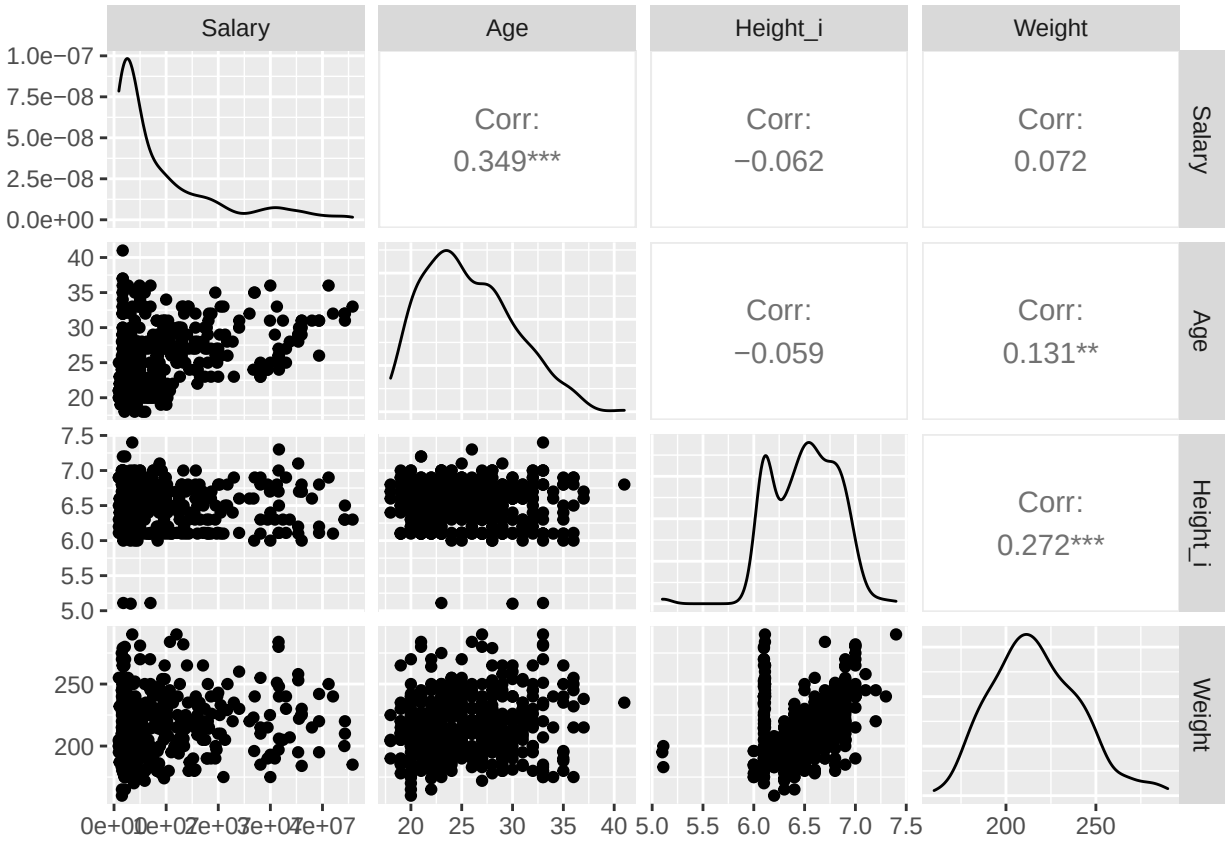
```
str(ap_tibble)
```

```
## tibble [445 x 13] (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 ...
##  $ Salary.Dummy: num [1:445] 1 0 0 0 1 0 0 0 0 0 ...
```

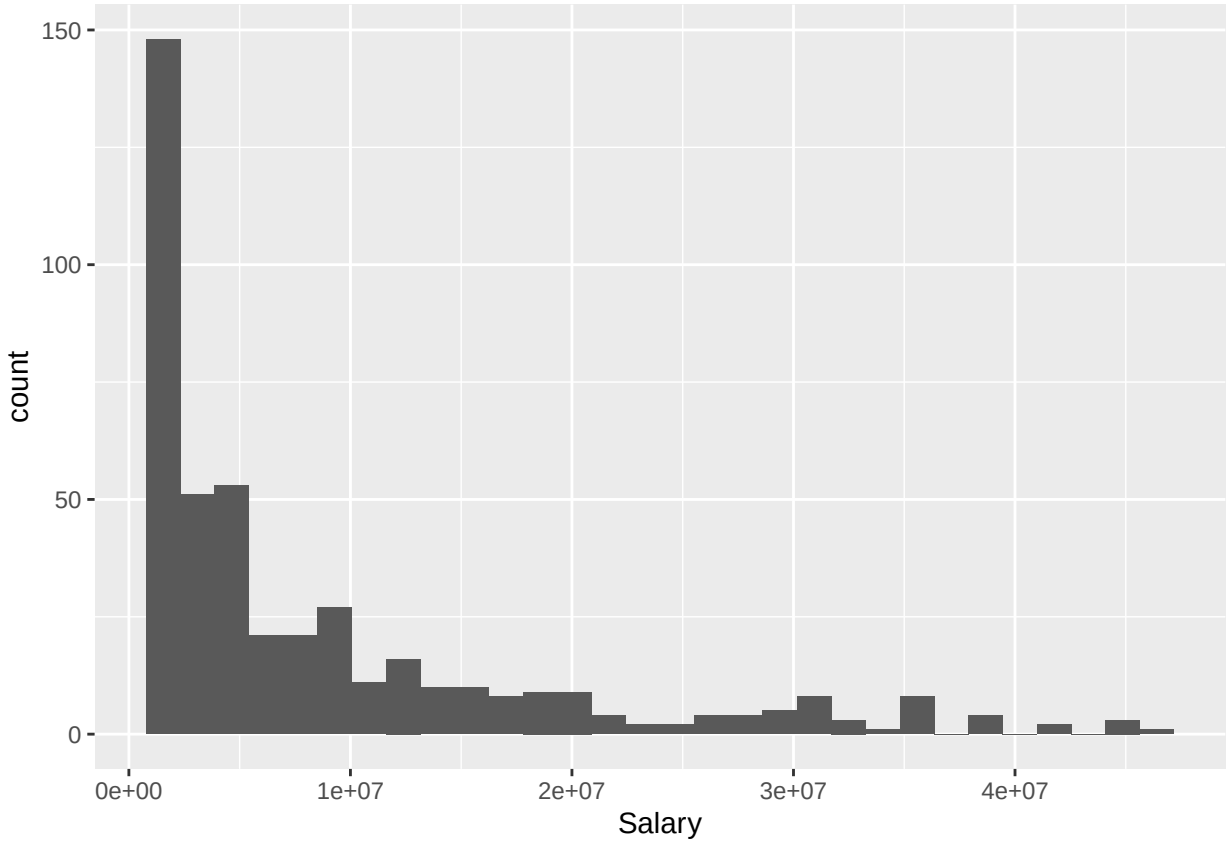
Model Building

Initial Graphs

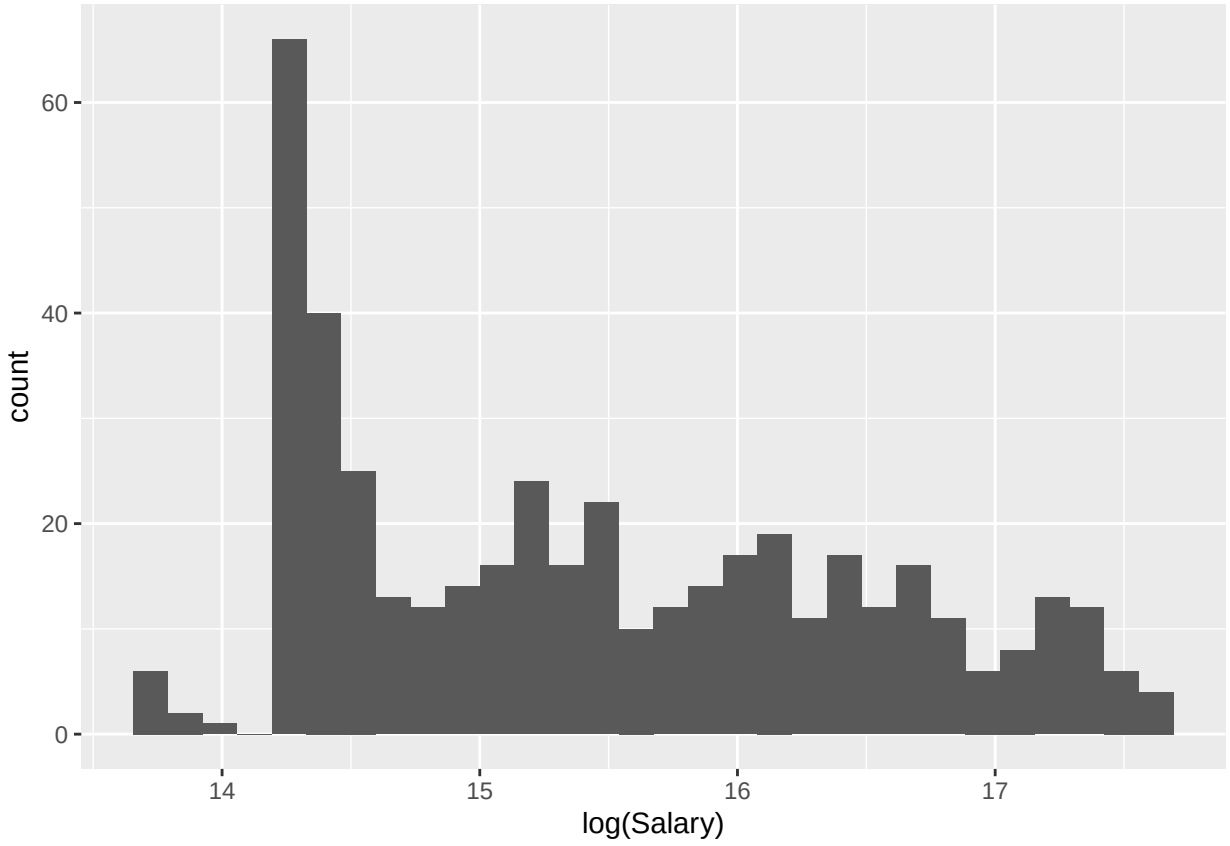
```
# The diagonal consists of the densities of the three variables and the upper panels consist of the cor

ggpairs(ap_tibble, columns = c(9,4,6,7), cardinality_threshold = NULL)
```




```
ggplot(ap_tibble, aes(Salary)) +
  geom_histogram(bins = 30)
```




```
ggplot(ap_tibble, aes(log(Salary))) +
  geom_histogram(bins = 30)
```



Full(Initial) Model

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

```
##
## 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
## 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
## fTeamSacremento 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
```

Initial Tests

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

```
##
##  Shapiro-Wilk normality test
##
## data:  resid(lm1)
```

```
## W = 0.9352, p-value = 5.455e-13
```

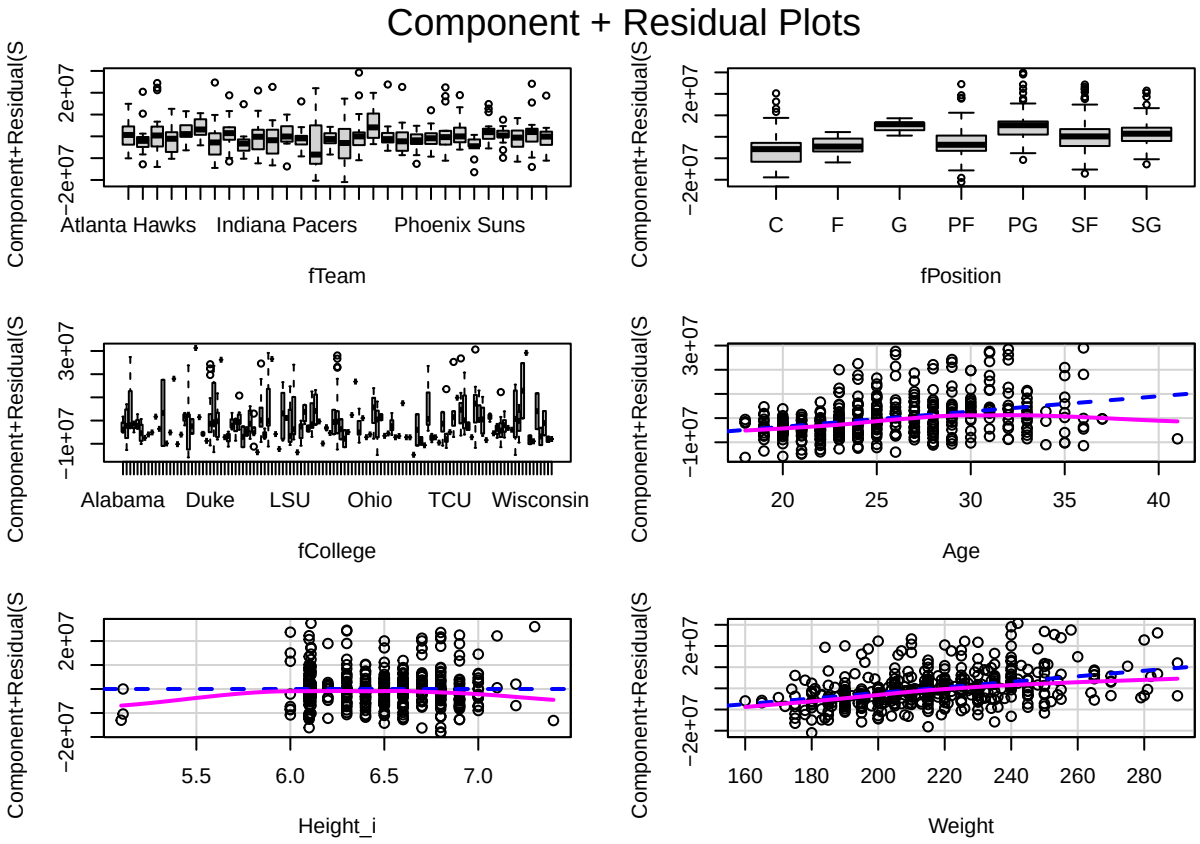
```
bptest(lm1)
```

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

Check for Polynomial Terms

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

```
crPlots(lm1)
```




```
summary(lm(Salary ~ fTeam+fPosition+fCollege+poly(Age,2)+poly(Height_i,2)+poly(Weight,2),
           data=ap_tibble))
```

```
##
## Call:
## lm(formula = Salary ~ fTeam + fPosition + fCollege + poly(Age,
##     2) + poly(Height_i, 2) + poly(Weight, 2), data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -15865608  -4355235         0   2905503  25723248
##
```

```
## Coefficients:
##                                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)                      3502414    5432878   0.645 0.519660
## fTeamBoston Celtics             -3186153    3928733  -0.811 0.418050
## fTeamBrooklyn Nets               1662459    3737375   0.445 0.656787
## fTeamCharlotte Hornets          -2342972    3666864  -0.639 0.523364
## fTeamChicago Bulls               1112036    4053245   0.274 0.784009
## fTeamCleveland Cavaliers         1710038    4002919   0.427 0.669558
## fTeamDallas Mavericks           -2961534    3773993  -0.785 0.433269
## fTeamDenver Nuggets               538854    3879576   0.139 0.889631
## fTeamDetroit Pistons            -4396424    3838890  -1.145 0.253073
## fTeamGolden State Warriors       -577995    3916988  -0.148 0.882793
## fTeamHouston Rockets            -1276098    3800321  -0.336 0.737279
## fTeamIndiana Pacers             -1283659    3887123  -0.330 0.741466
## fTeamLos Angeles Clippers       -2299616    3966883  -0.580 0.562573
## fTeamLos Angeles Lakers           153268    4167318   0.037 0.970687
## fTeamMemphis Grizzlies          -2780590    3923295  -0.709 0.479066
## fTeamMiami Heat                 -2107883    4013563  -0.525 0.599860
## fTeamMilwaukee Bucks              124647    3948691   0.032 0.974840
## fTeamMinnesota Timberwolves      4143964    4139797   1.001 0.317673
## fTeamNew Orleans Pelicans        -710921    3682629  -0.193 0.847060
## fTeamNew York Knicks            -1959620    3758751  -0.521 0.602529
## fTeamOklahoma City Thunder      -2465808    3871694  -0.637 0.524714
## fTeamOrlando Magic              -1482265    3880992  -0.382 0.702798
## fTeamPhiladelphia Sixers          405405    3903383   0.104 0.917354
## fTeamPhoenix Suns                 956633    3923967   0.244 0.807567
## fTeamPortland Trail Blazers     -5669449    4335448  -1.308 0.192030
## fTeamSacremento Kings             628847    3944640   0.159 0.873453
## fTeamSan Antonio Spurs           -386491    3817709  -0.101 0.919434
## fTeamToronto Raptors             -459480    4192326  -0.110 0.912804
## fTeamUtah Jazz                   1803691    4020580   0.449 0.654051
## fTeamWashington Wizards         -2342866    3661028  -0.640 0.522721
## fPositionF                        733233    4334798   0.169 0.865798
## fPositionG                       7837692    5149848   1.522 0.129136
## fPositionPF                      2625313    1993269   1.317 0.188867
## fPositionPG                     11080961    2950878   3.755 0.000210 ***
## fPositionSF                      5295799    2224568   2.381 0.017942 *
## fPositionSG                      5900481    2572218   2.294 0.022522 *
## fCollegeArizona                  -102083    5511892  -0.019 0.985237
## fCollegeArizona State            9163032    7178055   1.277 0.202806
## fCollegeArkansas                  926509    6551093   0.141 0.887632
## fCollegeAuburn                   1383867    7083008   0.195 0.845236
## fCollegeBaylor                  -5405289    6313688  -0.856 0.392649
## fCollegeBelmont                 -6751691   10506449  -0.643 0.520985
## fCollegeBoise State             -6701455   10698748  -0.626 0.531569
## fCollegeBoston College          -4567657   10721306  -0.426 0.670404
## fCollegeBowling Green            1495904   10812198   0.138 0.890059
## fCollegeBucknell                -3847959   10855368  -0.354 0.723245
## fCollegeButler                   3799182    8245993   0.461 0.645343
## fCollegeBYU                     -9808387   10689802  -0.918 0.359632
## fCollegeCal Poly                -6998093   10700955  -0.654 0.513659
## fCollegeCalifornia              18914095   10709195   1.766 0.078440 .
## fCollegeCharleston             -11549807   10779315  -1.071 0.284861
## fCollegeCleveland State         -6340030   10570959  -0.600 0.549143
```

```
## fCollegeColorado                 367007    7118722   0.052 0.958919
## fCollegeConnecticut              2862736    6210687   0.461 0.645195
## fCollegeCreighton               -3438330    8123564  -0.423 0.672429
## fCollegeDavidson                33138670   10681897   3.102 0.002113 **
## fCollegeDayton                   1261137   10629678   0.119 0.905642
## fCollegeDePaul                  -5982477    8188290  -0.731 0.465615
## fCollegeDrexel                  -9857695   10701918  -0.921 0.357770
## fCollegeDuke                     1949729    4808126   0.406 0.685409
## fCollegeFlorida                  9310095    6285365   1.481 0.139649
## fCollegeFlorida State             475125    5545882   0.086 0.931788
## fCollegeFresno State            27781624   10731117   2.589 0.010123 *
## fCollegeGeorge Washington       -8637522   10799812  -0.800 0.424502
## fCollegeGeorgetown              -5917021    7104244  -0.833 0.405607
## fCollegeGeorgia                   571223    7130595   0.080 0.936207
## fCollegeGeorgia Tech            -1563440    7159179  -0.218 0.827287
## fCollegeGonzaga                  2401844    5792947   0.415 0.678736
## fCollegeHouston                 -6016572    8062790  -0.746 0.456153
## fCollegeIllinois                -4424004    8551151  -0.517 0.605308
## fCollegeIndiana                  -242862    5817532  -0.042 0.966730
## fCollegeIowa State              -4560940    6205261  -0.735 0.462937
## fCollegeIUPUI                   -5472157   11773105  -0.465 0.642429
## fCollegeKansas                   4423286    5527090   0.800 0.424208
## fCollegeKansas State            -5996594    7081256  -0.847 0.397802
## fCollegeKentucky                 5172073    4788446   1.080 0.281004
## fCollegeLehigh                  27144392   10837953   2.505 0.012819 *
## fCollegeLiberty                 -4791951   10608779  -0.452 0.651831
## fCollegeLouisiana-Lafayette    -13882135   10719136  -1.295 0.196341
## fCollegeLouisville               3520600    6247154   0.564 0.573502
## fCollegeLoyola (MD)              4433349   10708969   0.414 0.679197
## fCollegeLSU                       598675    6465653   0.093 0.926292
## fCollegeMarquette                3515026    7222288   0.487 0.626851
## fCollegeMarshall               -11425244   10779112  -1.060 0.290068
## fCollegeMaryland                -3702182    6262964  -0.591 0.554907
## fCollegeMemphis                  4418480    6519192   0.678 0.498471
## fCollegeMiami (FL)              -3268771    8068125  -0.405 0.685674
## fCollegeMichigan                 1833700    5663405   0.324 0.746342
## fCollegeMichigan State           5674938    6287614   0.903 0.367523
## fCollegeMinnesota                1636389   10706557   0.153 0.878633
## fCollegeMississippi State       -6789638   10746615  -0.632 0.528028
## fCollegeMissouri                -2696364    7077473  -0.381 0.703503
## fCollegeMissouri State          -7198608   10670666  -0.675 0.500466
## fCollegeMurray State               -3180    8198443   0.000 0.999691
## fCollegenan                      2574100    4558251   0.565 0.572714
## fCollegeNebraska                -4060513    8262089  -0.491 0.623477
## fCollegeNevada                  -6025737    8210221  -0.734 0.463594
## fCollegeNew Mexico              -5122965   10857457  -0.472 0.637403
## fCollegeNew Mexico JC             273894   10951652   0.025 0.980065
## fCollegeNew Mexico State        14369252   10946292   1.313 0.190338
## fCollegeNorth Carolina          -1950098    5421201  -0.360 0.719325
## fCollegeNorth Carolina State     1379996   10701867   0.129 0.897489
## fCollegeNotre Dame              -6998970   10694706  -0.654 0.513361
## fCollegeOhio                    -5002480   10659406  -0.469 0.639213
## fCollegeOhio State               3959633    7170711   0.552 0.581247
## fCollegeOklahoma                 -934340    7126668  -0.131 0.895785
```

```
## fCollegeOklahoma State               2843749    8266116   0.344 0.731081
## fCollegeOld Dominion                -8121357   10772289  -0.754 0.451525
## fCollegeOle Miss                    -4618227   10690541  -0.432 0.666074
## fCollegeOregon                       -696751    6147636  -0.113 0.909844
## fCollegeOregon State                -7441696   10565796  -0.704 0.481809
## fCollegePenn State                  -6848963   11179852  -0.613 0.540618
## fCollegePittsburgh                   8739719   10808999   0.809 0.419443
## fCollegeProvidence                  -7935086   10687332  -0.742 0.458411
## fCollegePurdue                        140818   12409802   0.011 0.990954
## fCollegeRadford                   -16191853   10764291  -1.504 0.133632
## fCollegeSaint Joseph's             -5135664    8401546  -0.611 0.541504
## fCollegeSaint Mary's               -7406024    8086758  -0.916 0.360535
## fCollegeSalt Lake CC UT           -12525243   10708408  -1.170 0.243113
## fCollegeSan Diego State             6737539    7153771   0.942 0.347084
## fCollegeSMU                        -7626109    7163434  -1.065 0.287963
## fCollegeSouth Carolina             -7280792   10495466  -0.694 0.488430
## fCollegeSt. John's                 -9261354   10733327  -0.863 0.388940
## fCollegeStanford                    2074526    6038815   0.344 0.731452
## fCollegeSyracuse                   -3404788    6222528  -0.547 0.584689
## fCollegeTCU                        -5085677    8203787  -0.620 0.535807
## fCollegeTennessee                   6505023    6296699   1.033 0.302440
## fCollegeTennessee State             9330301   10900797   0.856 0.392756
## fCollegeTexas                       6770253    5316345   1.273 0.203886
## fCollegeTexas A&M                   3727197    6635982   0.562 0.574786
## fCollegeTexas Tech                  1605864    8503987   0.189 0.850355
## fCollegeUC Santa Barbara          -10110171   10695388  -0.945 0.345315
## fCollegeUCLA                        6842771    5342865   1.281 0.201330
## fCollegeUNLV                        2820907    7346781   0.384 0.701291
## fCollegeUSC                         3001161    5511464   0.545 0.586502
## fCollegeUSC Upstate                -7390796   10695573  -0.691 0.490119
## fCollegeUtah                        1857232    7103100   0.261 0.793921
## fCollegeUtah State                 -5292161   10654160  -0.497 0.619768
## fCollegeVanderbilt                 -2232933    6492031  -0.344 0.731138
## fCollegeVillanova                  -2160192    5437901  -0.397 0.691482
## fCollegeVirginia                   -1876496    5715678  -0.328 0.742921
## fCollegeVirginia Commonwealth        724421   10618500   0.068 0.945656
## fCollegeVirginia Tech              -3500057   10327619  -0.339 0.734933
## fCollegeWake Forest                 4136001    6194050   0.668 0.504841
## fCollegeWashington                   923579    5593969   0.165 0.868980
## fCollegeWashington State           14234700    8275360   1.720 0.086494 .
## fCollegeWeber State                29724711   10890525   2.729 0.006739 **
## fCollegeWest Virginia              -7724043    8139286  -0.949 0.343433
## fCollegeWestern Texas Coll. (J.C.) -9176850   10574938  -0.868 0.386238
## fCollegeWichita State               3731671    8290813   0.450 0.652983
## fCollegeWisconsin                  -8240947    8514687  -0.968 0.333939
## fCollegeWyoming                     -816433    8264074  -0.099 0.921372
## fCollegeXavier                     -8191021    7972784  -1.027 0.305116
## fCollegeYale                       -8818585   10693691  -0.825 0.410258
## poly(Age, 2)1                      56250320   11819542   4.759  3.1e-06 ***
## poly(Age, 2)2                     -41553597   12067671  -3.443 0.000661 ***
## poly(Height_i, 2)1                  5464608   12671276   0.431 0.666606
## poly(Height_i, 2)2                -12374415   12519659  -0.988 0.323796
## poly(Weight, 2)1                   61611656   19299577   3.192 0.001569 **
## poly(Weight, 2)2                  -12523724   12892006  -0.971 0.332156
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9195000 on 285 degrees of freedom
## Multiple R-squared:  0.4448, Adjusted R-squared:  0.135
## F-statistic: 1.436 on 159 and 285 DF,  p-value: 0.004241
```

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

```
##
## Call:
## lm(formula = Salary ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + poly(Height_i, 3) + poly(Weight, 3), data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -16279782  -4393433         0   3100589  25628094
##
## Coefficients:
##                                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)                          448856    5519099   0.081 0.935239
## fTeamBoston Celtics                -2397472    3886272  -0.617 0.537793
## fTeamBrooklyn Nets                  1059737    3693753   0.287 0.774400
## fTeamCharlotte Hornets             -2112706    3626683  -0.583 0.560665
## fTeamChicago Bulls                  2222242    4017562   0.553 0.580611
## fTeamCleveland Cavaliers            2163845    3959966   0.546 0.585202
## fTeamDallas Mavericks              -4932696    3818038  -1.292 0.197434
## fTeamDenver Nuggets                 1603637    3847874   0.417 0.677172
## fTeamDetroit Pistons               -3942280    3792143  -1.040 0.299420
## fTeamGolden State Warriors          -191346    3889723  -0.049 0.960800
## fTeamHouston Rockets                -679874    3776767  -0.180 0.857270
## fTeamIndiana Pacers                -1113534    3837263  -0.290 0.771884
## fTeamLos Angeles Clippers          -2398832    3913341  -0.613 0.540378
## fTeamLos Angeles Lakers              690387    4128514   0.167 0.867314
## fTeamMemphis Grizzlies             -2103290    3886404  -0.541 0.588803
## fTeamMiami Heat                     -522824    4017152  -0.130 0.896542
## fTeamMilwaukee Bucks                 390889    3907606   0.100 0.920389
## fTeamMinnesota Timberwolves         4821827    4106908   1.174 0.241355
## fTeamNew Orleans Pelicans             93456    3660098   0.026 0.979647
## fTeamNew York Knicks               -1276311    3720715  -0.343 0.731833
## fTeamOklahoma City Thunder         -2317997    3828255  -0.605 0.545336
## fTeamOrlando Magic                 -1238817    3842650  -0.322 0.747399
## fTeamPhiladelphia Sixers             583676    3859043   0.151 0.879887
## fTeamPhoenix Suns                   1560903    3895044   0.401 0.688914
## fTeamPortland Trail Blazers        -5084061    4319929  -1.177 0.240234
## fTeamSacremento Kings               1112030    3899832   0.285 0.775740
## fTeamSan Antonio Spurs              -302523    3768827  -0.080 0.936080
## fTeamToronto Raptors                -212587    4141585  -0.051 0.959099
## fTeamUtah Jazz                      1636026    3965980   0.413 0.680275
## fTeamWashington Wizards            -2370078    3626782  -0.653 0.513971
## fPositionF                          3822507    4424156   0.864 0.388318
## fPositionG                          9763821    5266647   1.854 0.064798 .
## fPositionPF                         3700836    2049701   1.806 0.072055 .
## fPositionPG                        12395282    3102190   3.996 8.24e-05 ***
```

```
## fPositionSF                      7441312    2462311   3.022 0.002741 **
## fPositionSG                      7813744    2884146   2.709 0.007157 **
## fCollegeArizona                  1341781    5462171   0.246 0.806132
## fCollegeArizona State            9804288    7094412   1.382 0.168074
## fCollegeArkansas                 1527718    6499830   0.235 0.814349
## fCollegeAuburn                   2171401    7004572   0.310 0.756792
## fCollegeBaylor                  -3664518    6275318  -0.584 0.559716
## fCollegeBelmont                 -3642501   10422214  -0.349 0.726979
## fCollegeBoise State             -4376071   10590342  -0.413 0.679764
## fCollegeBoston College          -4694438   10596186  -0.443 0.658083
## fCollegeBowling Green            2310203   10673750   0.216 0.828803
## fCollegeBucknell                -3910377   10710403  -0.365 0.715310
## fCollegeButler                   4952047    8148013   0.608 0.543835
## fCollegeBYU                     -7458037   10574503  -0.705 0.481215
## fCollegeCal Poly                -6223856   10577844  -0.588 0.556744
## fCollegeCalifornia              21198639   10596273   2.001 0.046397 *
## fCollegeCharleston              -8091348   10691489  -0.757 0.449800
## fCollegeCleveland State         -6246990   10457119  -0.597 0.550726
## fCollegeColorado                 2158760    7046241   0.306 0.759549
## fCollegeConnecticut              3744796    6132317   0.611 0.541913
## fCollegeCreighton               -2323222    8048082  -0.289 0.773048
## fCollegeDavidson                33597026   10536263   3.189 0.001590 **
## fCollegeDayton                   3223746   10530807   0.306 0.759735
## fCollegeDePaul                  -4686358    8102926  -0.578 0.563487
## fCollegeDrexel                  -8455942   10567702  -0.800 0.424287
## fCollegeDuke                     3551607    4790762   0.741 0.459101
## fCollegeFlorida                 14167946    6432260   2.203 0.028429 *
## fCollegeFlorida State            2268922    5509594   0.412 0.680789
## fCollegeFresno State            28277234   10585416   2.671 0.007994 **
## fCollegeGeorge Washington       -7684466   10694253  -0.719 0.473007
## fCollegeGeorgetown              -4565523    7027377  -0.650 0.516430
## fCollegeGeorgia                  1746143    7060798   0.247 0.804855
## fCollegeGeorgia Tech              -95190    7075603  -0.013 0.989276
## fCollegeGonzaga                  3848793    5749742   0.669 0.503797
## fCollegeHouston                 -4283667    7979842  -0.537 0.591821
## fCollegeIllinois                -3434413    8461559  -0.406 0.685135
## fCollegeIndiana                   307964    5754118   0.054 0.957355
## fCollegeIowa State              -3638143    6126767  -0.594 0.553114
## fCollegeIUPUI                   -3576805   11627334  -0.308 0.758598
## fCollegeKansas                   5755849    5488132   1.049 0.295177
## fCollegeKansas State            -4359315    7022374  -0.621 0.535249
## fCollegeKentucky                 6530174    4758351   1.372 0.171042
## fCollegeLehigh                  27164228   10692279   2.541 0.011604 *
## fCollegeLiberty                 -1330701   10528452  -0.126 0.899513
## fCollegeLouisiana-Lafayette    -12475379   10597306  -1.177 0.240100
## fCollegeLouisville               4731312    6189209   0.764 0.445241
## fCollegeLoyola (MD)              3570837   10607450   0.337 0.736643
## fCollegeLSU                      1899569    6394543   0.297 0.766639
## fCollegeMarquette                3874262    7134098   0.543 0.587516
## fCollegeMarshall               -11038255   10631814  -1.038 0.300053
## fCollegeMaryland                -2795097    6197919  -0.451 0.652355
## fCollegeMemphis                  4350395    6431566   0.676 0.499333
## fCollegeMiami (FL)               -557997    8051225  -0.069 0.944795
## fCollegeMichigan                 3715916    5621232   0.661 0.509120
```

```
## fCollegeMichigan State              7391405    6225300   1.187 0.236102
## fCollegeMinnesota                   4424455   10602645   0.417 0.676778
## fCollegeMississippi State          -5441423   10613520  -0.513 0.608571
## fCollegeMissouri                   -2416203    7009869  -0.345 0.730587
## fCollegeMissouri State             -2692823   10665421  -0.252 0.800853
## fCollegeMurray State                 948039    8103408   0.117 0.906949
## fCollegenan                         3364911    4509739   0.746 0.456202
## fCollegeNebraska                   -1108283    8226751  -0.135 0.892932
## fCollegeNevada                     -4705790    8114407  -0.580 0.562425
## fCollegeNew Mexico                 -4390223   10711466  -0.410 0.682218
## fCollegeNew Mexico JC               1745846   10904523   0.160 0.872915
## fCollegeNew Mexico State           15467092   10814213   1.430 0.153751
## fCollegeNorth Carolina              -736122    5365998  -0.137 0.890984
## fCollegeNorth Carolina State        2320523   10563261   0.220 0.826280
## fCollegeNotre Dame                 -5457043   10560409  -0.517 0.605739
## fCollegeOhio                       -1644088   10578664  -0.155 0.876605
## fCollegeOhio State                  5111662    7107699   0.719 0.472630
## fCollegeOklahoma                     -58495    7049034  -0.008 0.993385
## fCollegeOklahoma State              3336673    8156877   0.409 0.682804
## fCollegeOld Dominion               -8287485   10687195  -0.775 0.438718
## fCollegeOle Miss                   -2279672   10593704  -0.215 0.829774
## fCollegeOregon                       54879    6130706   0.009 0.992864
## fCollegeOregon State               -5169163   10483589  -0.493 0.622346
## fCollegePenn State                 -5529721   11033524  -0.501 0.616639
## fCollegePittsburgh                  9365943   10662846   0.878 0.380490
## fCollegeProvidence                 -6851407   10588153  -0.647 0.518105
## fCollegePurdue                      9170949   12600853   0.728 0.467338
## fCollegeRadford                   -15267078   10637270  -1.435 0.152326
## fCollegeSaint Joseph's             -2623342    8354136  -0.314 0.753740
## fCollegeSaint Mary's               -6350088    8001214  -0.794 0.428072
## fCollegeSalt Lake CC UT           -11330521   10580243  -1.071 0.285124
## fCollegeSan Diego State             8302105    7090899   1.171 0.242663
## fCollegeSMU                        -4254509    7139949  -0.596 0.551737
## fCollegeSouth Carolina             -4911536   10391945  -0.473 0.636843
## fCollegeSt. John's                 -8219925   10595259  -0.776 0.438510
## fCollegeStanford                    3157992    5976134   0.528 0.597614
## fCollegeSyracuse                    -538348    6224073  -0.086 0.931135
## fCollegeTCU                        -2693767    8146973  -0.331 0.741157
## fCollegeTennessee                   7426521    6235588   1.191 0.234659
## fCollegeTennessee State            10824487   10785793   1.004 0.316438
## fCollegeTexas                       8302142    5266788   1.576 0.116073
## fCollegeTexas A&M                   5199783    6564757   0.792 0.428982
## fCollegeTexas Tech                  2979520    8407283   0.354 0.723306
## fCollegeUC Santa Barbara           -9029852   10586119  -0.853 0.394389
## fCollegeUCLA                        7821358    5295864   1.477 0.140824
## fCollegeUNLV                        4652828    7320600   0.636 0.525566
## fCollegeUSC                         3721429    5451623   0.683 0.495402
## fCollegeUSC Upstate                -6797605   10553236  -0.644 0.520018
## fCollegeUtah                        2312278    7051595   0.328 0.743224
## fCollegeUtah State                 -3390739   10542316  -0.322 0.747970
## fCollegeVanderbilt                 -1174013    6435488  -0.182 0.855378
## fCollegeVillanova                   -496724    5404151  -0.092 0.926831
## fCollegeVirginia                     117539    5683422   0.021 0.983515
## fCollegeVirginia Commonwealth        372260   10700305   0.035 0.972272
```

```
## fCollegeVirginia Tech                -882742   10225339  -0.086 0.931266
## fCollegeWake Forest                   5263793    6134977   0.858 0.391623
## fCollegeWashington                    2876374    5552333   0.518 0.604831
## fCollegeWashington State             15581625    8172554   1.907 0.057591 .
## fCollegeWeber State                  29107427   10745593   2.709 0.007166 **
## fCollegeWest Virginia                -6871076    8088705  -0.849 0.396343
## fCollegeWestern Texas Coll. (J.C.)   -6456599   10490077  -0.615 0.538724
## fCollegeWichita State                 4796096    8219121   0.584 0.560004
## fCollegeWisconsin                    -8927634    8407748  -1.062 0.289220
## fCollegeWyoming                       1569303    8186655   0.192 0.848123
## fCollegeXavier                       -5608721    7919484  -0.708 0.479395
## fCollegeYale                         -5465668   10628231  -0.514 0.607473
## poly(Age, 3)1                        56180181   11661532   4.818 2.38e-06 ***
## poly(Age, 3)2                       -41709680   11913304  -3.501 0.000538 ***
## poly(Age, 3)3                       -25468874   11022435  -2.311 0.021574 *
## poly(Height_i, 3)1                    4590216   12513278   0.367 0.714023
## poly(Height_i, 3)2                   -9635910   12515540  -0.770 0.441994
## poly(Height_i, 3)3                   30767527   12804267   2.403 0.016911 *
## poly(Weight, 3)1                     64155727   19969489   3.213 0.001467 **
## poly(Weight, 3)2                    -16716755   12945944  -1.291 0.197666
## poly(Weight, 3)3                     -5098903   11689550  -0.436 0.663030
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9069000 on 282 degrees of freedom
## Multiple R-squared:  0.4656, Adjusted R-squared:  0.1586
## F-statistic: 1.517 on 162 and 282 DF,  p-value: 0.001173
```

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

```
##
## Call:
## lm(formula = Salary ~ fTeam + fPosition + fCollege + poly(Age,
##     4) + poly(Height_i, 4) + poly(Weight, 4), data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -15758387  -4416912         0   2869536  25732194
##
## Coefficients:
##                                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)                         -227325    5595240  -0.041 0.967621
## fTeamBoston Celtics                -2071341    3912778  -0.529 0.596964
## fTeamBrooklyn Nets                  1018814    3719522   0.274 0.784357
## fTeamCharlotte Hornets             -2118543    3645483  -0.581 0.561614
## fTeamChicago Bulls                  2578758    4074035   0.633 0.527269
## fTeamCleveland Cavaliers            2226362    3977281   0.560 0.576086
## fTeamDallas Mavericks              -4715172    3925300  -1.201 0.230682
## fTeamDenver Nuggets                 1660674    3868436   0.429 0.668045
## fTeamDetroit Pistons               -3843388    3808803  -1.009 0.313810
## fTeamGolden State Warriors          -355873    3929319  -0.091 0.927900
## fTeamHouston Rockets                -679341    3807585  -0.178 0.858524
## fTeamIndiana Pacers                -1159067    3872533  -0.299 0.764930
## fTeamLos Angeles Clippers          -2538233    3933522  -0.645 0.519274
```

```
## fTeamLos Angeles Lakers             1234509    4185928   0.295 0.768275
## fTeamMemphis Grizzlies             -2216054    3904379  -0.568 0.570776
## fTeamMiami Heat                     -696902    4049552  -0.172 0.863489
## fTeamMilwaukee Bucks                 407120    3922058   0.104 0.917401
## fTeamMinnesota Timberwolves         4912607    4140098   1.187 0.236398
## fTeamNew Orleans Pelicans            134592    3673603   0.037 0.970800
## fTeamNew York Knicks               -1239165    3733581  -0.332 0.740216
## fTeamOklahoma City Thunder         -2250581    3865237  -0.582 0.560860
## fTeamOrlando Magic                 -1131056    3858498  -0.293 0.769638
## fTeamPhiladelphia Sixers             324917    3882514   0.084 0.933365
## fTeamPhoenix Suns                   1622366    3907814   0.415 0.678344
## fTeamPortland Trail Blazers        -5238691    4353038  -1.203 0.229820
## fTeamSacremento Kings               1032894    3915390   0.264 0.792126
## fTeamSan Antonio Spurs              -175550    3800935  -0.046 0.963195
## fTeamToronto Raptors                -230439    4165750  -0.055 0.955925
## fTeamUtah Jazz                      1834541    3984373   0.460 0.645563
## fTeamWashington Wizards            -2536911    3641839  -0.697 0.486632
## fPositionF                          4089653    4496172   0.910 0.363826
## fPositionG                          9877339    5337646   1.851 0.065298 .
## fPositionPF                         3612456    2145055   1.684 0.093283 .
## fPositionPG                        12669296    3168064   3.999 8.15e-05 ***
## fPositionSF                         7619235    2608102   2.921 0.003770 **
## fPositionSG                         8226785    3044119   2.703 0.007304 **
## fCollegeArizona                     1851866    5507317   0.336 0.736931
## fCollegeArizona State              10483845    7155172   1.465 0.143989
## fCollegeArkansas                    2101160    6592733   0.319 0.750186
## fCollegeAuburn                      2820900    7065335   0.399 0.690008
## fCollegeBaylor                     -3100264    6318663  -0.491 0.624058
## fCollegeBelmont                    -2972970   10477081  -0.284 0.776805
## fCollegeBoise State                -3818882   10641879  -0.359 0.719976
## fCollegeBoston College             -4140242   10642422  -0.389 0.697549
## fCollegeBowling Green               2387059   10724344   0.223 0.824023
## fCollegeBucknell                   -3786772   10765007  -0.352 0.725279
## fCollegeButler                      5334242    8192212   0.651 0.515495
## fCollegeBYU                        -7089682   10614262  -0.668 0.504725
## fCollegeCal Poly                   -5828091   10628325  -0.548 0.583887
## fCollegeCalifornia                 21420259   10634429   2.014 0.044944 *
## fCollegeCharleston                 -6896460   10851703  -0.636 0.525611
## fCollegeCleveland State            -6431869   10492615  -0.613 0.540382
## fCollegeColorado                    2525806    7095327   0.356 0.722123
## fCollegeConnecticut                 4117944    6185591   0.666 0.506133
## fCollegeCreighton                  -2128008    8077421  -0.263 0.792397
## fCollegeDavidson                   35107953   10661957   3.293 0.001120 **
## fCollegeDayton                      3626733   10581092   0.343 0.732040
## fCollegeDePaul                     -4043548    8161567  -0.495 0.620681
## fCollegeDrexel                     -8085155   10606181  -0.762 0.446521
## fCollegeDuke                        4013081    4836114   0.830 0.407353
## fCollegeFlorida                    13664812    6500168   2.102 0.036430 *
## fCollegeFlorida State               2817732    5549268   0.508 0.612018
## fCollegeFresno State               28201215   10640901   2.650 0.008502 **
## fCollegeGeorge Washington          -8049719   10732751  -0.750 0.453878
## fCollegeGeorgetown                 -3955906    7121843  -0.555 0.579024
## fCollegeGeorgia                     2475984    7118557   0.348 0.728237
## fCollegeGeorgia Tech                 596563    7127220   0.084 0.933353
```

```
## fCollegeGonzaga                    4553903    5803573   0.785 0.433311
## fCollegeHouston                   -3680107    8026697  -0.458 0.646962
## fCollegeIllinois                  -3057524    8495172  -0.360 0.719184
## fCollegeIndiana                     713447    5783523   0.123 0.901912
## fCollegeIowa State                -3132395    6183951  -0.507 0.612880
## fCollegeIUPUI                     -1594446   11804482  -0.135 0.892653
## fCollegeKansas                     6000707    5534732   1.084 0.279216
## fCollegeKansas State              -3959309    7055837  -0.561 0.575153
## fCollegeKentucky                   7072462    4800288   1.473 0.141786
## fCollegeLehigh                    27696437   10777650   2.570 0.010695 *
## fCollegeLiberty                    -526544   10587211  -0.050 0.960370
## fCollegeLouisiana-Lafayette      -12034308   10674349  -1.127 0.260540
## fCollegeLouisville                 4916000    6213341   0.791 0.429499
## fCollegeLoyola (MD)                4178821   10657989   0.392 0.695296
## fCollegeLSU                        2716100    6464751   0.420 0.674707
## fCollegeMarquette                  4494365    7181809   0.626 0.531959
## fCollegeMarshall                 -10635412   10725584  -0.992 0.322255
## fCollegeMaryland                  -2605028    6232971  -0.418 0.676310
## fCollegeMemphis                    4846735    6468782   0.749 0.454338
## fCollegeMiami (FL)                  453384    8127057   0.056 0.955551
## fCollegeMichigan                   4028278    5658753   0.712 0.477142
## fCollegeMichigan State             8301949    6299217   1.318 0.188607
## fCollegeMinnesota                  5359869   10678475   0.502 0.616111
## fCollegeMississippi State         -4241178   10700425  -0.396 0.692145
## fCollegeMissouri                  -1809605    7055639  -0.256 0.797772
## fCollegeMissouri State            -2050502   10717741  -0.191 0.848415
## fCollegeMurray State               1385023    8143159   0.170 0.865067
## fCollegenan                        3751342    4537460   0.827 0.409086
## fCollegeNebraska                   -701203    8290595  -0.085 0.932657
## fCollegeNevada                    -3923683    8191561  -0.479 0.632320
## fCollegeNew Mexico                -3963039   10759604  -0.368 0.712910
## fCollegeNew Mexico JC              1606077   10955428   0.147 0.883553
## fCollegeNew Mexico State          14918360   10863382   1.373 0.170771
## fCollegeNorth Carolina             -108891    5415680  -0.020 0.983973
## fCollegeNorth Carolina State       2021309   10607554   0.191 0.849014
## fCollegeNotre Dame                -5258183   10599177  -0.496 0.620219
## fCollegeOhio                        -81505   10738161  -0.008 0.993949
## fCollegeOhio State                 5750434    7154336   0.804 0.422215
## fCollegeOklahoma                    459193    7091439   0.065 0.948417
## fCollegeOklahoma State             3154211    8209920   0.384 0.701127
## fCollegeOld Dominion              -7566501   10780930  -0.702 0.483363
## fCollegeOle Miss                  -1279055   10666228  -0.120 0.904636
## fCollegeOregon                     697949    6177097   0.113 0.910120
## fCollegeOregon State              -4753297   10548578  -0.451 0.652620
## fCollegePenn State                -4851018   11100327  -0.437 0.662438
## fCollegePittsburgh                 9812609   10766695   0.911 0.362879
## fCollegeProvidence                -6778158   10654791  -0.636 0.525193
## fCollegePurdue                    10008216   12677903   0.789 0.430536
## fCollegeRadford                  -15173599   10683789  -1.420 0.156653
## fCollegeSaint Joseph's            -2083947    8395789  -0.248 0.804152
## fCollegeSaint Mary's              -5764825    8054832  -0.716 0.474777
## fCollegeSalt Lake CC UT          -10713759   10644344  -1.007 0.315037
## fCollegeSan Diego State            8667012    7121740   1.217 0.224640
## fCollegeSMU                       -3497189    7202760  -0.486 0.627678
```

```
## fCollegeSouth Carolina              -4331250   10446844  -0.415 0.678754
## fCollegeSt. John's                  -8197192   10630627  -0.771 0.441305
## fCollegeStanford                     3044059    6072993   0.501 0.616594
## fCollegeSyracuse                       -9391    6262250  -0.001 0.998805
## fCollegeTCU                         -1993608    8203572  -0.243 0.808171
## fCollegeTennessee                    7710344    6322905   1.219 0.223711
## fCollegeTennessee State             11407153   10835266   1.053 0.293353
## fCollegeTexas                        9075001    5329093   1.703 0.089697 .
## fCollegeTexas A&M                    5407360    6589147   0.821 0.412548
## fCollegeTexas Tech                   4161458    8506148   0.489 0.625064
## fCollegeUC Santa Barbara            -8090092   10654699  -0.759 0.448315
## fCollegeUCLA                         8272045    5329933   1.552 0.121796
## fCollegeUNLV                         4843538    7360403   0.658 0.511046
## fCollegeUSC                          4277209    5501657   0.777 0.437558
## fCollegeUSC Upstate                 -6644063   10593216  -0.627 0.531041
## fCollegeUtah                         2533204    7080091   0.358 0.720769
## fCollegeUtah State                  -2605276   10604901  -0.246 0.806120
## fCollegeVanderbilt                   -491640    6488563  -0.076 0.939656
## fCollegeVillanova                      22924    5451188   0.004 0.996648
## fCollegeVirginia                      519422    5715978   0.091 0.927660
## fCollegeVirginia Commonwealth         354896   11021126   0.032 0.974334
## fCollegeVirginia Tech                -105973   10281987  -0.010 0.991784
## fCollegeWake Forest                  5678033    6215425   0.914 0.361748
## fCollegeWashington                   3648254    5614704   0.650 0.516377
## fCollegeWashington State            16377822    8245760   1.986 0.047988 *
## fCollegeWeber State                 29810780   10817159   2.756 0.006239 **
## fCollegeWest Virginia               -6509875    8124033  -0.801 0.423634
## fCollegeWestern Texas Coll. (J.C.)  -5842880   10558809  -0.553 0.580456
## fCollegeWichita State                5102736    8268594   0.617 0.537657
## fCollegeWisconsin                   -9347028    8443788  -1.107 0.269260
## fCollegeWyoming                      2182218    8264274   0.264 0.791933
## fCollegeXavier                      -4807943    7976803  -0.603 0.547171
## fCollegeYale                        -4853015   10675543  -0.455 0.649756
## poly(Age, 4)1                       56593344   11728037   4.825 2.30e-06 ***
## poly(Age, 4)2                      -42565908   11974866  -3.555 0.000444 ***
## poly(Age, 4)3                      -25607924   11076471  -2.312 0.021510 *
## poly(Age, 4)4                        9347830   10900948   0.858 0.391891
## poly(Height_i, 4)1                   5773099   12704347   0.454 0.649880
## poly(Height_i, 4)2                  -7784623   12746479  -0.611 0.541877
## poly(Height_i, 4)3                  32449580   13105453   2.476 0.013879 *
## poly(Height_i, 4)4                  -8403395   12789744  -0.657 0.511696
## poly(Weight, 4)1                    63847763   20094744   3.177 0.001653 **
## poly(Weight, 4)2                   -15723798   13201997  -1.191 0.234659
## poly(Weight, 4)3                    -4102063   11943350  -0.343 0.731511
## poly(Weight, 4)4                     3752407   12367625   0.303 0.761807
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9097000 on 279 degrees of freedom
## Multiple R-squared:  0.468,  Adjusted R-squared:  0.1534
## F-statistic: 1.487 on 165 and 279 DF,  p-value: 0.00182
```

```
summary(lm(Salary ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+poly(Weight,2),
           data=ap_tibble))
```

```
##
## Call:
## lm(formula = Salary ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + Height_i + poly(Weight, 2), data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -15906461  -4053393         0   2760622  26588791
##
## Coefficients:
##                                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)                      -1549879   13357984  -0.116 0.907713
## fTeamBoston Celtics              -2576503    3911709  -0.659 0.510643
## fTeamBrooklyn Nets                1255810    3717396   0.338 0.735748
## fTeamCharlotte Hornets           -2175113    3642623  -0.597 0.550896
## fTeamChicago Bulls                1754424    4025902   0.436 0.663323
## fTeamCleveland Cavaliers          2265076    3985238   0.568 0.570234
## fTeamDallas Mavericks            -3344557    3728669  -0.897 0.370484
## fTeamDenver Nuggets                452222    3811454   0.119 0.905638
## fTeamDetroit Pistons             -4060457    3814308  -1.065 0.287988
## fTeamGolden State Warriors        -533904    3890367  -0.137 0.890940
## fTeamHouston Rockets             -2046870    3763301  -0.544 0.586934
## fTeamIndiana Pacers               -925281    3859468  -0.240 0.810702
## fTeamLos Angeles Clippers        -2380702    3939663  -0.604 0.546131
## fTeamLos Angeles Lakers           1071299    4154094   0.258 0.796678
## fTeamMemphis Grizzlies           -2178116    3908423  -0.557 0.577768
## fTeamMiami Heat                   -626539    4044436  -0.155 0.876999
## fTeamMilwaukee Bucks               360014    3923586   0.092 0.926956
## fTeamMinnesota Timberwolves       4560570    4115866   1.108 0.268776
## fTeamNew Orleans Pelicans          -87301    3667854  -0.024 0.981027
## fTeamNew York Knicks             -1477000    3740330  -0.395 0.693223
## fTeamOklahoma City Thunder       -2782369    3847983  -0.723 0.470229
## fTeamOrlando Magic                -969367    3860287  -0.251 0.801908
## fTeamPhiladelphia Sixers           664407    3878997   0.171 0.864123
## fTeamPhoenix Suns                 1689093    3913309   0.432 0.666338
## fTeamPortland Trail Blazers      -5143711    4305251  -1.195 0.233177
## fTeamSacremento Kings             1200477    3926194   0.306 0.760010
## fTeamSan Antonio Spurs            -363733    3791699  -0.096 0.923645
## fTeamToronto Raptors              -231149    4164152  -0.056 0.955772
## fTeamUtah Jazz                    1720443    3993027   0.431 0.666895
## fTeamWashington Wizards          -2271473    3636242  -0.625 0.532684
## fPositionF                        1943883    4314136   0.451 0.652632
## fPositionG                        8116372    5088987   1.595 0.111845
## fPositionPF                       2717143    1964090   1.383 0.167622
## fPositionPG                      10956343    2924956   3.746 0.000218 ***
## fPositionSF                       5629414    2177066   2.586 0.010212 *
## fPositionSG                       6087123    2505840   2.429 0.015751 *
## fCollegeArizona                   1115781    5498923   0.203 0.839351
## fCollegeArizona State            10153231    7139889   1.422 0.156107
## fCollegeArkansas                  1669025    6513676   0.256 0.797955
## fCollegeAuburn                    1611579    7035290   0.229 0.818978
## fCollegeBaylor                   -3961615    6305801  -0.628 0.530344
## fCollegeBelmont                  -4971664   10465643  -0.475 0.635118
## fCollegeBoise State              -5412958   10639061  -0.509 0.611299
```

```
## fCollegeBoston College             -4137016   10648269  -0.389 0.697925
## fCollegeBowling Green               2248802   10742774   0.209 0.834339
## fCollegeBucknell                   -3292177   10782710  -0.305 0.760345
## fCollegeButler                      4490324    8197123   0.548 0.584263
## fCollegeBYU                        -8107150   10643712  -0.762 0.446878
## fCollegeCal Poly                   -5208691   10635137  -0.490 0.624679
## fCollegeCalifornia                 20633533   10668051   1.934 0.054085 .
## fCollegeCharleston                 -9073630   10748617  -0.844 0.399284
## fCollegeCleveland State            -5436097   10508820  -0.517 0.605356
## fCollegeColorado                    1432836    7079480   0.202 0.839754
## fCollegeConnecticut                 3386127    6173388   0.549 0.583775
## fCollegeCreighton                  -1767563    8099449  -0.218 0.827404
## fCollegeDavidson                   33812880   10604780   3.188 0.001590 **
## fCollegeDayton                      2588594   10578025   0.245 0.806854
## fCollegeDePaul                     -5089946    8144874  -0.625 0.532519
## fCollegeDrexel                     -8738688   10641286  -0.821 0.412215
## fCollegeDuke                        3124206    4807198   0.650 0.516279
## fCollegeFlorida                    13100611    6454745   2.030 0.043325 *
## fCollegeFlorida State               1710822    5540943   0.309 0.757730
## fCollegeFresno State               27765889   10653110   2.606 0.009632 **
## fCollegeGeorge Washington          -7714296   10735069  -0.719 0.472972
## fCollegeGeorgetown                 -5093846    7066488  -0.721 0.471595
## fCollegeGeorgia                     1681390    7101272   0.237 0.813003
## fCollegeGeorgia Tech                -752011    7120511  -0.106 0.915965
## fCollegeGonzaga                     3658127    5786552   0.632 0.527778
## fCollegeHouston                    -4984621    8020592  -0.621 0.534782
## fCollegeIllinois                   -3619215    8502465  -0.426 0.670672
## fCollegeIndiana                     670671    5792353   0.116 0.907904
## fCollegeIowa State                 -3841918    6163619  -0.623 0.533572
## fCollegeIUPUI                      -4036931   11703293  -0.345 0.730394
## fCollegeKansas                      5190486    5502944   0.943 0.346367
## fCollegeKansas State               -4998178    7050154  -0.709 0.478938
## fCollegeKentucky                    6305554    4784948   1.318 0.188632
## fCollegeLehigh                     27331410   10763679   2.539 0.011642 *
## fCollegeLiberty                    -2538362   10589569  -0.240 0.810732
## fCollegeLouisiana-Lafayette       -12814600   10648657  -1.203 0.229820
## fCollegeLouisville                  4677225    6230296   0.751 0.453439
## fCollegeLoyola (MD)                 4140904   10636666   0.389 0.697341
## fCollegeLSU                         1596758    6438059   0.248 0.804299
## fCollegeMarquette                   3183506    7175017   0.444 0.657601
## fCollegeMarshall                  -11725052   10699333  -1.096 0.274062
## fCollegeMaryland                   -3050285    6227101  -0.490 0.624624
## fCollegeMemphis                     4424320    6474416   0.683 0.494938
## fCollegeMiami (FL)                 -1002572    8077114  -0.124 0.901304
## fCollegeMichigan                    2880343    5646372   0.510 0.610360
## fCollegeMichigan State              6810197    6263120   1.087 0.277801
## fCollegeMinnesota                   2417829   10634846   0.227 0.820315
## fCollegeMississippi State          -6004614   10679060  -0.562 0.574368
## fCollegeMissouri                   -1478974    7041452  -0.210 0.833788
## fCollegeMissouri State             -4654816   10662469  -0.437 0.662760
## fCollegeMurray State                1249405    8154101   0.153 0.878330
## fCollegenan                         3120290    4535541   0.688 0.492035
## fCollegeNebraska                   -2323034    8247622  -0.282 0.778408
## fCollegeNevada                     -5511048    8158388  -0.676 0.499901
```

```
## fCollegeNew Mexico                  -5072836   10783140  -0.470 0.638399
## fCollegeNew Mexico JC                 671717   10878005   0.062 0.950805
## fCollegeNew Mexico State            15395882   10884040   1.415 0.158296
## fCollegeNorth Carolina              -1378892    5390226  -0.256 0.798280
## fCollegeNorth Carolina State         1664656   10624852   0.157 0.875611
## fCollegeNotre Dame                  -6071016   10629141  -0.571 0.568336
## fCollegeOhio                        -2505570   10627144  -0.236 0.813780
## fCollegeOhio State                   5776090    7151835   0.808 0.419973
## fCollegeOklahoma                      -11265    7093328  -0.002 0.998734
## fCollegeOklahoma State               3015291    8209757   0.367 0.713682
## fCollegeOld Dominion                -8926201   10706342  -0.834 0.405131
## fCollegeOle Miss                    -2815442   10649857  -0.264 0.791690
## fCollegeOregon                        526408    6136817   0.086 0.931703
## fCollegeOregon State                -5572915   10536135  -0.529 0.597263
## fCollegePenn State                  -6088584   11105467  -0.548 0.583949
## fCollegePittsburgh                   9198663   10730674   0.857 0.392038
## fCollegeProvidence                  -6756443   10622492  -0.636 0.525254
## fCollegePurdue                      -4081138   10843530  -0.376 0.706925
## fCollegeRadford                    -15368961   10696284  -1.437 0.151857
## fCollegeSaint Joseph's              -3337851    8382964  -0.398 0.690802
## fCollegeSaint Mary's                -5992039    8055307  -0.744 0.457573
## fCollegeSalt Lake CC UT            -11171857   10645403  -1.049 0.294858
## fCollegeSan Diego State              8042392    7133389   1.127 0.260509
## fCollegeSMU                         -5600445    7156252  -0.783 0.434515
## fCollegeSouth Carolina              -4869177   10447339  -0.466 0.641522
## fCollegeSt. John's                  -8996170   10661018  -0.844 0.399468
## fCollegeStanford                     1984382    5997804   0.331 0.741000
## fCollegeSyracuse                    -1640507    6232341  -0.263 0.792567
## fCollegeTCU                         -3186964    8189619  -0.389 0.697458
## fCollegeTennessee                    6491098    6253432   1.038 0.300147
## fCollegeTennessee State              9184437   10825949   0.848 0.396943
## fCollegeTexas                        6942824    5259396   1.320 0.187868
## fCollegeTexas A&M                    4769311    6605022   0.722 0.470841
## fCollegeTexas Tech                   2282579    8451584   0.270 0.787296
## fCollegeUC Santa Barbara            -9139170   10625862  -0.860 0.390464
## fCollegeUCLA                         7649511    5322078   1.437 0.151725
## fCollegeUNLV                         4428910    7328180   0.604 0.546081
## fCollegeUSC                          3441042    5478216   0.628 0.530421
## fCollegeUSC Upstate                 -7607150   10620685  -0.716 0.474419
## fCollegeUtah                         2910494    7073742   0.411 0.681052
## fCollegeUtah State                  -3678647   10602529  -0.347 0.728878
## fCollegeVanderbilt                  -1064861    6467705  -0.165 0.869342
## fCollegeVillanova                    -842970    5434084  -0.155 0.876831
## fCollegeVirginia                     -553931    5714549  -0.097 0.922847
## fCollegeVirginia Commonwealth        1785267   10504303   0.170 0.865166
## fCollegeVirginia Tech               -1828257   10288437  -0.178 0.859085
## fCollegeWake Forest                  5149498    6172697   0.834 0.404846
## fCollegeWashington                   1937549    5574504   0.348 0.728417
## fCollegeWashington State            14801250    8223952   1.800 0.072954 .
## fCollegeWeber State                29561793   10816322   2.733 0.006667 **
## fCollegeWest Virginia               -6355717    8109594  -0.784 0.433851
## fCollegeWestern Texas Coll. (J.C.)  -6810929   10558794  -0.645 0.519415
## fCollegeWichita State                5008205    8256766   0.607 0.544627
## fCollegeWisconsin                   -8604101    8440069  -1.019 0.308861
```

```
## fCollegeWyoming                      310546    8226846   0.038 0.969915
## fCollegeXavier                     -6401273    7959994  -0.804 0.421963
## fCollegeYale                       -6353840   10678897  -0.595 0.552322
## poly(Age, 3)1                      55018725   11712770   4.697  4.1e-06 ***
## poly(Age, 3)2                     -41334660   11979478  -3.450 0.000644 ***
## poly(Age, 3)3                     -24541364   11071654  -2.217 0.027440 *
## Height_i                             573323    1875035   0.306 0.760005
## poly(Weight, 2)1                   61093252   19169741   3.187 0.001598 **
## poly(Weight, 2)2                  -13354926   12778539  -1.045 0.296860
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9133000 on 285 degrees of freedom
## Multiple R-squared:  0.4523, Adjusted R-squared:  0.1467
## F-statistic:  1.48 on 159 and 285 DF,  p-value: 0.002147
```

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

```
##
## Call:
## lm(formula = Salary ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + Height_i + poly(Weight, 3), data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -16073875  -4144464         0   2771232  26475688
##
## Coefficients:
##                                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)                       -1886111   13471466  -0.140 0.888753
## fTeamBoston Celtics               -2596391    3919363  -0.662 0.508219
## fTeamBrooklyn Nets                 1274842    3724684   0.342 0.732402
## fTeamCharlotte Hornets            -2118707    3658153  -0.579 0.562931
## fTeamChicago Bulls                 1799775    4038168   0.446 0.656160
## fTeamCleveland Cavaliers           2275042    3992193   0.570 0.569214
## fTeamDallas Mavericks             -3312269    3737942  -0.886 0.376302
## fTeamDenver Nuggets                 518556    3830294   0.135 0.892405
## fTeamDetroit Pistons              -4026461    3823976  -1.053 0.293258
## fTeamGolden State Warriors         -439260    3921676  -0.112 0.910896
## fTeamHouston Rockets              -2010306    3773448  -0.533 0.594623
## fTeamIndiana Pacers                -898930    3867884  -0.232 0.816388
## fTeamLos Angeles Clippers         -2362940    3947137  -0.599 0.549886
## fTeamLos Angeles Lakers            1051054    4162128   0.253 0.800816
## fTeamMemphis Grizzlies            -2152480    3916794  -0.550 0.583059
## fTeamMiami Heat                    -614355    4051617  -0.152 0.879585
## fTeamMilwaukee Bucks                423304    3941176   0.107 0.914543
## fTeamMinnesota Timberwolves        4645565    4141680   1.122 0.262954
## fTeamNew Orleans Pelicans           -10423    3691365  -0.003 0.997749
## fTeamNew York Knicks              -1431257    3752640  -0.381 0.703192
## fTeamOklahoma City Thunder        -2753428    3856788  -0.714 0.475865
## fTeamOrlando Magic                 -917885    3874169  -0.237 0.812886
## fTeamPhiladelphia Sixers            711135    3891577   0.183 0.855135
## fTeamPhoenix Suns                  1740156    3927062   0.443 0.658017
## fTeamPortland Trail Blazers       -5018908    4351363  -1.153 0.249712
```

```
## fTeamSacremento Kings               1216921    3933524   0.309 0.757266
## fTeamSan Antonio Spurs              -328318    3801630  -0.086 0.931239
## fTeamToronto Raptors                -256198    4172764  -0.061 0.951086
## fTeamUtah Jazz                      1711582    3999938   0.428 0.669047
## fTeamWashington Wizards            -2199296    3657779  -0.601 0.548143
## fPositionF                          2068670    4360173   0.474 0.635546
## fPositionG                          8338853    5201488   1.603 0.110009
## fPositionPF                         2765779    1980347   1.397 0.163620
## fPositionPG                        11127572    3036169   3.665 0.000295 ***
## fPositionSF                         5767105    2272805   2.537 0.011702 *
## fPositionSG                         6296152    2691744   2.339 0.020026 *
## fCollegeArizona                     1129673    5508527   0.205 0.837659
## fCollegeArizona State              10195196    7154529   1.425 0.155256
## fCollegeArkansas                    1530366    6556397   0.233 0.815607
## fCollegeAuburn                      1709449    7061778   0.242 0.808900
## fCollegeBaylor                     -3874205    6329449  -0.612 0.540967
## fCollegeBelmont                    -4842180   10500484  -0.461 0.645052
## fCollegeBoise State                -5287555   10672857  -0.495 0.620686
## fCollegeBoston College             -4001086   10684851  -0.374 0.708339
## fCollegeBowling Green               2322876   10766309   0.216 0.829334
## fCollegeBucknell                   -3279207   10800966  -0.304 0.761653
## fCollegeButler                      4427949    8215997   0.539 0.590349
## fCollegeBYU                        -8064526   10663409  -0.756 0.450108
## fCollegeCal Poly                   -5144071   10657216  -0.483 0.629692
## fCollegeCalifornia                 20647751   10686152   1.932 0.054330 .
## fCollegeCharleston                 -9128786   10769703  -0.848 0.397355
## fCollegeCleveland State            -5337371   10536459  -0.507 0.612855
## fCollegeColorado                    1488035    7096002   0.210 0.834052
## fCollegeConnecticut                 3404229    6184317   0.550 0.582436
## fCollegeCreighton                  -1729765    8114940  -0.213 0.831357
## fCollegeDavidson                   33811509   10622572   3.183 0.001620 **
## fCollegeDayton                      2720297   10613460   0.256 0.797900
## fCollegeDePaul                     -5000207    8169206  -0.612 0.540975
## fCollegeDrexel                     -8731033   10659196  -0.819 0.413412
## fCollegeDuke                        3207121    4830680   0.664 0.507289
## fCollegeFlorida                    13158169    6471113   2.033 0.042945 *
## fCollegeFlorida State               1752597    5553638   0.316 0.752556
## fCollegeFresno State               27758334   10671038   2.601 0.009774 **
## fCollegeGeorge Washington          -7556962   10777947  -0.701 0.483783
## fCollegeGeorgetown                 -5021791    7086271  -0.709 0.479114
## fCollegeGeorgia                     1757833    7122065   0.247 0.805230
## fCollegeGeorgia Tech                -739575    7132690  -0.104 0.917490
## fCollegeGonzaga                     3677968    5796993   0.634 0.526291
## fCollegeHouston                    -4896777    8044428  -0.609 0.543199
## fCollegeIllinois                   -3511345    8531492  -0.412 0.680962
## fCollegeIndiana                     668820    5802076   0.115 0.908311
## fCollegeIowa State                 -3856726    6174342  -0.625 0.532710
## fCollegeIUPUI                      -4019001   11723222  -0.343 0.731985
## fCollegeKansas                      5287541    5530627   0.956 0.339861
## fCollegeKansas State               -4887853    7080597  -0.690 0.490559
## fCollegeKentucky                    6358554    4799310   1.325 0.186273
## fCollegeLehigh                     27314813   10782011   2.533 0.011835 *
## fCollegeLiberty                    -2479106   10610913  -0.234 0.815435
## fCollegeLouisiana-Lafayette       -12688603   10682606  -1.188 0.235912
```

```
## fCollegeLouisville                  4689956    6241029   0.751 0.452991
## fCollegeLoyola (MD)                 4342160   10695547   0.406 0.685064
## fCollegeLSU                         1584738    6449101   0.246 0.806069
## fCollegeMarquette                   3193224    7187196   0.444 0.657169
## fCollegeMarshall                  -11714570   10717392  -1.093 0.275301
## fCollegeMaryland                   -2997976    6242289  -0.480 0.631406
## fCollegeMemphis                     4455861    6486936   0.687 0.492708
## fCollegeMiami (FL)                  -854062    8120094  -0.105 0.916308
## fCollegeMichigan                    2936227    5661813   0.519 0.604442
## fCollegeMichigan State              6800810    6273779   1.084 0.279282
## fCollegeMinnesota                   2422565   10652709   0.227 0.820266
## fCollegeMississippi State          -6081075   10702884  -0.568 0.570367
## fCollegeMissouri                   -1411337    7060275  -0.200 0.841703
## fCollegeMissouri State             -4423970   10734186  -0.412 0.680549
## fCollegeMurray State                1189831    8172478   0.146 0.884348
## fCollegenan                         3155048    4546025   0.694 0.488235
## fCollegeNebraska                   -2180706    8287936  -0.263 0.792650
## fCollegeNevada                     -5432319    8180273  -0.664 0.507181
## fCollegeNew Mexico                 -5048929   10801801  -0.467 0.640561
## fCollegeNew Mexico JC                988860   10995638   0.090 0.928405
## fCollegeNew Mexico State           15372996   10902818   1.410 0.159633
## fCollegeNorth Carolina             -1318009    5406689  -0.244 0.807582
## fCollegeNorth Carolina State        1724090   10646264   0.162 0.871466
## fCollegeNotre Dame                 -6025833   10649045  -0.566 0.571938
## fCollegeOhio                       -2402678   10655723  -0.225 0.821766
## fCollegeOhio State                  5763908    7164056   0.805 0.421747
## fCollegeOklahoma                     -34739    7106066  -0.005 0.996103
## fCollegeOklahoma State              3060289    8226192   0.372 0.710157
## fCollegeOld Dominion               -8703471   10774219  -0.808 0.419879
## fCollegeOle Miss                   -2686005   10684696  -0.251 0.801696
## fCollegeOregon                       635245    6167918   0.103 0.918042
## fCollegeOregon State               -5657060   10561063  -0.536 0.592618
## fCollegePenn State                 -6090771   11124101  -0.548 0.584445
## fCollegePittsburgh                  9196527   10748679   0.856 0.392943
## fCollegeProvidence                 -6564682   10677624  -0.615 0.539174
## fCollegePurdue                     -3851624   10914049  -0.353 0.724421
## fCollegeRadford                   -15246341   10729395  -1.421 0.156417
## fCollegeSaint Joseph's             -3196029    8422894  -0.379 0.704641
## fCollegeSaint Mary's               -6017861    8069714  -0.746 0.456445
## fCollegeSalt Lake CC UT           -11091357   10669832  -1.040 0.299454
## fCollegeSan Diego State             8104606    7151212   1.133 0.258036
## fCollegeSMU                        -5571701    7169503  -0.777 0.437724
## fCollegeSouth Carolina             -4804078   10469244  -0.459 0.646675
## fCollegeSt. John's                 -8924844   10684053  -0.835 0.404227
## fCollegeStanford                    1977647    6007947   0.329 0.742268
## fCollegeSyracuse                   -1527512    6264878  -0.244 0.807545
## fCollegeTCU                        -3091687    8215317  -0.376 0.706951
## fCollegeTennessee                   6572461    6275342   1.047 0.295830
## fCollegeTennessee State             9321170   10862741   0.858 0.391568
## fCollegeTexas                       6994246    5273645   1.326 0.185818
## fCollegeTexas A&M                   4809661    6618763   0.727 0.468026
## fCollegeTexas Tech                  2373581    8476335   0.280 0.779663
## fCollegeUC Santa Barbara           -8965129   10674423  -0.840 0.401688
## fCollegeUCLA                        7708470    5338054   1.444 0.149824
```

```
## fCollegeUNLV                           4598553    7382756   0.623 0.533865
## fCollegeUSC                            3510850    5497002   0.639 0.523543
## fCollegeUSC Upstate                   -7558716   10640886  -0.710 0.478072
## fCollegeUtah                           2921906    7085807   0.412 0.680386
## fCollegeUtah State                    -3569299   10632485  -0.336 0.737347
## fCollegeVanderbilt                     -978308    6491049  -0.151 0.880306
## fCollegeVillanova                      -784405    5450011  -0.144 0.885660
## fCollegeVirginia                       -520006    5726310  -0.091 0.927708
## fCollegeVirginia Commonwealth          1293375   10767770   0.120 0.904477
## fCollegeVirginia Tech                 -1774344   10308746  -0.172 0.863466
## fCollegeWake Forest                    5120728    6184500   0.828 0.408369
## fCollegeWashington                     1984272    5588082   0.355 0.722786
## fCollegeWashington State              14789378    8237933   1.795 0.073673 .
## fCollegeWeber State                   29609879   10836775   2.732 0.006683 **
## fCollegeWest Virginia                 -6204566    8153561  -0.761 0.447310
## fCollegeWestern Texas Coll. (J.C.)    -6870136   10580091  -0.649 0.516640
## fCollegeWichita State                  5125888    8288708   0.618 0.536795
## fCollegeWisconsin                     -8573692    8455410  -1.014 0.311451
## fCollegeWyoming                         268601    8242956   0.033 0.974028
## fCollegeXavier                        -6316305    7983134  -0.791 0.429484
## fCollegeYale                          -6215688   10716092  -0.580 0.562352
## poly(Age, 3)1                         54980871   11733739   4.686 4.33e-06 ***
## poly(Age, 3)2                        -41323048   11999695  -3.444 0.000660 ***
## poly(Age, 3)3                        -24676765   11108092  -2.222 0.027105 *
## Height_i                                593174    1880448   0.315 0.752657
## poly(Weight, 3)1                      62370228   20099435   3.103 0.002108 **
## poly(Weight, 3)2                     -12997545   12907448  -1.007 0.314801
## poly(Weight, 3)3                      -2503422   11643441  -0.215 0.829916
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9148000 on 284 degrees of freedom
## Multiple R-squared:  0.4524, Adjusted R-squared:  0.1439
## F-statistic: 1.466 on 160 and 284 DF,  p-value: 0.00264
```

```
summary(lm(Salary ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+poly(Weight,4),
           data=ap_tibble))
```

```
##
## Call:
## lm(formula = Salary ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + Height_i + poly(Weight, 4), data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -16034321  -4082785         0   2617012  26648780
##
## Coefficients:
##                                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)                       -1379257   13536191  -0.102 0.918913
## fTeamBoston Celtics               -2634355    3925731  -0.671 0.502737
## fTeamBrooklyn Nets                 1371814    3735974   0.367 0.713751
## fTeamCharlotte Hornets            -2025318    3669011  -0.552 0.581379
## fTeamChicago Bulls                 1953089    4057821   0.481 0.630665
## fTeamCleveland Cavaliers           2355275    4001661   0.589 0.556616
```

```
## fTeamDallas Mavericks              -3514325    3769402  -0.932 0.351961
## fTeamDenver Nuggets                  464268    3837505   0.121 0.903791
## fTeamDetroit Pistons               -4012643    3829445  -1.048 0.295607
## fTeamGolden State Warriors          -441460    3927164  -0.112 0.910576
## fTeamHouston Rockets               -2013335    3778732  -0.533 0.594585
## fTeamIndiana Pacers                 -809386    3878287  -0.209 0.834835
## fTeamLos Angeles Clippers          -2469939    3959642  -0.624 0.533276
## fTeamLos Angeles Lakers             1202784    4181259   0.288 0.773817
## fTeamMemphis Grizzlies             -2086921    3924917  -0.532 0.595343
## fTeamMiami Heat                     -521565    4062402  -0.128 0.897933
## fTeamMilwaukee Bucks                 428322    3946704   0.109 0.913655
## fTeamMinnesota Timberwolves         4812227    4163605   1.156 0.248744
## fTeamNew Orleans Pelicans             26467    3697417   0.007 0.994294
## fTeamNew York Knicks               -1453414    3758204  -0.387 0.699246
## fTeamOklahoma City Thunder         -2585388    3879788  -0.666 0.505715
## fTeamOrlando Magic                  -906546    3879668  -0.234 0.815413
## fTeamPhiladelphia Sixers             607712    3903639   0.156 0.876398
## fTeamPhoenix Suns                   1758634    3932764   0.447 0.655091
## fTeamPortland Trail Blazers        -5138483    4365362  -1.177 0.240143
## fTeamSacremento Kings               1233870    3939202   0.313 0.754338
## fTeamSan Antonio Spurs              -222279    3814069  -0.058 0.953568
## fTeamToronto Raptors                -210952    4179783  -0.050 0.959784
## fTeamUtah Jazz                      1780268    4008374   0.444 0.657283
## fTeamWashington Wizards            -2180732    3663122  -0.595 0.552105
## fPositionF                          1821675    4399864   0.414 0.679166
## fPositionG                          8267327    5211134   1.586 0.113749
## fPositionPF                         2510572    2060856   1.218 0.224156
## fPositionPG                        10981892    3057216   3.592 0.000387 ***
## fPositionSF                         5460162    2373787   2.300 0.022165 *
## fPositionSG                         6109989    2726362   2.241 0.025797 *
## fCollegeArizona                     1284358    5526691   0.232 0.816402
## fCollegeArizona State              10029867    7173738   1.398 0.163167
## fCollegeArkansas                    1194048    6607015   0.181 0.856713
## fCollegeAuburn                      1681845    7071916   0.238 0.812193
## fCollegeBaylor                     -3826080    6339184  -0.604 0.546619
## fCollegeBelmont                    -4623958   10526095  -0.439 0.660790
## fCollegeBoise State                -5186436   10690094  -0.485 0.627936
## fCollegeBoston College             -3959582   10700185  -0.370 0.711623
## fCollegeBowling Green               2064013   10796358   0.191 0.848524
## fCollegeBucknell                   -3587229   10837224  -0.331 0.740882
## fCollegeButler                      4260171    8235742   0.517 0.605366
## fCollegeBYU                        -8083642   10678407  -0.757 0.449675
## fCollegeCal Poly                   -5170859   10672285  -0.485 0.628397
## fCollegeCalifornia                 20553409   10703106   1.920 0.055822 .
## fCollegeCharleston                 -8711016   10823754  -0.805 0.421608
## fCollegeCleveland State            -5386686   10551753  -0.511 0.610098
## fCollegeColorado                    1469596    7106043   0.207 0.836308
## fCollegeConnecticut                 3671131    6220667   0.590 0.555561
## fCollegeCreighton                  -1808877    8128150  -0.223 0.824050
## fCollegeDavidson                   34067376   10652273   3.198 0.001540 **
## fCollegeDayton                      2710553   10628327   0.255 0.798884
## fCollegeDePaul                     -4964259    8181014  -0.607 0.544469
## fCollegeDrexel                     -8757228   10674261  -0.820 0.412675
## fCollegeDuke                        3392741    4854596   0.699 0.485206
```

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## fCollegeFlorida                  13175358    6480274   2.033 0.042971 *
## fCollegeFlorida State             1773027    5561587   0.319 0.750114
## fCollegeFresno State             27710298   10686486   2.593 0.010008 *
## fCollegeGeorge Washington        -7551586   10793029  -0.700 0.484707
## fCollegeGeorgetown               -4744903    7122210  -0.666 0.505818
## fCollegeGeorgia                   1679237    7134117   0.235 0.814083
## fCollegeGeorgia Tech              -662767    7144660  -0.093 0.926157
## fCollegeGonzaga                   3752571    5807415   0.646 0.518694
## fCollegeHouston                  -4882474    8055742  -0.606 0.544943
## fCollegeIllinois                 -3444556    8544685  -0.403 0.687162
## fCollegeIndiana                   657495    5810245   0.113 0.909983
## fCollegeIowa State               -3772039    6185777  -0.610 0.542489
## fCollegeIUPUI                    -3813031   11748338  -0.325 0.745755
## fCollegeKansas                    5463472    5551835   0.984 0.325915
## fCollegeKansas State             -4797421    7093284  -0.676 0.499382
## fCollegeKentucky                  6465974    4811814   1.344 0.180099
## fCollegeLehigh                   27754426   10840205   2.560 0.010977 *
## fCollegeLiberty                  -2389133   10627594  -0.225 0.822293
## fCollegeLouisiana-Lafayette     -12470405   10708284  -1.165 0.245179
## fCollegeLouisville                4726399    6250271   0.756 0.450164
## fCollegeLoyola (MD)               4239764   10712870   0.396 0.692578
## fCollegeLSU                       1793552    6474396   0.277 0.781965
## fCollegeMarquette                 3201376    7197271   0.445 0.656801
## fCollegeMarshall                -11207091   10790141  -1.039 0.299858
## fCollegeMaryland                 -2844839    6260068  -0.454 0.649859
## fCollegeMemphis                   4558124    6499894   0.701 0.483716
## fCollegeMiami (FL)                -754563    8134390  -0.093 0.926158
## fCollegeMichigan                  3065786    5676873   0.540 0.589588
## fCollegeMichigan State            6799935    6282554   1.082 0.280018
## fCollegeMinnesota                 2306336   10670665   0.216 0.829036
## fCollegeMississippi State        -5976311   10720326  -0.557 0.577644
## fCollegeMissouri                 -1308602    7073753  -0.185 0.853366
## fCollegeMissouri State           -4482808   10749978  -0.417 0.676990
## fCollegeMurray State              1198076    8183929   0.146 0.883715
## fCollegenan                       3177043    4552640   0.698 0.485846
## fCollegeNebraska                 -2358891    8308756  -0.284 0.776691
## fCollegeNevada                   -5101453    8223905  -0.620 0.535546
## fCollegeNew Mexico               -4889885   10822553  -0.452 0.651742
## fCollegeNew Mexico JC             1224470   11023179   0.111 0.911631
## fCollegeNew Mexico State         15198437   10924802   1.391 0.165262
## fCollegeNorth Carolina           -1177686    5423021  -0.217 0.828237
## fCollegeNorth Carolina State      1617603   10663722   0.152 0.879538
## fCollegeNotre Dame               -6039769   10663985  -0.566 0.571591
## fCollegeOhio                     -1967406   10713394  -0.184 0.854428
## fCollegeOhio State                5742847    7174226   0.800 0.424102
## fCollegeOklahoma                    89541    7121242   0.013 0.989977
## fCollegeOklahoma State            2889730    8246216   0.350 0.726276
## fCollegeOld Dominion             -8478184   10800636  -0.785 0.433127
## fCollegeOle Miss                 -2518235   10705988  -0.235 0.814210
## fCollegeOregon                    671120    6177048   0.109 0.913559
## fCollegeOregon State             -5408348   10589942  -0.511 0.609955
## fCollegePenn State               -6198870   11142192  -0.556 0.578417
## fCollegePittsburgh                9670654   10814000   0.894 0.371936
## fCollegeProvidence               -6496932   10693596  -0.608 0.543971
```

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## fCollegePurdue                      -3725682   10932817  -0.341 0.733522
## fCollegeRadford                    -15370701   10747876  -1.430 0.153787
## fCollegeSaint Joseph's              -3188585    8434691  -0.378 0.705690
## fCollegeSaint Mary's                -5874821    8087110  -0.726 0.468168
## fCollegeSalt Lake CC UT            -10859670   10696874  -1.015 0.310869
## fCollegeSan Diego State              8120846    7161303   1.134 0.257758
## fCollegeSMU                         -5384649    7191284  -0.749 0.454615
## fCollegeSouth Carolina              -4641253   10489989  -0.442 0.658504
## fCollegeSt. John's                  -8965091   10699363  -0.838 0.402789
## fCollegeStanford                     1695065    6048298   0.280 0.779487
## fCollegeSyracuse                    -1452356    6275813  -0.231 0.817155
## fCollegeTCU                         -3191698    8229742  -0.388 0.698437
## fCollegeTennessee                    6776684    6300117   1.076 0.283003
## fCollegeTennessee State              9500860   10885097   0.873 0.383495
## fCollegeTexas                        7028245    5281549   1.331 0.184353
## fCollegeTexas A&M                    4814153    6628028   0.726 0.468235
## fCollegeTexas Tech                   2613579    8504553   0.307 0.758829
## fCollegeUC Santa Barbara            -8903868   10690201  -0.833 0.405604
## fCollegeUCLA                         7786137    5348243   1.456 0.146548
## fCollegeUNLV                         4398445    7406143   0.594 0.553059
## fCollegeUSC                          3490773    5504868   0.634 0.526512
## fCollegeUSC Upstate                 -7688781   10659601  -0.721 0.471320
## fCollegeUtah                         3005616    7098102   0.423 0.672296
## fCollegeUtah State                  -3544564   10647495  -0.333 0.739455
## fCollegeVanderbilt                   -836942    6507544  -0.129 0.897757
## fCollegeVillanova                    -617507    5469938  -0.113 0.910197
## fCollegeVirginia                     -557679    5734917  -0.097 0.922602
## fCollegeVirginia Commonwealth         167100   11063107   0.015 0.987960
## fCollegeVirginia Tech               -1698664   10324504  -0.165 0.869433
## fCollegeWake Forest                  5037184    6195870   0.813 0.416907
## fCollegeWashington                   2128777    5604897   0.380 0.704374
## fCollegeWashington State            14902265    8253183   1.806 0.072037 .
## fCollegeWeber State                29935272   10875455   2.753 0.006295 **
## fCollegeWest Virginia              -6093491    8168612  -0.746 0.456308
## fCollegeWestern Texas Coll. (J.C.) -7111445   10608146  -0.670 0.503165
## fCollegeWichita State                5388393    8320314   0.648 0.517756
## fCollegeWisconsin                   -8541553    8467532  -1.009 0.313960
## fCollegeWyoming                      667063    8300777   0.080 0.936007
## fCollegeXavier                      -6256097    7995395  -0.782 0.434597
## fCollegeYale                        -6204130   10731111  -0.578 0.563627
## poly(Age, 3)1                       55303000   11771446   4.698  4.1e-06 ***
## poly(Age, 3)2                      -41372019   12016961  -3.443 0.000663 ***
## poly(Age, 3)3                      -24904531   11134880  -2.237 0.026090 *
## Height_i                             529615    1888249   0.280 0.779315
## poly(Weight, 4)1                    61794412   20167267   3.064 0.002394 **
## poly(Weight, 4)2                   -14022773   13120294  -1.069 0.286077
## poly(Weight, 4)3                    -2856014   11685432  -0.244 0.807092
## poly(Weight, 4)4                     5514221   12114849   0.455 0.649342
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9161000 on 283 degrees of freedom
## Multiple R-squared:  0.4528, Adjusted R-squared:  0.1415
## F-statistic: 1.454 on 161 and 283 DF,  p-value: 0.003145
```

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

```
##
## Call:
## lm(formula = Salary ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + Height_i + Weight, data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -15845192  -4236590         0   2817577  26638013
##
## Coefficients:
##                                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)                     -28100952   15781292  -1.781 0.076031 .
## fTeamBoston Celtics              -2498579    3911629  -0.639 0.523493
## fTeamBrooklyn Nets                1208781    3717723   0.325 0.745313
## fTeamCharlotte Hornets           -2219790    3642960  -0.609 0.542785
## fTeamChicago Bulls                1652120    4025361   0.410 0.681800
## fTeamCleveland Cavaliers          2377524    3984428   0.597 0.551177
## fTeamDallas Mavericks            -3389325    3729024  -0.909 0.364166
## fTeamDenver Nuggets                437732    3812044   0.115 0.908662
## fTeamDetroit Pistons             -3846509    3809424  -1.010 0.313476
## fTeamGolden State Warriors        -350777    3887045  -0.090 0.928158
## fTeamHouston Rockets             -1858619    3759594  -0.494 0.621427
## fTeamIndiana Pacers              -1004796    3859340  -0.260 0.794778
## fTeamLos Angeles Clippers        -2114869    3932077  -0.538 0.591099
## fTeamLos Angeles Lakers           1093475    4154710   0.263 0.792594
## fTeamMemphis Grizzlies           -2076115    3907834  -0.531 0.595644
## fTeamMiami Heat                   -429517    4040691  -0.106 0.915420
## fTeamMilwaukee Bucks               377816    3924182   0.096 0.923367
## fTeamMinnesota Timberwolves       4431981    4114690   1.077 0.282338
## fTeamNew Orleans Pelicans         -385444    3657333  -0.105 0.916141
## fTeamNew York Knicks             -1171706    3729507  -0.314 0.753620
## fTeamOklahoma City Thunder       -3153191    3832208  -0.823 0.411300
## fTeamOrlando Magic                -941755    3860819  -0.244 0.807463
## fTeamPhiladelphia Sixers           486633    3875890   0.126 0.900173
## fTeamPhoenix Suns                 1692378    3913939   0.432 0.665778
## fTeamPortland Trail Blazers      -5537907    4289388  -1.291 0.197721
## fTeamSacremento Kings             1268408    3926289   0.323 0.746889
## fTeamSan Antonio Spurs            -286506    3791591  -0.076 0.939819
## fTeamToronto Raptors              -262010    4164719  -0.063 0.949881
## fTeamUtah Jazz                    1601893    3992059   0.401 0.688521
## fTeamWashington Wizards          -2087478    3632563  -0.575 0.565975
## fPositionF                        2519006    4279585   0.589 0.556588
## fPositionG                        8219984    5088842   1.615 0.107349
## fPositionPF                       3291038    1886069   1.745 0.082073 .
## fPositionPG                      10784169    2920784   3.692 0.000266 ***
## fPositionSF                       6255406    2093384   2.988 0.003050 **
## fPositionSG                       6395862    2488767   2.570 0.010680 *
## fCollegeArizona                   1382765    5493872   0.252 0.801460
## fCollegeArizona State            10784722    7115422   1.516 0.130704
## fCollegeArkansas                  1450593    6511372   0.223 0.823867
## fCollegeAuburn                    1898033    7031083   0.270 0.787394
```

```
## fCollegeBaylor                  -3602280    6297436  -0.572 0.567756
## fCollegeBelmont                 -5083373   10466785  -0.486 0.627575
## fCollegeBoise State             -5279062   10640005  -0.496 0.620168
## fCollegeBoston College          -3404067   10626862  -0.320 0.748955
## fCollegeBowling Green            3047889   10717258   0.284 0.776317
## fCollegeBucknell                -2129193   10726865  -0.198 0.842801
## fCollegeButler                   5005869    8183586   0.612 0.541225
## fCollegeBYU                     -7660288   10636835  -0.720 0.472011
## fCollegeCal Poly                -5109108   10636425  -0.480 0.631352
## fCollegeCalifornia              21163722   10657701   1.986 0.048014 *
## fCollegeCharleston              -9169410   10749959  -0.853 0.394389
## fCollegeCleveland State         -5129372   10506415  -0.488 0.625773
## fCollegeColorado                 1849371    7069392   0.262 0.793816
## fCollegeConnecticut              2865171    6154223   0.466 0.641884
## fCollegeCreighton               -1509364    8096986  -0.186 0.852255
## fCollegeDavidson                33677639   10605701   3.175 0.001660 **
## fCollegeDayton                   2591182   10579730   0.245 0.806694
## fCollegeDePaul                  -4753693    8139829  -0.584 0.559678
## fCollegeDrexel                  -8446967   10639340  -0.794 0.427890
## fCollegeDuke                     3092084    4807875   0.643 0.520656
## fCollegeFlorida                 13470522    6446073   2.090 0.037526 *
## fCollegeFlorida State            1935365    5537669   0.349 0.726978
## fCollegeFresno State            28125947   10649255   2.641 0.008718 **
## fCollegeGeorge Washington       -7497793   10734801  -0.698 0.485459
## fCollegeGeorgetown              -5582970    7052110  -0.792 0.429207
## fCollegeGeorgia                  2040386    7094103   0.288 0.773848
## fCollegeGeorgia Tech             -580477    7119767  -0.082 0.935077
## fCollegeGonzaga                  3777179    5786363   0.653 0.514427
## fCollegeHouston                 -4761057    8019032  -0.594 0.553169
## fCollegeIllinois                -3488387    8502914  -0.410 0.681924
## fCollegeIndiana                  1007865    5784293   0.174 0.861799
## fCollegeIowa State              -3623880    6161080  -0.588 0.556870
## fCollegeIUPUI                   -4038890   11705180  -0.345 0.730309
## fCollegeKansas                   4947024    5498897   0.900 0.369069
## fCollegeKansas State            -4989749    7051286  -0.708 0.479747
## fCollegeKentucky                 6494719    4782295   1.358 0.175510
## fCollegeLehigh                  27483171   10764435   2.553 0.011195 *
## fCollegeLiberty                 -2389168   10590315  -0.226 0.821674
## fCollegeLouisiana-Lafayette    -12350528   10641111  -1.161 0.246755
## fCollegeLouisville               5014092    6222956   0.806 0.421061
## fCollegeLoyola (MD)              4464526   10633872   0.420 0.674917
## fCollegeLSU                      1999235    6427567   0.311 0.755996
## fCollegeMarquette                3292324    7175419   0.459 0.646702
## fCollegeMarshall               -12040813   10696791  -1.126 0.261259
## fCollegeMaryland                -2934526    6227120  -0.471 0.637822
## fCollegeMemphis                  4498849    6475068   0.695 0.487747
## fCollegeMiami (FL)               -870338    8077425  -0.108 0.914270
## fCollegeMichigan                 3078492    5644098   0.545 0.585879
## fCollegeMichigan State           7111058    6257510   1.136 0.256739
## fCollegeMinnesota                3041650   10619794   0.286 0.774769
## fCollegeMississippi State       -5835428   10679555  -0.546 0.585209
## fCollegeMissouri                -1132507    7034778  -0.161 0.872217
## fCollegeMissouri State          -4390876   10661196  -0.412 0.680754
## fCollegeMurray State              705079    8138762   0.087 0.931024
```

```
## fCollegenan                          3174190    4535979   0.700 0.484633
## fCollegeNebraska                    -1288031    8189270  -0.157 0.875133
## fCollegeNevada                      -5857444    8152967  -0.718 0.473071
## fCollegeNew Mexico                  -4463277   10769091  -0.414 0.678853
## fCollegeNew Mexico JC                 564927   10879279   0.052 0.958623
## fCollegeNew Mexico State            16437669   10840045   1.516 0.130527
## fCollegeNorth Carolina              -1063109    5382619  -0.198 0.843570
## fCollegeNorth Carolina State         2000823   10621694   0.188 0.850719
## fCollegeNotre Dame                  -5636466   10622718  -0.531 0.596104
## fCollegeOhio                        -2697562   10627270  -0.254 0.799806
## fCollegeOhio State                   5798889    7152955   0.811 0.418213
## fCollegeOklahoma                       17897    7094417   0.003 0.997989
## fCollegeOklahoma State               4013545    8155318   0.492 0.622999
## fCollegeOld Dominion                -9205156   10704741  -0.860 0.390557
## fCollegeOle Miss                    -2656805   10650493  -0.249 0.803189
## fCollegeOregon                        856521    6129671   0.140 0.888969
## fCollegeOregon State                -5714923   10536958  -0.542 0.587986
## fCollegePenn State                  -5892811   11105678  -0.531 0.596099
## fCollegePittsburgh                   8694966   10721574   0.811 0.418052
## fCollegeProvidence                  -5989598   10598828  -0.565 0.572436
## fCollegePurdue                      -3314444   10820431  -0.306 0.759589
## fCollegeRadford                    -14426877   10659952  -1.353 0.177006
## fCollegeSaint Joseph's              -2965471    8376739  -0.354 0.723590
## fCollegeSaint Mary's                -6047256    8056433  -0.751 0.453503
## fCollegeSalt Lake CC UT            -10880073   10643457  -1.022 0.307535
## fCollegeSan Diego State              7854033    7132262   1.101 0.271736
## fCollegeSMU                         -5285879    7151073  -0.739 0.460408
## fCollegeSouth Carolina              -4521499   10443725  -0.433 0.665385
## fCollegeSt. John's                  -8794906   10660997  -0.825 0.410081
## fCollegeStanford                     1121244    5941628   0.189 0.850454
## fCollegeSyracuse                    -1418323    6229719  -0.228 0.820065
## fCollegeTCU                         -2697656    8177543  -0.330 0.741728
## fCollegeTennessee                    6738844    6249945   1.078 0.281842
## fCollegeTennessee State              9770533   10813158   0.904 0.366980
## fCollegeTexas                        7398399    5242145   1.411 0.159234
## fCollegeTexas A&M                    4934943    6604185   0.747 0.455530
## fCollegeTexas Tech                   2204694    8452618   0.261 0.794412
## fCollegeUC Santa Barbara            -8660385   10617693  -0.816 0.415376
## fCollegeUCLA                         8027049    5310660   1.511 0.131766
## fCollegeUNLV                         5032114    7306594   0.689 0.491565
## fCollegeUSC                          3799320    5468361   0.695 0.487756
## fCollegeUSC Upstate                 -7223806   10616061  -0.680 0.496764
## fCollegeUtah                         2909863    7074883   0.411 0.681164
## fCollegeUtah State                  -3429652   10601561  -0.324 0.746550
## fCollegeVanderbilt                   -894356    6466689  -0.138 0.890099
## fCollegeVillanova                    -527126    5426549  -0.097 0.922685
## fCollegeVirginia                      -97997    5698792  -0.017 0.986292
## fCollegeVirginia Commonwealth         258139   10403851   0.025 0.980222
## fCollegeVirginia Tech               -1184659   10271646  -0.115 0.908262
## fCollegeWake Forest                  5093695    6173462   0.825 0.410005
## fCollegeWashington                   1943710    5575400   0.349 0.727629
## fCollegeWashington State            15316326    8210495   1.865 0.063141 .
## fCollegeWeber State                 30495429   10781106   2.829 0.005006 **
## fCollegeWest Virginia               -5746988    8089955  -0.710 0.478044
```

```
## fCollegeWestern Texas Coll. (J.C.)  -6269050   10547757  -0.594 0.552748
## fCollegeWichita State                4937906    8257823   0.598 0.550335
## fCollegeWisconsin                   -8412031    8439429  -0.997 0.319727
## fCollegeWyoming                       301299    8228168   0.037 0.970815
## fCollegeXavier                      -5822278    7941972  -0.733 0.464097
## fCollegeYale                        -5860643   10670185  -0.549 0.583260
## poly(Age, 3)1                       54655272   11709494   4.668 4.69e-06 ***
## poly(Age, 3)2                      -42509394   11928551  -3.564 0.000428 ***
## poly(Age, 3)3                      -24531140   11073435  -2.215 0.027526 *
## Height_i                              698756    1871492   0.373 0.709151
## Weight                                116620      37351   3.122 0.001978 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9134000 on 286 degrees of freedom
## Multiple R-squared:  0.4502, Adjusted R-squared:  0.1465
## F-statistic: 1.482 on 158 and 286 DF,  p-value: 0.0021
```

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

Reduced Model

```
# Removal of `fTeam` due to no significance
summary(lm2 <- lm(Salary ~ fPosition+fCollege+poly(Age,3)+Height_i+Weight,
                  data=ap_tibble))
```

```
##
## Call:
## lm(formula = Salary ~ fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight, data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -15603270  -3954287    -13762   2344352  27884563
##
## Coefficients:
##                                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)                     -29076842   14314006  -2.031 0.043058 *
## fPositionF                        1628704    3909151   0.417 0.677226
## fPositionG                        9589398    4689028   2.045 0.041678 *
## fPositionPF                       3544382    1797240   1.972 0.049470 *
## fPositionPG                      11324804    2670538   4.241 2.93e-05 ***
## fPositionSF                       6682246    1986221   3.364 0.000862 ***
## fPositionSG                       6959800    2300314   3.026 0.002686 **
## fCollegeArizona                    729513    5158655   0.141 0.887632
## fCollegeArizona State             8754559    6589303   1.329 0.184941
## fCollegeArkansas                  1592163    6023178   0.264 0.791691
## fCollegeAuburn                    1211667    6575960   0.184 0.853930
## fCollegeBaylor                   -2538489    5715303  -0.444 0.657234
## fCollegeBelmont                  -3237466    9871607  -0.328 0.743162
## fCollegeBoise State              -4175833    9866595  -0.423 0.672417
## fCollegeBoston College           -6506326    9871812  -0.659 0.510325
## fCollegeBowling Green             3697367    9923757   0.373 0.709714
## fCollegeBucknell                 -6077565    9922619  -0.612 0.540652
## fCollegeButler                    2397268    7584657   0.316 0.752160
```

```
## fCollegeBYU                      -8044424    9884351  -0.814 0.416343
## fCollegeCal Poly                 -7744331    9868610  -0.785 0.433194
## fCollegeCalifornia               17791623    9916396   1.794 0.073746 .
## fCollegeCharleston               -8511985    9925883  -0.858 0.391791
## fCollegeCleveland State          -6219174    9881727  -0.629 0.529569
## fCollegeColorado                   -92863    6630098  -0.014 0.988834
## fCollegeConnecticut               1486668    5709143   0.260 0.794724
## fCollegeCreighton                -3400361    7561380  -0.450 0.653235
## fCollegeDavidson                 32398547    9863569   3.285 0.001136 **
## fCollegeDayton                     988385    9885232   0.100 0.920419
## fCollegeDePaul                   -5348901    7547428  -0.709 0.479032
## fCollegeDrexel                   -9597478    9878630  -0.972 0.332025
## fCollegeDuke                      1641564    4475092   0.367 0.713998
## fCollegeFlorida                   9724415    5921286   1.642 0.101530
## fCollegeFlorida State             1815876    5163565   0.352 0.725320
## fCollegeFresno State             24982185    9918274   2.519 0.012270 *
## fCollegeGeorge Washington        -8358802    9879935  -0.846 0.398174
## fCollegeGeorgetown               -6656902    6612661  -1.007 0.314856
## fCollegeGeorgia                   2621749    6565609   0.399 0.689931
## fCollegeGeorgia Tech             -1157562    6596088  -0.175 0.860806
## fCollegeGonzaga                   1299976    5346109   0.243 0.808037
## fCollegeHouston                  -4814382    7565978  -0.636 0.525030
## fCollegeIllinois                 -3042128    7788382  -0.391 0.696358
## fCollegeIndiana                  -1894855    5321436  -0.356 0.722019
## fCollegeIowa State               -3016444    5731728  -0.526 0.599070
## fCollegeIUPUI                    -5854660   10727804  -0.546 0.585627
## fCollegeKansas                    2650282    5096887   0.520 0.603442
## fCollegeKansas State             -6826345    6597031  -1.035 0.301575
## fCollegeKentucky                  5080527    4409335   1.152 0.250104
## fCollegeLehigh                   21318458    9873515   2.159 0.031593 *
## fCollegeLiberty                  -5122231    9877043  -0.519 0.604404
## fCollegeLouisiana-Lafayette     -11266606    9856266  -1.143 0.253869
## fCollegeLouisville                3801244    5749353   0.661 0.508993
## fCollegeLoyola (MD)               2040057    9875236   0.207 0.836469
## fCollegeLSU                       2532047    6044310   0.419 0.675564
## fCollegeMarquette                 2722608    6627276   0.411 0.681485
## fCollegeMarshall                -11538417    9949609  -1.160 0.247055
## fCollegeMaryland                 -2271484    5751088  -0.395 0.693135
## fCollegeMemphis                   3952288    6075578   0.651 0.515830
## fCollegeMiami (FL)                -979545    7541684  -0.130 0.896741
## fCollegeMichigan                   675302    5151100   0.131 0.895781
## fCollegeMichigan State            4845526    5716434   0.848 0.397277
## fCollegeMinnesota                  617796    9861753   0.063 0.950088
## fCollegeMississippi State        -5322870    9875569  -0.539 0.590272
## fCollegeMissouri                 -1859460    6579029  -0.283 0.777643
## fCollegeMissouri State           -3600780    9898485  -0.364 0.716273
## fCollegeMurray State               148990    7547336   0.020 0.984263
## fCollegenan                       1361939    4197567   0.324 0.745806
## fCollegeNebraska                 -3364073    7549540  -0.446 0.656192
## fCollegeNevada                   -7049210    7555738  -0.933 0.351555
## fCollegeNew Mexico              -10715266    9863800  -1.086 0.278167
## fCollegeNew Mexico JC              29578    9944369   0.003 0.997629
## fCollegeNew Mexico State         15257751   10026509   1.522 0.129077
## fCollegeNorth Carolina           -1861748    4934741  -0.377 0.706224
```

```
## fCollegeNorth Carolina State          273637    9873379   0.028 0.977907
## fCollegeNotre Dame                   -6045721    9877188  -0.612 0.540920
## fCollegeOhio                         -5182116    9829849  -0.527 0.598439
## fCollegeOhio State                    6435466    6580231   0.978 0.328825
## fCollegeOklahoma                        16372    6575860   0.002 0.998015
## fCollegeOklahoma State                 155943    7614317   0.020 0.983673
## fCollegeOld Dominion                 -8885360    9898565  -0.898 0.370062
## fCollegeOle Miss                     -2027915    9872592  -0.205 0.837386
## fCollegeOregon                        -314160    5708793  -0.055 0.956149
## fCollegeOregon State                 -6776065    9920926  -0.683 0.495104
## fCollegePenn State                   -3023210   10455145  -0.289 0.772649
## fCollegePittsburgh                    5599644    9938784   0.563 0.573554
## fCollegeProvidence                   -9223264    9872001  -0.934 0.350872
## fCollegePurdue                       -6677183   10057145  -0.664 0.507224
## fCollegeRadford                     -13510166    9872518  -1.368 0.172143
## fCollegeSaint Joseph's               -3883919    7748537  -0.501 0.616548
## fCollegeSaint Mary's                 -6461602    7544837  -0.856 0.392413
## fCollegeSalt Lake CC UT             -11861921    9852867  -1.204 0.229530
## fCollegeSan Diego State               5833027    6565590   0.888 0.374991
## fCollegeSMU                          -6866057    6622295  -1.037 0.300620
## fCollegeSouth Carolina               -4729352    9877043  -0.479 0.632397
## fCollegeSt. John's                   -8271180    9869054  -0.838 0.402614
## fCollegeStanford                     -1211076    5461430  -0.222 0.824652
## fCollegeSyracuse                     -2950156    5734877  -0.514 0.607317
## fCollegeTCU                          -5997360    7554098  -0.794 0.427839
## fCollegeTennessee                     5070939    5663605   0.895 0.371281
## fCollegeTennessee State               3710414    9902854   0.375 0.708150
## fCollegeTexas                         5596961    4897126   1.143 0.253945
## fCollegeTexas A&M                     3718598    6075409   0.612 0.540931
## fCollegeTexas Tech                    1023242    7777535   0.132 0.895413
## fCollegeUC Santa Barbara             -9733093    9868135  -0.986 0.324735
## fCollegeUCLA                          6759893    4883324   1.384 0.167252
## fCollegeUNLV                          4423812    6654104   0.665 0.506649
## fCollegeUSC                           3230060    5045439   0.640 0.522512
## fCollegeUSC Upstate                  -9076268    9871715  -0.919 0.358579
## fCollegeUtah                          1496443    6607775   0.226 0.820985
## fCollegeUtah State                   -6213284    9879425  -0.629 0.529863
## fCollegeVanderbilt                   -2082459    6037102  -0.345 0.730367
## fCollegeVillanova                    -1813323    5059729  -0.358 0.720296
## fCollegeVirginia                     -1507440    5315629  -0.284 0.776914
## fCollegeVirginia Commonwealth          735735    9818851   0.075 0.940317
## fCollegeVirginia Tech                -2188720    9867341  -0.222 0.824602
## fCollegeWake Forest                   4144619    5747775   0.721 0.471394
## fCollegeWashington                    1761915    5117725   0.344 0.730868
## fCollegeWashington State             11642033    7556197   1.541 0.124387
## fCollegeWeber State                  24134752    9850792   2.450 0.014828 *
## fCollegeWest Virginia                -6285156    7542204  -0.833 0.405289
## fCollegeWestern Texas Coll. (J.C.)   -7476695    9922175  -0.754 0.451692
## fCollegeWichita State                 5052143    7600490   0.665 0.506721
## fCollegeWisconsin                    -7749470    7791802  -0.995 0.320710
## fCollegeWyoming                      -2494005    7564417  -0.330 0.741844
## fCollegeXavier                       -7127107    7542277  -0.945 0.345406
## fCollegeYale                         -4939291    9876489  -0.500 0.617350
## poly(Age, 3)1                        60328791   10393260   5.805 1.57e-08 ***
```

```
## poly(Age, 3)2                      -39910951   10479603  -3.808 0.000168 ***
## poly(Age, 3)3                      -21792983   10216124  -2.133 0.033681 *
## Height_i                              475829    1739390   0.274 0.784601
## Weight                                129283      34073   3.794 0.000177 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8913000 on 315 degrees of freedom
## Multiple R-squared:  0.4235, Adjusted R-squared:  0.1873
## F-statistic: 1.793 on 129 and 315 DF,  p-value: 1.992e-05
```

```
# Removal of `Height_i` due to no significance
summary(lm3 <- lm(Salary ~ fPosition+fCollege+poly(Age,3)+Weight,
                  data=ap_tibble))
```

```
##
## Call:
## lm(formula = Salary ~ fPosition + fCollege + poly(Age, 3) + Weight,
##     data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -15700515  -3901416         0   2374635  27681023
##
## Coefficients:
##                                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)                     -26107587    9317961  -2.802 0.005394 **
## fPositionF                        1694967    3895924   0.435 0.663815
## fPositionG                        9591767    4682151   2.049 0.041329 *
## fPositionPF                       3555977    1794108   1.982 0.048342 *
## fPositionPG                      11193324    2623084   4.267 2.62e-05 ***
## fPositionSF                       6732709    1974739   3.409 0.000735 ***
## fPositionSG                       6944411    2296258   3.024 0.002697 **
## fCollegeArizona                    734266    5151069   0.143 0.886739
## fCollegeArizona State             8677403    6573620   1.320 0.187779
## fCollegeArkansas                  1499043    6004742   0.250 0.803025
## fCollegeAuburn                    1080888    6548952   0.165 0.869012
## fCollegeBaylor                   -2544227    5706892  -0.446 0.656035
## fCollegeBelmont                  -3179861    9854903  -0.323 0.747160
## fCollegeBoise State              -4186288    9852067  -0.425 0.671188
## fCollegeBoston College           -6509725    9857343  -0.660 0.509482
## fCollegeBowling Green             3492727    9881026   0.353 0.723966
## fCollegeBucknell                 -6280605    9880326  -0.636 0.525453
## fCollegeButler                    2417937    7573170   0.319 0.749728
## fCollegeBYU                      -8030914    9869747  -0.814 0.416435
## fCollegeCal Poly                 -7795468    9852385  -0.791 0.429405
## fCollegeCalifornia               17831171    9900817   1.801 0.072659 .
## fCollegeCharleston               -8557906    9909924  -0.864 0.388480
## fCollegeCleveland State          -6337846    9857739  -0.643 0.520735
## fCollegeColorado                    7409    6610260   0.001 0.999106
## fCollegeConnecticut               1437946    5698005   0.252 0.800927
## fCollegeCreighton                -3423214    7549842  -0.453 0.650561
## fCollegeDavidson                 32453074    9847108   3.296 0.001093 **
## fCollegeDayton                    1137040    9855825   0.115 0.908227
## fCollegeDePaul                   -5293542    7533662  -0.703 0.482790
```

```
## fCollegeDrexel                    -9576744    9863868  -0.971 0.332345
## fCollegeDuke                       1614092    4467411   0.361 0.718114
## fCollegeFlorida                    9770250    5910244   1.653 0.099303 .
## fCollegeFlorida State              1816106    5156001   0.352 0.724899
## fCollegeFresno State              25140167    9886942   2.543 0.011475 *
## fCollegeGeorge Washington         -8224156    9853212  -0.835 0.404535
## fCollegeGeorgetown                -6529098    6586473  -0.991 0.322303
## fCollegeGeorgia                    2496274    6539973   0.382 0.702944
## fCollegeGeorgia Tech              -1106434    6583781  -0.168 0.866648
## fCollegeGonzaga                    1220269    5330343   0.229 0.819072
## fCollegeHouston                   -4818845    7554877  -0.638 0.524036
## fCollegeIllinois                  -3120630    7771692  -0.402 0.688295
## fCollegeIndiana                   -1992375    5301704  -0.376 0.707318
## fCollegeIowa State                -3023798    5723268  -0.528 0.597638
## fCollegeIUPUI                     -5897625   10710940  -0.551 0.582285
## fCollegeKansas                     2674498    5088653   0.526 0.599548
## fCollegeKansas State              -6781096    6585296  -1.030 0.303923
## fCollegeKentucky                   5063105    4402416   1.150 0.250983
## fCollegeLehigh                    21259031    9856664   2.157 0.031774 *
## fCollegeLiberty                   -5070645    9860776  -0.514 0.607455
## fCollegeLouisiana-Lafayette      -11217850    9840218  -1.140 0.255150
## fCollegeLouisville                 3715092    5732311   0.648 0.517393
## fCollegeLoyola (MD)                1780582    9815179   0.181 0.856161
## fCollegeLSU                        2503130    6034532   0.415 0.678569
## fCollegeMarquette                  2744873    6617069   0.415 0.678557
## fCollegeMarshall                 -11332724    9906623  -1.144 0.253508
## fCollegeMaryland                  -2223025    5739939  -0.387 0.698802
## fCollegeMemphis                    4003221    6063828   0.660 0.509619
## fCollegeMiami (FL)                -1060581    7524825  -0.141 0.888004
## fCollegeMichigan                    656191    5143081   0.128 0.898557
## fCollegeMichigan State             4801618    5705809   0.842 0.400687
## fCollegeMinnesota                   695022    9843271   0.071 0.943754
## fCollegeMississippi State         -5387928    9858242  -0.547 0.585080
## fCollegeMissouri                  -2003012    6548460  -0.306 0.759901
## fCollegeMissouri State            -3526122    9880227  -0.357 0.721415
## fCollegeMurray State                143183    7536249   0.019 0.984854
## fCollegenan                        1345031    4190964   0.321 0.748471
## fCollegeNebraska                  -3170901    7505432  -0.422 0.672961
## fCollegeNevada                    -6976916    7540053  -0.925 0.355509
## fCollegeNew Mexico               -10713177    9849347  -1.088 0.277555
## fCollegeNew Mexico JC               220347    9905355   0.022 0.982266
## fCollegeNew Mexico State          15568598    9947319   1.565 0.118559
## fCollegeNorth Carolina            -1905550    4924917  -0.387 0.699076
## fCollegeNorth Carolina State        364580    9853325   0.037 0.970508
## fCollegeNotre Dame                -6024319    9862409  -0.611 0.541747
## fCollegeOhio                      -5116457    9812522  -0.521 0.602439
## fCollegeOhio State                 6413714    6570112   0.976 0.329714
## fCollegeOklahoma                     33239    6565938   0.005 0.995964
## fCollegeOklahoma State              244849    7596234   0.032 0.974307
## fCollegeOld Dominion              -8968812    9879369  -0.908 0.364659
## fCollegeOle Miss                  -2068819    9856998  -0.210 0.833894
## fCollegeOregon                     -262642    5697327  -0.046 0.963260
## fCollegeOregon State              -6635465    9893090  -0.671 0.502891
## fCollegePenn State                -3069994   10438432  -0.294 0.768871
```

```
## fCollegePittsburgh                   5382633    9892562   0.544 0.586750
## fCollegeProvidence                  -9181196    9856343  -0.932 0.352305
## fCollegePurdue                      -7223811    9842202  -0.734 0.463516
## fCollegeRadford                    -13417581    9852261  -1.362 0.174206
## fCollegeSaint Joseph's              -3888046    7737171  -0.503 0.615655
## fCollegeSaint Mary's                -6591870    7518764  -0.877 0.381303
## fCollegeSalt Lake CC UT            -11810230    9836624  -1.201 0.230791
## fCollegeSan Diego State              5880318    6553699   0.897 0.370268
## fCollegeSMU                         -6879494    6612412  -1.040 0.298954
## fCollegeSouth Carolina              -4677766    9860776  -0.474 0.635556
## fCollegeSt. John's                  -8227820    9853325  -0.835 0.404332
## fCollegeStanford                    -1161186    5450388  -0.213 0.831428
## fCollegeSyracuse                    -2903204    5723910  -0.507 0.612364
## fCollegeTCU                         -6005414    7542975  -0.796 0.426537
## fCollegeTennessee                    5089118    5654919   0.900 0.368835
## fCollegeTennessee State              3802007    9882693   0.385 0.700708
## fCollegeTexas                        5489279    4874129   1.126 0.260932
## fCollegeTexas A&M                    3750442    6065396   0.618 0.536800
## fCollegeTexas Tech                    971373    7763834   0.125 0.900512
## fCollegeUC Santa Barbara            -9697666    9852830  -0.984 0.325745
## fCollegeUCLA                         6831090    4869240   1.403 0.161626
## fCollegeUNLV                         4395319    6643542   0.662 0.508714
## fCollegeUSC                          3266978    5036245   0.649 0.517008
## fCollegeUSC Upstate                 -9031568    9855903  -0.916 0.360176
## fCollegeUtah                         1510966    6597882   0.229 0.819011
## fCollegeUtah State                  -6249709    9864057  -0.634 0.526811
## fCollegeVanderbilt                  -2189767    6015519  -0.364 0.716087
## fCollegeVillanova                   -1830649    5051921  -0.362 0.717320
## fCollegeVirginia                    -1424311    5299161  -0.269 0.788274
## fCollegeVirginia Commonwealth         743182    9804429   0.076 0.939626
## fCollegeVirginia Tech               -2145798    9851640  -0.218 0.827717
## fCollegeWake Forest                  4175217    5738268   0.728 0.467392
## fCollegeWashington                   1804162    5107900   0.353 0.724166
## fCollegeWashington State            11687213    7543325   1.549 0.122300
## fCollegeWeber State                24140047    9836342   2.454 0.014660 *
## fCollegeWest Virginia              -6346798    7527793  -0.843 0.399802
## fCollegeWestern Texas Coll. (J.C.) -7486068    9907581  -0.756 0.450458
## fCollegeWichita State                4953449    7580801   0.653 0.513961
## fCollegeWisconsin                   -7583439    7756749  -0.978 0.328992
## fCollegeWyoming                     -2406651    7546602  -0.319 0.750009
## fCollegeXavier                      -7076954    7529003  -0.940 0.347956
## fCollegeYale                        -4935957    9862013  -0.501 0.617070
## poly(Age, 3)1                       59932126   10276538   5.832 1.35e-08 ***
## poly(Age, 3)2                      -39594159   10400165  -3.807 0.000169 ***
## poly(Age, 3)3                      -21817812   10200756  -2.139 0.033215 *
## Weight                                129952      33935   3.829 0.000155 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8900000 on 316 degrees of freedom
## Multiple R-squared:  0.4233, Adjusted R-squared:  0.1897
## F-statistic: 1.812 on 128 and 316 DF,  p-value: 1.484e-05
```

```r
# Removal of `fCollege`
summary(lm4 <- lm(Salary ~ fPosition+poly(Age,3)+Weight,
                  data=ap_tibble))
```

```
##
## Call:
## lm(formula = Salary ~ fPosition + poly(Age, 3) + Weight, data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -14639129  -5391132  -1890469   2760348  30064206
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -19170525    7492081  -2.559 0.010843 *
## fPositionF     -2044567    3258868  -0.627 0.530736
## fPositionG      6500711    3944547   1.648 0.100071
## fPositionPF     2740886    1568074   1.748 0.081183 .
## fPositionPG     9281566    2214766   4.191 3.37e-05 ***
## fPositionSF     4198957    1720746   2.440 0.015078 *
## fPositionSG     5692395    1937668   2.938 0.003482 **
## poly(Age, 3)1  67675886    9116291   7.424 6.07e-13 ***
## poly(Age, 3)2 -25177915    9079936  -2.773 0.005795 **
## poly(Age, 3)3 -25404780    9019042  -2.817 0.005072 **
## Weight           108610      29708   3.656 0.000288 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8956000 on 434 degrees of freedom
## Multiple R-squared:  0.1979, Adjusted R-squared:  0.1794
## F-statistic: 10.71 on 10 and 434 DF,  p-value: 2.64e-16
```

```r
lm1 <- lm(Salary ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+Weight,
          data=ap_tibble)
anova(lm4,lm3,lm2,lm1)
```

```
## Analysis of Variance Table
##
## Model 1: Salary ~ fPosition + poly(Age, 3) + Weight
## Model 2: Salary ~ fPosition + fCollege + poly(Age, 3) + Weight
## Model 3: Salary ~ fPosition + fCollege + poly(Age, 3) + Height_i + Weight
## Model 4: Salary ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##   Res.Df        RSS  Df  Sum of Sq      F Pr(>F)
## 1    434 3.4811e+16
## 2    316 2.5028e+16 118 9.7829e+15 0.9937 0.5077
## 3    315 2.5022e+16   1 5.9446e+12 0.0713 0.7897
## 4    286 2.3861e+16  29 1.1609e+15 0.4798 0.9902
```

Stepwise Model Selection

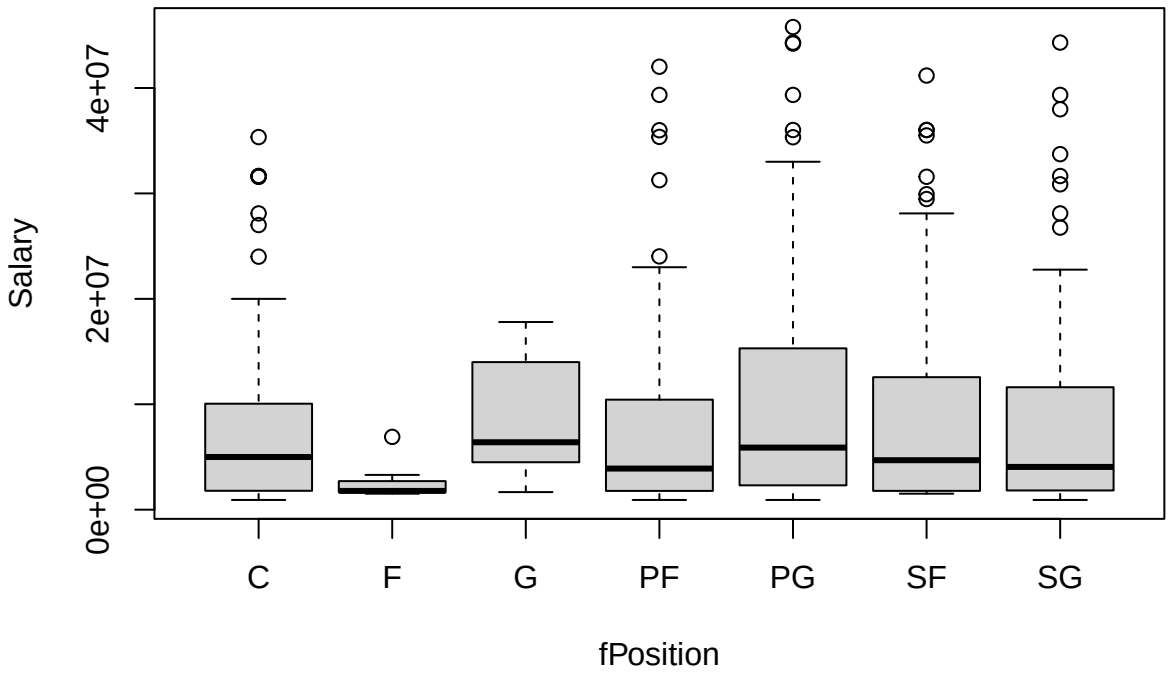
```r
lm1 <- lm(Salary ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+Weight,
          data=ap_tibble)
summary(lm_step <- step(lm1))
```

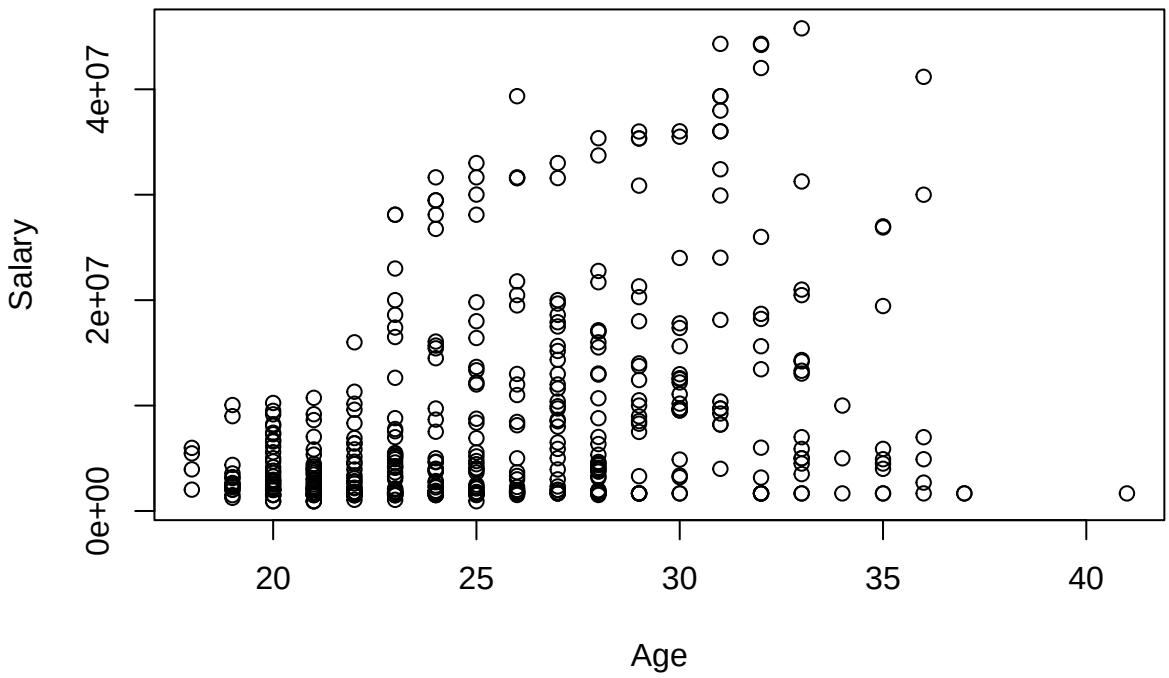
```
## Start:  AIC=14385.77
## Salary ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##
##                 Df  Sum of Sq        RSS   AIC
## - fCollege     118 1.0181e+16 3.4043e+16 14308
## - fTeam         29 1.1609e+15 2.5022e+16 14349
## - Height_i       1 1.1631e+13 2.3873e+16 14384
## <none>                        2.3861e+16 14386
## - fPosition      6 1.2947e+15 2.5156e+16 14397
## - Weight         1 8.1336e+14 2.4675e+16 14399
## - poly(Age, 3)   3 3.6046e+15 2.7466e+16 14442
##
## Step:  AIC=14307.9
## Salary ~ fTeam + fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df  Sum of Sq        RSS   AIC
## - fTeam        29 7.6410e+14 3.4807e+16 14260
## - Height_i      1 7.4399e+12 3.4050e+16 14306
## <none>                       3.4043e+16 14308
## - fPosition     6 1.8173e+15 3.5860e+16 14319
## - Weight        1 1.0891e+15 3.5132e+16 14320
## - poly(Age, 3)  3 5.0580e+15 3.9100e+16 14364
##
## Step:  AIC=14259.78
## Salary ~ fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df  Sum of Sq        RSS   AIC
## - Height_i      1 4.6674e+12 3.4811e+16 14258
## <none>                       3.4807e+16 14260
## - fPosition     6 1.7432e+15 3.6550e+16 14270
## - Weight        1 1.0521e+15 3.5859e+16 14271
## - poly(Age, 3)  3 5.6390e+15 4.0446e+16 14321
##
## Step:  AIC=14257.84
## Salary ~ fPosition + poly(Age, 3) + Weight
##
##                Df  Sum of Sq        RSS   AIC
## <none>                       3.4811e+16 14258
## - fPosition     6 1.8010e+15 3.6612e+16 14268
## - Weight        1 1.0721e+15 3.5883e+16 14269
## - poly(Age, 3)  3 5.6654e+15 4.0477e+16 14319
##
## Call:
## lm(formula = Salary ~ fPosition + poly(Age, 3) + Weight, data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -14639129  -5391132  -1890469   2760348  30064206
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -19170525    7492081  -2.559 0.010843 *
```

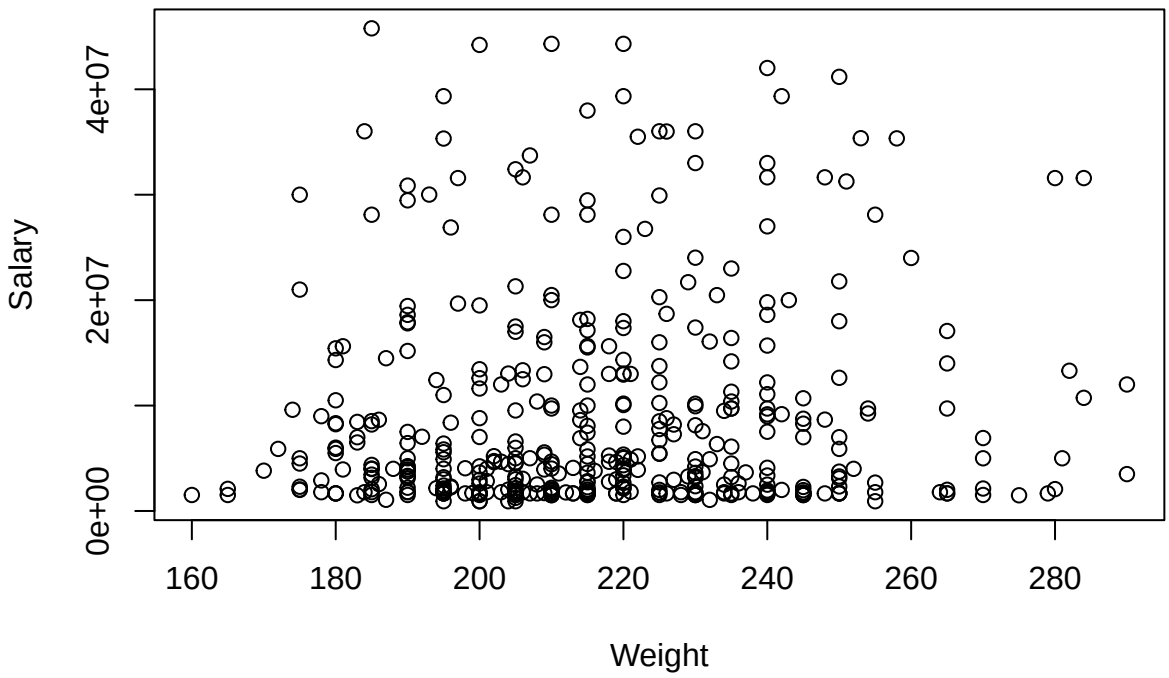
```
## fPositionF     -2044567    3258868  -0.627 0.530736
## fPositionG      6500711    3944547   1.648 0.100071
## fPositionPF     2740886    1568074   1.748 0.081183 .
## fPositionPG     9281566    2214766   4.191 3.37e-05 ***
## fPositionSF     4198957    1720746   2.440 0.015078 *
## fPositionSG     5692395    1937668   2.938 0.003482 **
## poly(Age, 3)1  67675886    9116291   7.424 6.07e-13 ***
## poly(Age, 3)2 -25177915    9079936  -2.773 0.005795 **
## poly(Age, 3)3 -25404780    9019042  -2.817 0.005072 **
## Weight           108610      29708   3.656 0.000288 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8956000 on 434 degrees of freedom
## Multiple R-squared:  0.1979, Adjusted R-squared:  0.1794
## F-statistic: 10.71 on 10 and 434 DF,  p-value: 2.64e-16
```

Linear Regression

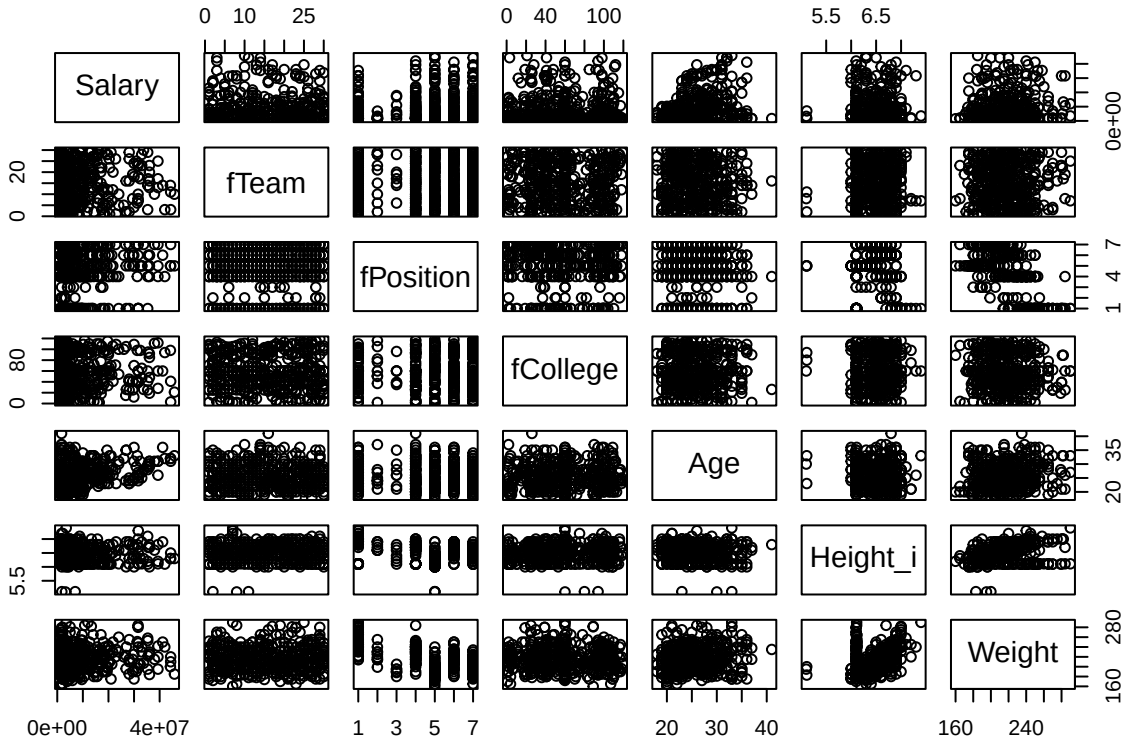
```
plot(Salary ~ fPosition+Age+Weight+fPosition:Age+fPosition:Weight+Age:Weight,
     data=ap_tibble)
```



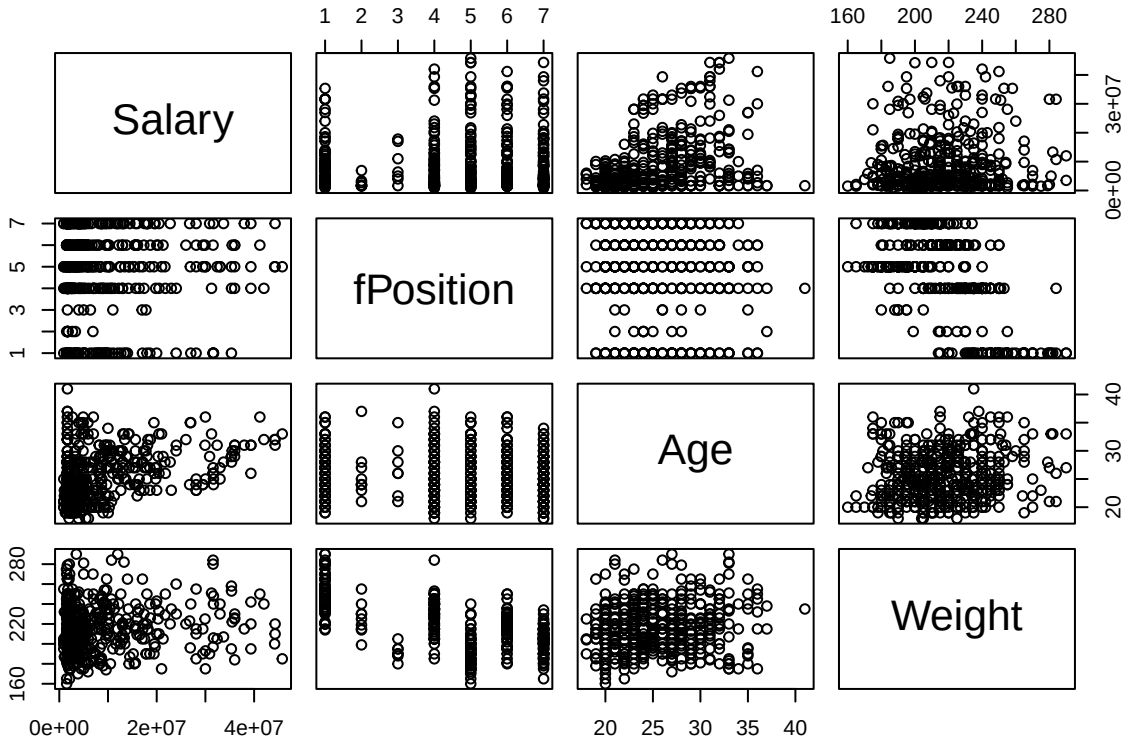

Salary
0e+00
2e+07
4e+07
20
25
30
35
40
Age




```
pairs(Salary ~ fTeam+fPosition+fCollege+Age+Height_i+Weight,
      data=ap_tibble)
```




```
pairs(Salary ~ fPosition+Age+Weight+fPosition:Age+fPosition:Weight+Age:Weight,
      data=ap_tibble)
```




```
lmst <- step(lm1)
```

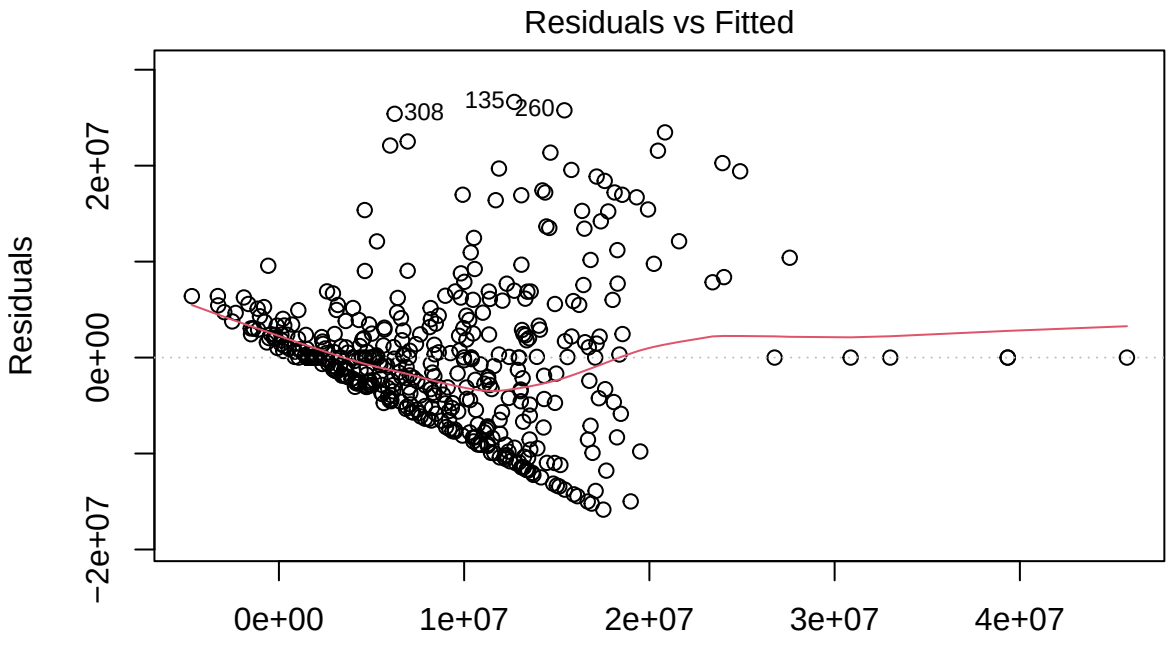
```
## Start:  AIC=14385.77
## Salary ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##
##                 Df  Sum of Sq        RSS   AIC
## - fCollege     118 1.0181e+16 3.4043e+16 14308
## - fTeam         29 1.1609e+15 2.5022e+16 14349
## - Height_i       1 1.1631e+13 2.3873e+16 14384
## <none>                        2.3861e+16 14386
## - fPosition      6 1.2947e+15 2.5156e+16 14397
## - Weight         1 8.1336e+14 2.4675e+16 14399
## - poly(Age, 3)   3 3.6046e+15 2.7466e+16 14442
##
## Step:  AIC=14307.9
## Salary ~ fTeam + fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df  Sum of Sq        RSS   AIC
## - fTeam        29 7.6410e+14 3.4807e+16 14260
## - Height_i      1 7.4399e+12 3.4050e+16 14306
## <none>                       3.4043e+16 14308
## - fPosition     6 1.8173e+15 3.5860e+16 14319
## - Weight        1 1.0891e+15 3.5132e+16 14320
## - poly(Age, 3)  3 5.0580e+15 3.9100e+16 14364
##
```

```
## Step:  AIC=14259.78
## Salary ~ fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df  Sum of Sq        RSS   AIC
## - Height_i      1 4.6674e+12 3.4811e+16 14258
## <none>                       3.4807e+16 14260
## - fPosition     6 1.7432e+15 3.6550e+16 14270
## - Weight        1 1.0521e+15 3.5859e+16 14271
## - poly(Age, 3)  3 5.6390e+15 4.0446e+16 14321
##
## Step:  AIC=14257.84
## Salary ~ fPosition + poly(Age, 3) + Weight
##
##                Df  Sum of Sq        RSS   AIC
## <none>                       3.4811e+16 14258
## - fPosition     6 1.8010e+15 3.6612e+16 14268
## - Weight        1 1.0721e+15 3.5883e+16 14269
## - poly(Age, 3)  3 5.6654e+15 4.0477e+16 14319
```

```
summary(lmst)
```

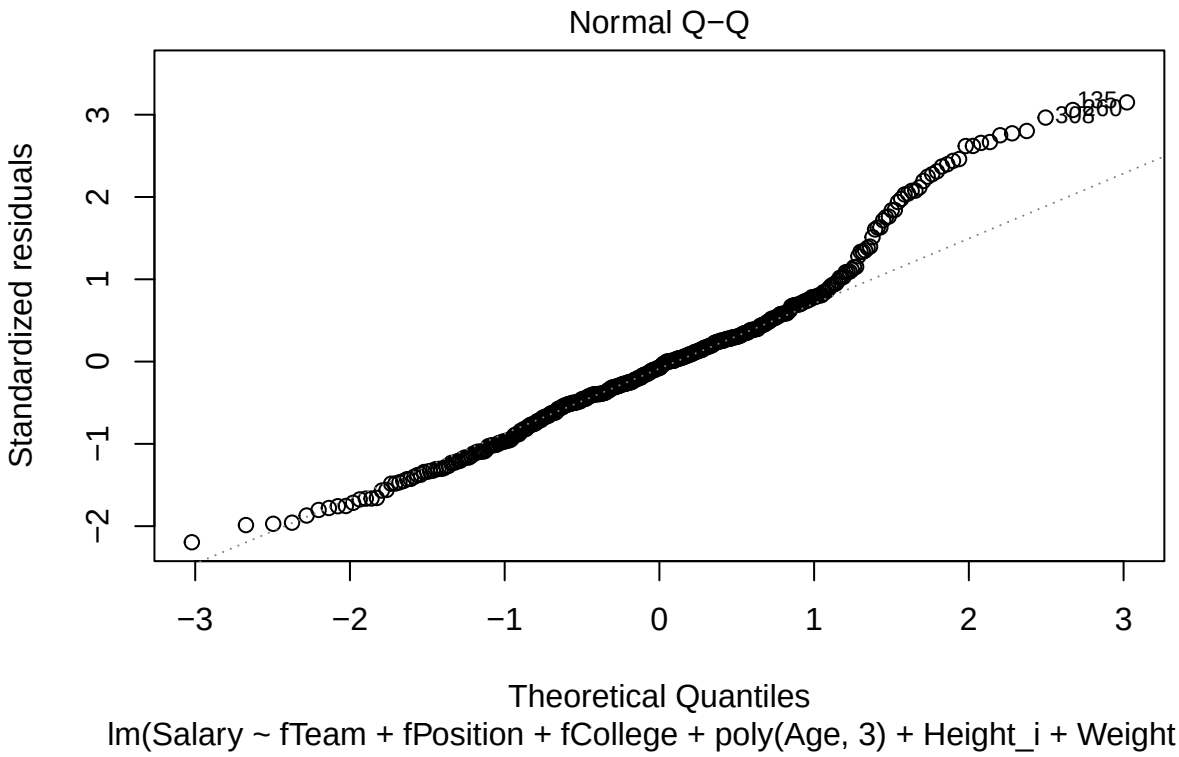
```
##
## Call:
## lm(formula = Salary ~ fPosition + poly(Age, 3) + Weight, data = ap_tibble)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -14639129  -5391132  -1890469   2760348  30064206
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -19170525    7492081  -2.559 0.010843 *
## fPositionF     -2044567    3258868  -0.627 0.530736
## fPositionG      6500711    3944547   1.648 0.100071
## fPositionPF     2740886    1568074   1.748 0.081183 .
## fPositionPG     9281566    2214766   4.191 3.37e-05 ***
## fPositionSF     4198957    1720746   2.440 0.015078 *
## fPositionSG     5692395    1937668   2.938 0.003482 **
## poly(Age, 3)1  67675886    9116291   7.424 6.07e-13 ***
## poly(Age, 3)2 -25177915    9079936  -2.773 0.005795 **
## poly(Age, 3)3 -25404780    9019042  -2.817 0.005072 **
## Weight           108610      29708   3.656 0.000288 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8956000 on 434 degrees of freedom
## Multiple R-squared:  0.1979, Adjusted R-squared:  0.1794
## F-statistic: 10.71 on 10 and 434 DF,  p-value: 2.64e-16
```

```
plot(lm1, which = 1)
```



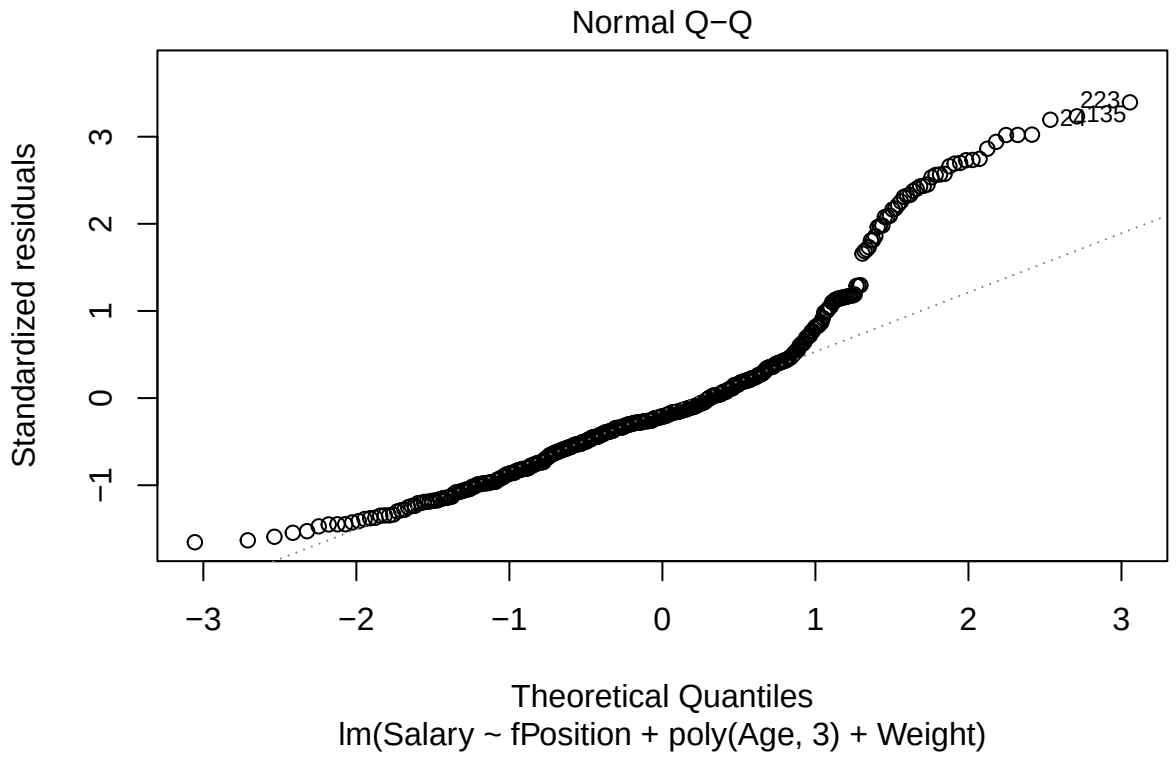

```
plot(lm1, which = 2)
```

```
## Warning: not plotting observations with leverage one:
##   1, 27, 46, 69, 74, 77, 85, 102, 104, 122, 133, 137, 138, 141, 190, 217, 223, 227, 231, 241, 249, 25
```




```
plot(lm4, which = 1)
```


```
plot(lm4, which = 2)
```

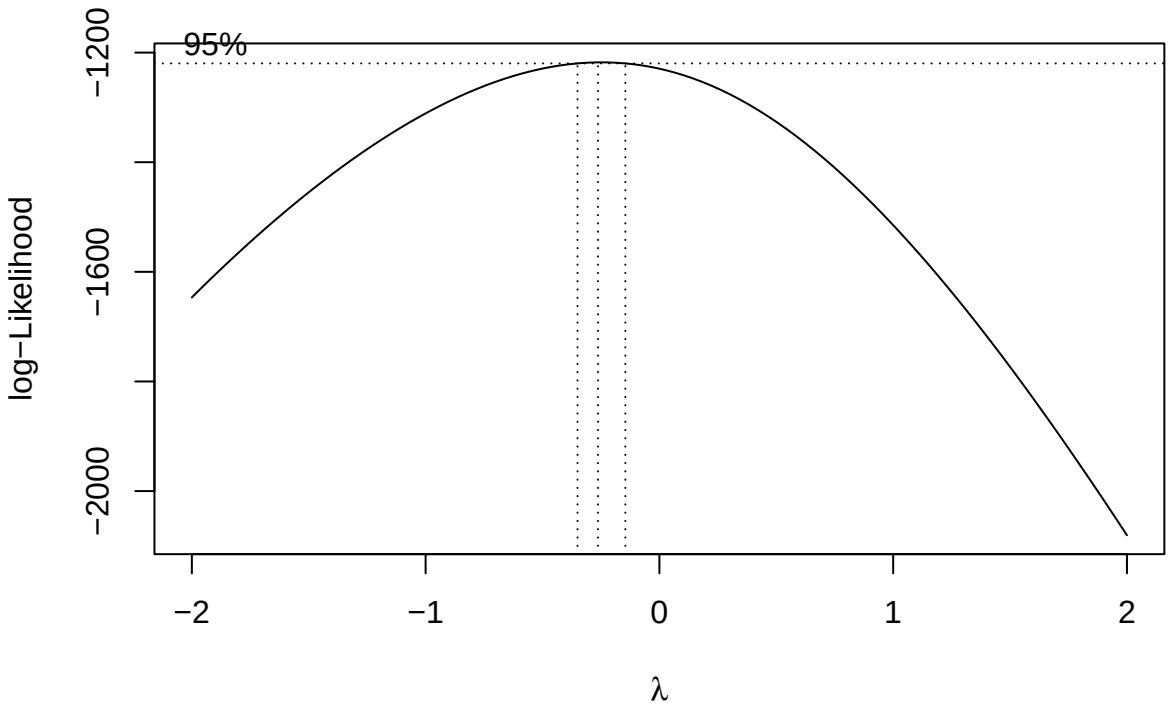



```
head(ap_tibble)
```

```
## # A tibble: 6 x 13
##   Name          Team  Position   Age Height Height_i Weight College Salary fTeam
##   <chr>         <chr> <chr>    <dbl> <chr>     <dbl>  <dbl> <chr>    <dbl> <fct>
## 1 Jaylen Brown  Bost~ SG          24 "6' 6~     6.6     223 Califo~ 2.68e7 Bost~
## 2 Kris Dunn     Bost~ PG          27 "6' 3~     6.3     205 Provid~ 5.01e6 Bost~
## 3 Carsen Edwar~ Bost~ PG          23 "5' 1~     5.11    200 Purdue  1.78e6 Bost~
## 4 Bruno Fernan~ Bost~ F           23 "6' 9~     6.9     240 Maryla~ 1.78e6 Bost~
## 5 Al Horford    Bost~ C           35 "6' 9~     6.9     240 Florida 2.7 e7 Bost~
## 6 Enes Kanter   Bost~ C           29 "6' 1~     6.1     250 Kentuc~ 1.67e6 Bost~
## # ... with 3 more variables: fPosition <fct>, fCollege <fct>,
## #   Salary.Dummy <dbl>
```

```
#check

library(car)
library(MASS)
boxcox(lm1, lambda = seq(-2,2, by=0.05))
```




```
summary(powerTransform(lm1))
```

```
## bcPower Transformation to Normality
##    Est Power Rounded Pwr Wald Lwr Bnd Wald Upr Bnd
## Y1   -0.2474       -0.33      -0.3494      -0.1454
##
## Likelihood ratio test that transformation parameter is equal to 0
##  (log transformation)
##                            LRT df       pval
## LR test, lambda = (0) 23.22731  1 1.4394e-06
##
## Likelihood ratio test that no transformation is needed
##                            LRT df       pval
## LR test, lambda = (1) 593.9788  1 < 2.22e-16
```

```
summary(lm1_log <- 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
## fTeamSacremento 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
```

```
AIC(lm1, lm4, lmst)
```

```
##       df      AIC
## lm1  160 15650.63
## lm4   12 15522.69
## lmst  12 15522.69
```

```
# 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)
)

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

```
## [1] 445
```

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

```
## [1] 311
```

```
#randomly sample 70% of the rows

train <- sample(1:n, 311)

data_train <- glm(fSalary.Dummy ~ nTeam+nPosition+nCollege+Age+Height_i+Weight,
                  family=binomial, subset = train, data=ap_tibble)

summary(data_train)
```

```
##
## Call:
## glm(formula = fSalary.Dummy ~ nTeam + nPosition + nCollege +
##     Age + Height_i + Weight, family = binomial, data = ap_tibble,
##     subset = train)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.8316  -0.8619  -0.6289   1.1227   2.1530
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -0.983282   2.938567  -0.335  0.73792
## nTeam        0.003829   0.014741   0.260  0.79506
## nPosition    0.133861   0.083609   1.601  0.10937
## nCollege    -0.002080   0.003997  -0.520  0.60274
## Age          0.145098   0.029809   4.868 1.13e-06 ***
```

```
## Height_i    -1.213449   0.452664  -2.681  0.00735 **
## Weight       0.017791   0.007394   2.406  0.01611 *
## ---
## 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: 363.03  on 304  degrees of freedom
## AIC: 377.03
##
## Number of Fisher Scoring iterations: 4
```

```
library(mlbench)
tn <- ap_tibble[train,]
test <- ap_tibble[-train,]

summary(glmFit <- train(fSalary.Dummy ~ nTeam+nPosition+nCollege+Age
                        +Height_i+Weight,data=ap_tibble, method="glmStepAIC"))
```

```
## Start:  AIC=546.19
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   532.19 544.19
## - nTeam      1   532.72 544.72
## - nCollege   1   532.89 544.89
## - Weight     1   532.94 544.94
## <none>           532.19 546.19
## - Height_i   1   534.31 546.31
## - Age        1   572.98 584.98
##
## Step:  AIC=544.19
## .outcome ~ nTeam + nCollege + Age + Height_i + Weight
##
##            Df Deviance    AIC
## - nTeam     1   532.72 542.72
## - nCollege  1   532.92 542.92
## - Weight    1   533.38 543.38
## <none>          532.19 544.19
## - Height_i  1   534.35 544.35
## - Age       1   572.98 582.98
##
## Step:  AIC=542.72
## .outcome ~ nCollege + Age + Height_i + Weight
##
##            Df Deviance    AIC
## - nCollege  1   533.35 541.35
## - Weight    1   533.97 541.97
## <none>          532.72 542.72
## - Height_i  1   534.77 542.77
## - Age       1   573.18 581.18
##
## Step:  AIC=541.35
## .outcome ~ Age + Height_i + Weight
```

```
##
##             Df Deviance    AIC
## - Weight     1   534.72 540.72
## <none>           533.35 541.35
## - Height_i   1   535.46 541.46
## - Age        1   574.07 580.07
##
## Step:  AIC=540.72
## .outcome ~ Age + Height_i
##
##             Df Deviance    AIC
## - Height_i   1   536.03 540.03
## <none>           534.72 540.72
## - Age        1   581.06 585.06
##
## Step:  AIC=540.03
## .outcome ~ Age
##
##        Df Deviance    AIC
## <none>      536.03 540.03
## - Age   1   582.46 584.46
## Start:  AIC=510.01
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   496.27 508.27
## - nTeam      1   496.98 508.98
## <none>           496.01 510.01
## - Weight     1   504.46 516.46
## - nPosition  1   504.57 516.57
## - Height_i   1   509.77 521.77
## - Age        1   554.78 566.78
##
## Step:  AIC=508.27
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   497.22 507.22
## <none>           496.27 508.27
## - Weight     1   504.58 514.58
## - nPosition  1   504.72 514.72
## - Height_i   1   510.16 520.16
## - Age        1   556.24 566.24
##
## Step:  AIC=507.22
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           497.22 507.22
## - Weight     1   506.19 514.19
## - nPosition  1   506.29 514.29
## - Height_i   1   511.45 519.45
## - Age        1   557.36 565.36
## Start:  AIC=546.05
```

```
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   532.14 544.14
## - nTeam      1   532.18 544.18
## <none>           532.05 546.05
## - nPosition  1   534.09 546.09
## - Weight     1   537.26 549.26
## - Height_i   1   540.32 552.32
## - Age        1   556.07 568.07
##
## Step:  AIC=544.14
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   532.29 542.29
## <none>           532.14 544.14
## - nPosition  1   534.36 544.36
## - Weight     1   537.80 547.80
## - Height_i   1   540.64 550.64
## - Age        1   556.09 566.09
##
## Step:  AIC=542.29
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           532.29 542.29
## - nPosition  1   534.61 542.61
## - Weight     1   537.95 545.95
## - Height_i   1   540.79 548.79
## - Age        1   556.33 564.33
## Start:  AIC=539.32
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   525.43 537.43
## - nCollege   1   526.12 538.12
## - nPosition  1   526.21 538.21
## <none>           525.32 539.32
## - Weight     1   528.73 540.73
## - Height_i   1   530.83 542.83
## - Age        1   547.04 559.04
##
## Step:  AIC=537.43
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   526.24 536.24
## - nPosition  1   526.45 536.45
## <none>           525.43 537.43
## - Weight     1   529.09 539.09
## - Height_i   1   530.89 540.89
## - Age        1   547.11 557.11
##
```

```
## Step:  AIC=536.24
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   527.17 535.17
## <none>           526.24 536.24
## - Weight     1   529.65 537.65
## - Height_i   1   531.41 539.41
## - Age        1   548.73 556.73
##
## Step:  AIC=535.17
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          527.17 535.17
## - Weight    1   529.75 535.75
## - Height_i  1   531.85 537.85
## - Age       1   549.37 555.37
## Start:  AIC=555.48
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   541.50 553.50
## - Height_i   1   541.63 553.63
## - nCollege   1   541.91 553.91
## <none>           541.48 555.48
## - nPosition  1   545.23 557.23
## - Weight     1   552.98 564.98
## - Age        1   569.45 581.45
##
## Step:  AIC=553.5
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Height_i   1   541.64 551.64
## - nCollege   1   541.91 551.91
## <none>           541.50 553.50
## - nPosition  1   545.29 555.29
## - Weight     1   553.14 563.14
## - Age        1   569.46 579.46
##
## Step:  AIC=551.64
## .outcome ~ nPosition + nCollege + Age + Weight
##
##             Df Deviance    AIC
## - nCollege   1   542.00 550.00
## <none>           541.64 551.64
## - nPosition  1   545.29 553.29
## - Weight     1   554.50 562.50
## - Age        1   571.13 579.13
##
## Step:  AIC=550
## .outcome ~ nPosition + Age + Weight
##
```

```
##             Df Deviance    AIC
## <none>           542.00 550.00
## - nPosition  1   545.50 551.50
## - Weight     1   554.60 560.60
## - Age        1   571.91 577.91
## Start:  AIC=534.5
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   520.81 532.81
## - nCollege   1   521.52 533.52
## - nPosition  1   521.79 533.79
## <none>           520.50 534.50
## - Weight     1   523.19 535.19
## - Height_i   1   534.02 546.02
## - Age        1   573.23 585.23
##
## Step:  AIC=532.81
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   521.83 531.83
## - nPosition  1   522.16 532.16
## <none>           520.81 532.81
## - Weight     1   523.48 533.48
## - Height_i   1   534.45 544.45
## - Age        1   573.51 583.51
##
## Step:  AIC=531.83
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   523.43 531.43
## <none>           521.83 531.83
## - Weight     1   524.88 532.88
## - Height_i   1   535.37 543.37
## - Age        1   573.98 581.98
##
## Step:  AIC=531.43
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## - Weight    1   524.90 530.90
## <none>          523.43 531.43
## - Height_i  1   535.97 541.97
## - Age       1   575.09 581.09
##
## Step:  AIC=530.9
## .outcome ~ Age + Height_i
##
##            Df Deviance    AIC
## <none>          524.90 530.90
## - Height_i  1   536.07 540.07
## - Age       1   578.81 582.81
```

```
## Start:  AIC=480.14
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   466.21 478.21
## - nCollege   1   466.83 478.83
## <none>           466.14 480.14
## - nPosition  1   470.60 482.60
## - Weight     1   485.82 497.82
## - Height_i   1   492.60 504.60
## - Age        1   526.39 538.39
##
## Step:  AIC=478.21
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   466.92 476.92
## <none>           466.21 478.21
## - nPosition  1   470.63 480.63
## - Weight     1   485.82 495.82
## - Height_i   1   492.77 502.77
## - Age        1   527.58 537.58
##
## Step:  AIC=476.92
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           466.92 476.92
## - nPosition  1   471.19 479.19
## - Weight     1   485.87 493.87
## - Height_i   1   492.79 500.79
## - Age        1   527.91 535.91
## Start:  AIC=522.18
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   508.63 520.63
## - nPosition  1   509.62 521.62
## - nCollege   1   509.74 521.74
## <none>           508.18 522.18
## - Height_i   1   515.33 527.33
## - Weight     1   517.74 529.74
## - Age        1   549.81 561.81
##
## Step:  AIC=520.63
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   510.07 520.07
## - nCollege   1   510.10 520.10
## <none>           508.63 520.63
## - Height_i   1   515.80 525.80
## - Weight     1   518.02 528.02
## - Age        1   550.55 560.55
```

```
##
## Step:  AIC=520.07
## .outcome ~ nCollege + Age + Height_i + Weight
##
##            Df Deviance    AIC
## - nCollege  1   511.68 519.68
## <none>          510.07 520.07
## - Height_i  1   515.94 523.94
## - Weight    1   519.14 527.14
## - Age       1   551.54 559.54
##
## Step:  AIC=519.68
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          511.68 519.68
## - Height_i  1   517.96 523.96
## - Weight    1   520.69 526.69
## - Age       1   551.90 557.90
## Start:  AIC=526.36
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   512.36 524.36
## - nCollege   1   513.37 525.37
## - nPosition  1   514.13 526.13
## <none>           512.36 526.36
## - Height_i   1   515.62 527.62
## - Weight     1   518.54 530.54
## - Age        1   577.44 589.44
##
## Step:  AIC=524.36
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   513.38 523.38
## - nPosition  1   514.13 524.13
## <none>           512.36 524.36
## - Height_i   1   515.65 525.65
## - Weight     1   518.57 528.57
## - Age        1   577.47 587.47
##
## Step:  AIC=523.38
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   515.34 523.34
## <none>           513.38 523.38
## - Height_i   1   516.80 524.80
## - Weight     1   519.97 527.97
## - Age        1   577.53 585.53
##
## Step:  AIC=523.34
## .outcome ~ Age + Height_i + Weight
```

```
##
##            Df Deviance    AIC
## <none>          515.34 523.34
## - Height_i  1   518.00 524.00
## - Weight    1   520.16 526.16
## - Age       1   577.76 583.76
## Start:  AIC=521.56
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   507.59 519.59
## - nTeam      1   507.73 519.73
## <none>           507.56 521.56
## - nPosition  1   510.07 522.07
## - Height_i   1   513.13 525.13
## - Weight     1   518.54 530.54
## - Age        1   551.90 563.90
##
## Step:  AIC=519.59
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   507.78 517.78
## <none>           507.59 519.59
## - nPosition  1   510.23 520.23
## - Height_i   1   513.23 523.23
## - Weight     1   519.13 529.13
## - Age        1   552.09 562.09
##
## Step:  AIC=517.78
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           507.78 517.78
## - nPosition  1   510.42 518.42
## - Height_i   1   513.34 521.34
## - Weight     1   519.36 527.36
## - Age        1   552.09 560.09
## Start:  AIC=529.89
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   517.20 529.20
## <none>           515.89 529.89
## - nTeam      1   518.73 530.73
## - Height_i   1   530.40 542.40
## - Weight     1   533.01 545.01
## - nPosition  1   534.30 546.30
## - Age        1   548.95 560.95
##
## Step:  AIC=529.2
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
```

```
## <none>           517.20 529.20
## - nTeam      1   519.95 529.95
## - Height_i   1   532.53 542.53
## - Weight     1   534.79 544.79
## - nPosition  1   535.95 545.95
## - Age        1   549.29 559.29
## Start:  AIC=532.16
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   518.32 530.32
## - Height_i   1   518.48 530.48
## - nCollege   1   519.23 531.23
## <none>           518.16 532.16
## - nPosition  1   520.80 532.80
## - Weight     1   523.37 535.37
## - Age        1   560.31 572.31
##
## Step:  AIC=530.32
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Height_i   1   518.63 528.63
## - nCollege   1   519.34 529.34
## <none>           518.32 530.32
## - nPosition  1   521.04 531.04
## - Weight     1   523.72 533.72
## - Age        1   560.32 570.32
##
## Step:  AIC=528.63
## .outcome ~ nPosition + nCollege + Age + Weight
##
##             Df Deviance    AIC
## - nCollege   1   519.77 527.77
## <none>           518.63 528.63
## - nPosition  1   521.12 529.12
## - Weight     1   523.81 531.81
## - Age        1   561.30 569.30
##
## Step:  AIC=527.77
## .outcome ~ nPosition + Age + Weight
##
##             Df Deviance    AIC
## <none>           519.77 527.77
## - nPosition  1   522.38 528.38
## - Weight     1   525.25 531.25
## - Age        1   561.80 567.80
## Start:  AIC=529.29
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   515.33 527.33
## - nCollege   1   516.53 528.53
## <none>           515.29 529.29
```

```
## - nPosition  1   520.46 532.46
## - Height_i   1   522.71 534.71
## - Weight     1   533.34 545.34
## - Age        1   565.45 577.45
##
## Step:  AIC=527.33
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   516.58 526.58
## <none>           515.33 527.33
## - nPosition  1   520.53 530.53
## - Height_i   1   522.79 532.79
## - Weight     1   533.54 543.54
## - Age        1   565.46 575.46
##
## Step:  AIC=526.58
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           516.58 526.58
## - nPosition  1   521.70 529.70
## - Height_i   1   523.57 531.57
## - Weight     1   534.09 542.09
## - Age        1   567.51 575.51
## Start:  AIC=519.36
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   505.58 517.58
## - nTeam      1   506.15 518.15
## <none>           505.36 519.36
## - Weight     1   514.07 526.07
## - nPosition  1   514.53 526.53
## - Height_i   1   524.00 536.00
## - Age        1   548.40 560.40
##
## Step:  AIC=517.58
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   506.33 516.33
## <none>           505.58 517.58
## - Weight     1   514.18 524.18
## - nPosition  1   514.69 524.69
## - Height_i   1   524.00 534.00
## - Age        1   549.14 559.14
##
## Step:  AIC=516.33
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           506.33 516.33
## - Weight     1   514.91 522.91
```

```
## - nPosition  1   515.03 523.03
## - Height_i   1   524.40 532.40
## - Age        1   549.20 557.20
## Start:  AIC=547.09
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Height_i   1   533.37 545.37
## - nCollege   1   533.69 545.69
## - nPosition  1   533.94 545.94
## - nTeam      1   534.92 546.92
## <none>           533.09 547.09
## - Weight     1   542.62 554.62
## - Age        1   577.59 589.59
##
## Step:  AIC=545.37
## .outcome ~ nTeam + nPosition + nCollege + Age + Weight
##
##             Df Deviance    AIC
## - nPosition  1   534.04 544.04
## - nCollege   1   534.07 544.07
## - nTeam      1   535.05 545.05
## <none>           533.37 545.37
## - Weight     1   542.92 552.92
## - Age        1   579.03 589.03
##
## Step:  AIC=544.04
## .outcome ~ nTeam + nCollege + Age + Weight
##
##            Df Deviance    AIC
## - nCollege  1   534.93 542.93
## - nTeam     1   535.70 543.70
## <none>          534.04 544.04
## - Weight    1   545.45 553.45
## - Age       1   579.70 587.70
##
## Step:  AIC=542.93
## .outcome ~ nTeam + Age + Weight
##
##          Df Deviance    AIC
## - nTeam   1   536.81 542.81
## <none>        534.93 542.93
## - Weight  1   546.61 552.61
## - Age     1   579.89 585.89
##
## Step:  AIC=542.81
## .outcome ~ Age + Weight
##
##          Df Deviance    AIC
## <none>        536.81 542.81
## - Weight  1   549.13 553.13
## - Age     1   581.26 585.26
## Start:  AIC=527.84
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
```

```
##
##             Df Deviance    AIC
## - nCollege   1   514.67 526.67
## - nTeam      1   514.71 526.71
## <none>           513.84 527.84
## - nPosition  1   518.01 530.01
## - Weight     1   520.59 532.59
## - Height_i   1   520.64 532.64
## - Age        1   558.77 570.77
##
## Step:  AIC=526.67
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   515.68 525.68
## <none>           514.67 526.67
## - nPosition  1   519.28 529.28
## - Weight     1   521.90 531.90
## - Height_i   1   522.36 532.36
## - Age        1   558.91 568.91
##
## Step:  AIC=525.68
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           515.68 525.68
## - nPosition  1   520.01 528.01
## - Weight     1   522.80 530.80
## - Height_i   1   522.99 530.99
## - Age        1   559.20 567.20
## Start:  AIC=526.81
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   512.81 524.81
## - nCollege   1   512.82 524.82
## - nPosition  1   514.02 526.02
## <none>           512.81 526.81
## - Weight     1   522.38 534.38
## - Age        1   527.69 539.69
## - Height_i   1   536.12 548.12
##
## Step:  AIC=524.81
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   512.82 522.82
## - nPosition  1   514.03 524.03
## <none>           512.81 524.81
## - Weight     1   522.39 532.39
## - Age        1   527.71 537.71
## - Height_i   1   536.17 546.17
##
## Step:  AIC=522.82
```

```
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   514.04 522.04
## <none>           512.82 522.82
## - Weight     1   522.53 530.53
## - Age        1   527.87 535.87
## - Height_i   1   536.20 544.20
##
## Step:  AIC=522.04
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          514.04 522.04
## - Weight    1   523.53 529.53
## - Age       1   528.43 534.43
## - Height_i  1   536.26 542.26
## Start:  AIC=532.45
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   518.53 530.53
## - nTeam      1   519.60 531.60
## <none>           518.45 532.45
## - nPosition  1   524.57 536.57
## - Height_i   1   524.99 536.99
## - Weight     1   526.74 538.74
## - Age        1   561.46 573.46
##
## Step:  AIC=530.53
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   519.69 529.69
## <none>           518.53 530.53
## - nPosition  1   524.85 534.85
## - Height_i   1   525.31 535.31
## - Weight     1   527.19 537.19
## - Age        1   561.54 571.54
##
## Step:  AIC=529.69
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           519.69 529.69
## - Height_i   1   526.48 534.48
## - nPosition  1   526.60 534.60
## - Weight     1   528.64 536.64
## - Age        1   562.27 570.27
## Start:  AIC=519.62
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   505.64 517.64
```

```
## - nCollege   1   505.88 517.88
## <none>           505.62 519.62
## - Height_i   1   509.02 521.02
## - nPosition  1   516.94 528.94
## - Weight     1   519.62 531.62
## - Age        1   546.09 558.09
##
## Step:  AIC=517.64
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   505.91 515.91
## <none>           505.64 517.64
## - Height_i   1   509.05 519.05
## - nPosition  1   516.95 526.95
## - Weight     1   519.63 529.63
## - Age        1   546.77 556.77
##
## Step:  AIC=515.91
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           505.91 515.91
## - Height_i   1   509.42 517.42
## - nPosition  1   517.37 525.37
## - Weight     1   520.64 528.64
## - Age        1   546.79 554.79
## Start:  AIC=507.09
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Weight     1   493.17 505.17
## - nPosition  1   493.79 505.79
## - Height_i   1   493.79 505.79
## <none>           493.09 507.09
## - nCollege   1   496.79 508.79
## - nTeam      1   498.14 510.14
## - Age        1   544.37 556.37
##
## Step:  AIC=505.17
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i
##
##             Df Deviance    AIC
## - Height_i   1   493.79 503.79
## <none>           493.17 505.17
## - nPosition  1   495.20 505.20
## - nCollege   1   496.79 506.79
## - nTeam      1   498.19 508.19
## - Age        1   546.67 556.67
##
## Step:  AIC=503.79
## .outcome ~ nTeam + nPosition + nCollege + Age
##
##             Df Deviance    AIC
```

```
## - nPosition  1   495.77 503.77
## <none>           493.79 503.79
## - nCollege   1   497.31 505.31
## - nTeam      1   498.48 506.48
## - Age        1   547.68 555.68
##
## Step:  AIC=503.77
## .outcome ~ nTeam + nCollege + Age
##
##            Df Deviance    AIC
## <none>          495.77 503.77
## - nCollege  1   499.54 505.54
## - nTeam     1   500.10 506.10
## - Age       1   549.47 555.47
## Start:  AIC=538.84
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   525.52 537.52
## - Weight     1   525.91 537.91
## - nPosition  1   526.19 538.19
## <none>           524.84 538.84
## - nCollege   1   526.96 538.96
## - Height_i   1   535.92 547.92
## - Age        1   554.34 566.34
##
## Step:  AIC=537.52
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Weight     1   526.59 536.59
## - nPosition  1   526.86 536.86
## - nCollege   1   527.50 537.50
## <none>           525.52 537.52
## - Height_i   1   536.44 546.44
## - Age        1   554.98 564.98
##
## Step:  AIC=536.59
## .outcome ~ nPosition + nCollege + Age + Height_i
##
##             Df Deviance    AIC
## - nPosition  1   526.99 534.99
## <none>           526.59 536.59
## - nCollege   1   528.96 536.96
## - Height_i   1   536.52 544.52
## - Age        1   556.78 564.78
##
## Step:  AIC=534.99
## .outcome ~ nCollege + Age + Height_i
##
##            Df Deviance    AIC
## <none>          526.99 534.99
## - nCollege  1   529.31 535.31
## - Height_i  1   537.64 543.64
```

```
## - Age       1   556.80 562.80
## Start:  AIC=490.42
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   476.55 488.55
## - nCollege   1   477.65 489.65
## - nPosition  1   478.09 490.09
## <none>           476.42 490.42
## - Height_i   1   487.17 499.17
## - Weight     1   487.34 499.34
## - Age        1   522.40 534.40
##
## Step:  AIC=488.55
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   477.81 487.81
## - nPosition  1   478.36 488.36
## <none>           476.55 488.55
## - Height_i   1   487.21 497.21
## - Weight     1   487.63 497.63
## - Age        1   522.41 532.41
##
## Step:  AIC=487.81
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   479.61 487.61
## <none>           477.81 487.81
## - Height_i   1   488.08 496.08
## - Weight     1   488.69 496.69
## - Age        1   523.86 531.86
##
## Step:  AIC=487.61
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          479.61 487.61
## - Height_i  1   489.11 495.11
## - Weight    1   489.68 495.68
## - Age       1   524.49 530.49
## Start:  AIC=511.87
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   497.90 509.90
## - Height_i   1   498.65 510.65
## <none>           497.87 511.87
## - nTeam      1   499.95 511.95
## - nPosition  1   510.98 522.98
## - Weight     1   513.55 525.55
## - Age        1   545.92 557.92
##
```

```
## Step:  AIC=509.9
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Height_i   1   498.67 508.67
## <none>           497.90 509.90
## - nTeam      1   499.98 509.98
## - nPosition  1   511.01 521.01
## - Weight     1   513.64 523.64
## - Age        1   546.03 556.03
##
## Step:  AIC=508.67
## .outcome ~ nTeam + nPosition + Age + Weight
##
##             Df Deviance    AIC
## <none>           498.67 508.67
## - nTeam      1   500.67 508.67
## - nPosition  1   511.03 519.03
## - Weight     1   514.09 522.09
## - Age        1   547.82 555.82
## Start:  AIC=560.53
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   547.17 559.17
## - nPosition  1   547.34 559.34
## <none>           546.53 560.53
## - nTeam      1   549.32 561.32
## - Weight     1   550.05 562.05
## - Height_i   1   554.89 566.89
## - Age        1   569.62 581.62
##
## Step:  AIC=559.17
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   547.82 557.82
## <none>           547.17 559.17
## - nTeam      1   549.95 559.95
## - Weight     1   550.30 560.30
## - Height_i   1   555.33 565.33
## - Age        1   570.73 580.73
##
## Step:  AIC=557.82
## .outcome ~ nTeam + Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          547.82 557.82
## - Weight    1   550.42 558.42
## - nTeam     1   550.84 558.84
## - Height_i  1   555.56 563.56
## - Age       1   571.42 579.42
## Start:  AIC=531.56
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
```

```
##
##             Df Deviance    AIC
## - nTeam      1   517.56 529.56
## - nCollege   1   517.68 529.68
## <none>           517.56 531.56
## - nPosition  1   525.87 537.87
## - Weight     1   529.96 541.96
## - Height_i   1   531.84 543.84
## - Age        1   566.85 578.85
##
## Step:  AIC=529.56
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   517.68 527.68
## <none>           517.56 529.56
## - nPosition  1   525.87 535.87
## - Weight     1   529.96 539.96
## - Height_i   1   531.84 541.84
## - Age        1   567.58 577.58
##
## Step:  AIC=527.68
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           517.68 527.68
## - nPosition  1   525.92 533.92
## - Weight     1   530.17 538.17
## - Height_i   1   532.21 540.21
## - Age        1   567.72 575.72
## Start:  AIC=535.17
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   521.17 533.17
## - nTeam      1   521.61 533.61
## <none>           521.17 535.17
## - nPosition  1   525.35 537.35
## - Height_i   1   526.51 538.51
## - Weight     1   527.96 539.96
## - Age        1   562.31 574.31
##
## Step:  AIC=533.17
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   521.62 531.62
## <none>           521.17 533.17
## - nPosition  1   525.41 535.41
## - Height_i   1   526.56 536.56
## - Weight     1   528.08 538.08
## - Age        1   562.45 572.45
##
## Step:  AIC=531.62
```

```
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           521.62 531.62
## - nPosition  1   525.86 533.86
## - Height_i   1   526.90 534.90
## - Weight     1   528.62 536.62
## - Age        1   562.65 570.65
```

```
##
## Call:
## NULL
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.8917  -0.8587  -0.6293   1.1236   2.1465
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -3.488752   2.432577  -1.434  0.15152
## nPosition    0.140870   0.069198   2.036  0.04178 *
## Age          0.154183   0.025267   6.102 1.05e-09 ***
## Height_i    -0.809923   0.355835  -2.276  0.02284 *
## Weight       0.015820   0.006056   2.612  0.00899 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 576.54  on 444  degrees of freedom
## Residual deviance: 521.62  on 440  degrees of freedom
## AIC: 531.62
##
## Number of Fisher Scoring iterations: 4
```

```
confusionMatrix(glmFit)
```

```
## Bootstrapped (25 reps) Confusion Matrix
##
## (entries are percentual average cell counts across resamples)
##
##           Reference
## Prediction    0    1
##          0 55.5 23.9
##          1  9.6 11.1
##
##  Accuracy (average) : 0.6657
```

```
library(mlbench)
# 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)
```

```
)

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

```
## [1] 445
```

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

```
## [1] 311
```

```
#randomly sample 70% of the rows

train <- sample(1:n, 311)
summary(glmFit <- train(fSalary.Dummy ~ nTeam+nPosition+nCollege+Age
                        +Height_i+Weight, data=ap_tibble, method="glmStepAIC"))
```

```
## Start:  AIC=546.19
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   532.19 544.19
## - nTeam      1   532.72 544.72
## - nCollege   1   532.89 544.89
## - Weight     1   532.94 544.94
## <none>           532.19 546.19
## - Height_i   1   534.31 546.31
## - Age        1   572.98 584.98
##
## Step:  AIC=544.19
## .outcome ~ nTeam + nCollege + Age + Height_i + Weight
##
##            Df Deviance    AIC
## - nTeam     1   532.72 542.72
## - nCollege  1   532.92 542.92
## - Weight    1   533.38 543.38
## <none>          532.19 544.19
## - Height_i  1   534.35 544.35
## - Age       1   572.98 582.98
##
## Step:  AIC=542.72
## .outcome ~ nCollege + Age + Height_i + Weight
##
##            Df Deviance    AIC
## - nCollege  1   533.35 541.35
## - Weight    1   533.97 541.97
## <none>          532.72 542.72
## - Height_i  1   534.77 542.77
## - Age       1   573.18 581.18
##
## Step:  AIC=541.35
## .outcome ~ Age + Height_i + Weight
##
```

```
##             Df Deviance    AIC
## - Weight     1   534.72 540.72
## <none>           533.35 541.35
## - Height_i   1   535.46 541.46
## - Age        1   574.07 580.07
##
## Step:  AIC=540.72
## .outcome ~ Age + Height_i
##
##             Df Deviance    AIC
## - Height_i   1   536.03 540.03
## <none>           534.72 540.72
## - Age        1   581.06 585.06
##
## Step:  AIC=540.03
## .outcome ~ Age
##
##        Df Deviance    AIC
## <none>      536.03 540.03
## - Age   1   582.46 584.46
## Start:  AIC=510.01
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   496.27 508.27
## - nTeam      1   496.98 508.98
## <none>           496.01 510.01
## - Weight     1   504.46 516.46
## - nPosition  1   504.57 516.57
## - Height_i   1   509.77 521.77
## - Age        1   554.78 566.78
##
## Step:  AIC=508.27
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   497.22 507.22
## <none>           496.27 508.27
## - Weight     1   504.58 514.58
## - nPosition  1   504.72 514.72
## - Height_i   1   510.16 520.16
## - Age        1   556.24 566.24
##
## Step:  AIC=507.22
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           497.22 507.22
## - Weight     1   506.19 514.19
## - nPosition  1   506.29 514.29
## - Height_i   1   511.45 519.45
## - Age        1   557.36 565.36
## Start:  AIC=546.05
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
```

```
##
##             Df Deviance    AIC
## - nCollege   1   532.14 544.14
## - nTeam      1   532.18 544.18
## <none>           532.05 546.05
## - nPosition  1   534.09 546.09
## - Weight     1   537.26 549.26
## - Height_i   1   540.32 552.32
## - Age        1   556.07 568.07
##
## Step:  AIC=544.14
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   532.29 542.29
## <none>           532.14 544.14
## - nPosition  1   534.36 544.36
## - Weight     1   537.80 547.80
## - Height_i   1   540.64 550.64
## - Age        1   556.09 566.09
##
## Step:  AIC=542.29
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           532.29 542.29
## - nPosition  1   534.61 542.61
## - Weight     1   537.95 545.95
## - Height_i   1   540.79 548.79
## - Age        1   556.33 564.33
## Start:  AIC=539.32
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   525.43 537.43
## - nCollege   1   526.12 538.12
## - nPosition  1   526.21 538.21
## <none>           525.32 539.32
## - Weight     1   528.73 540.73
## - Height_i   1   530.83 542.83
## - Age        1   547.04 559.04
##
## Step:  AIC=537.43
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   526.24 536.24
## - nPosition  1   526.45 536.45
## <none>           525.43 537.43
## - Weight     1   529.09 539.09
## - Height_i   1   530.89 540.89
## - Age        1   547.11 557.11
##
## Step:  AIC=536.24
```

```
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   527.17 535.17
## <none>           526.24 536.24
## - Weight     1   529.65 537.65
## - Height_i   1   531.41 539.41
## - Age        1   548.73 556.73
##
## Step:  AIC=535.17
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          527.17 535.17
## - Weight    1   529.75 535.75
## - Height_i  1   531.85 537.85
## - Age       1   549.37 555.37
## Start:  AIC=555.48
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   541.50 553.50
## - Height_i   1   541.63 553.63
## - nCollege   1   541.91 553.91
## <none>           541.48 555.48
## - nPosition  1   545.23 557.23
## - Weight     1   552.98 564.98
## - Age        1   569.45 581.45
##
## Step:  AIC=553.5
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Height_i   1   541.64 551.64
## - nCollege   1   541.91 551.91
## <none>           541.50 553.50
## - nPosition  1   545.29 555.29
## - Weight     1   553.14 563.14
## - Age        1   569.46 579.46
##
## Step:  AIC=551.64
## .outcome ~ nPosition + nCollege + Age + Weight
##
##             Df Deviance    AIC
## - nCollege   1   542.00 550.00
## <none>           541.64 551.64
## - nPosition  1   545.29 553.29
## - Weight     1   554.50 562.50
## - Age        1   571.13 579.13
##
## Step:  AIC=550
## .outcome ~ nPosition + Age + Weight
##
##             Df Deviance    AIC
```

```
## <none>           542.00 550.00
## - nPosition  1   545.50 551.50
## - Weight     1   554.60 560.60
## - Age        1   571.91 577.91
## Start:  AIC=534.5
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   520.81 532.81
## - nCollege   1   521.52 533.52
## - nPosition  1   521.79 533.79
## <none>           520.50 534.50
## - Weight     1   523.19 535.19
## - Height_i   1   534.02 546.02
## - Age        1   573.23 585.23
##
## Step:  AIC=532.81
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   521.83 531.83
## - nPosition  1   522.16 532.16
## <none>           520.81 532.81
## - Weight     1   523.48 533.48
## - Height_i   1   534.45 544.45
## - Age        1   573.51 583.51
##
## Step:  AIC=531.83
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   523.43 531.43
## <none>           521.83 531.83
## - Weight     1   524.88 532.88
## - Height_i   1   535.37 543.37
## - Age        1   573.98 581.98
##
## Step:  AIC=531.43
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## - Weight    1   524.90 530.90
## <none>          523.43 531.43
## - Height_i  1   535.97 541.97
## - Age       1   575.09 581.09
##
## Step:  AIC=530.9
## .outcome ~ Age + Height_i
##
##            Df Deviance    AIC
## <none>          524.90 530.90
## - Height_i  1   536.07 540.07
## - Age       1   578.81 582.81
## Start:  AIC=480.14
```

```
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   466.21 478.21
## - nCollege   1   466.83 478.83
## <none>           466.14 480.14
## - nPosition  1   470.60 482.60
## - Weight     1   485.82 497.82
## - Height_i   1   492.60 504.60
## - Age        1   526.39 538.39
##
## Step:  AIC=478.21
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   466.92 476.92
## <none>           466.21 478.21
## - nPosition  1   470.63 480.63
## - Weight     1   485.82 495.82
## - Height_i   1   492.77 502.77
## - Age        1   527.58 537.58
##
## Step:  AIC=476.92
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           466.92 476.92
## - nPosition  1   471.19 479.19
## - Weight     1   485.87 493.87
## - Height_i   1   492.79 500.79
## - Age        1   527.91 535.91
## Start:  AIC=522.18
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   508.63 520.63
## - nPosition  1   509.62 521.62
## - nCollege   1   509.74 521.74
## <none>           508.18 522.18
## - Height_i   1   515.33 527.33
## - Weight     1   517.74 529.74
## - Age        1   549.81 561.81
##
## Step:  AIC=520.63
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   510.07 520.07
## - nCollege   1   510.10 520.10
## <none>           508.63 520.63
## - Height_i   1   515.80 525.80
## - Weight     1   518.02 528.02
## - Age        1   550.55 560.55
##
```

```
## Step:  AIC=520.07
## .outcome ~ nCollege + Age + Height_i + Weight
##
##            Df Deviance    AIC
## - nCollege  1   511.68 519.68
## <none>          510.07 520.07
## - Height_i  1   515.94 523.94
## - Weight    1   519.14 527.14
## - Age       1   551.54 559.54
##
## Step:  AIC=519.68
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          511.68 519.68
## - Height_i  1   517.96 523.96
## - Weight    1   520.69 526.69
## - Age       1   551.90 557.90
## Start:  AIC=526.36
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   512.36 524.36
## - nCollege   1   513.37 525.37
## - nPosition  1   514.13 526.13
## <none>           512.36 526.36
## - Height_i   1   515.62 527.62
## - Weight     1   518.54 530.54
## - Age        1   577.44 589.44
##
## Step:  AIC=524.36
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   513.38 523.38
## - nPosition  1   514.13 524.13
## <none>           512.36 524.36
## - Height_i   1   515.65 525.65
## - Weight     1   518.57 528.57
## - Age        1   577.47 587.47
##
## Step:  AIC=523.38
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   515.34 523.34
## <none>           513.38 523.38
## - Height_i   1   516.80 524.80
## - Weight     1   519.97 527.97
## - Age        1   577.53 585.53
##
## Step:  AIC=523.34
## .outcome ~ Age + Height_i + Weight
##
```

```
##            Df Deviance    AIC
## <none>          515.34 523.34
## - Height_i  1   518.00 524.00
## - Weight    1   520.16 526.16
## - Age       1   577.76 583.76
## Start:  AIC=521.56
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   507.59 519.59
## - nTeam      1   507.73 519.73
## <none>           507.56 521.56
## - nPosition  1   510.07 522.07
## - Height_i   1   513.13 525.13
## - Weight     1   518.54 530.54
## - Age        1   551.90 563.90
##
## Step:  AIC=519.59
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   507.78 517.78
## <none>           507.59 519.59
## - nPosition  1   510.23 520.23
## - Height_i   1   513.23 523.23
## - Weight     1   519.13 529.13
## - Age        1   552.09 562.09
##
## Step:  AIC=517.78
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           507.78 517.78
## - nPosition  1   510.42 518.42
## - Height_i   1   513.34 521.34
## - Weight     1   519.36 527.36
## - Age        1   552.09 560.09
## Start:  AIC=529.89
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   517.20 529.20
## <none>           515.89 529.89
## - nTeam      1   518.73 530.73
## - Height_i   1   530.40 542.40
## - Weight     1   533.01 545.01
## - nPosition  1   534.30 546.30
## - Age        1   548.95 560.95
##
## Step:  AIC=529.2
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           517.20 529.20
```

```
## - nTeam      1   519.95 529.95
## - Height_i   1   532.53 542.53
## - Weight     1   534.79 544.79
## - nPosition  1   535.95 545.95
## - Age        1   549.29 559.29
## Start:  AIC=532.16
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   518.32 530.32
## - Height_i   1   518.48 530.48
## - nCollege   1   519.23 531.23
## <none>           518.16 532.16
## - nPosition  1   520.80 532.80
## - Weight     1   523.37 535.37
## - Age        1   560.31 572.31
##
## Step:  AIC=530.32
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Height_i   1   518.63 528.63
## - nCollege   1   519.34 529.34
## <none>           518.32 530.32
## - nPosition  1   521.04 531.04
## - Weight     1   523.72 533.72
## - Age        1   560.32 570.32
##
## Step:  AIC=528.63
## .outcome ~ nPosition + nCollege + Age + Weight
##
##             Df Deviance    AIC
## - nCollege   1   519.77 527.77
## <none>           518.63 528.63
## - nPosition  1   521.12 529.12
## - Weight     1   523.81 531.81
## - Age        1   561.30 569.30
##
## Step:  AIC=527.77
## .outcome ~ nPosition + Age + Weight
##
##             Df Deviance    AIC
## <none>           519.77 527.77
## - nPosition  1   522.38 528.38
## - Weight     1   525.25 531.25
## - Age        1   561.80 567.80
## Start:  AIC=529.29
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   515.33 527.33
## - nCollege   1   516.53 528.53
## <none>           515.29 529.29
## - nPosition  1   520.46 532.46
```

```
## - Height_i   1   522.71 534.71
## - Weight     1   533.34 545.34
## - Age        1   565.45 577.45
##
## Step:  AIC=527.33
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   516.58 526.58
## <none>           515.33 527.33
## - nPosition  1   520.53 530.53
## - Height_i   1   522.79 532.79
## - Weight     1   533.54 543.54
## - Age        1   565.46 575.46
##
## Step:  AIC=526.58
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           516.58 526.58
## - nPosition  1   521.70 529.70
## - Height_i   1   523.57 531.57
## - Weight     1   534.09 542.09
## - Age        1   567.51 575.51
## Start:  AIC=519.36
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   505.58 517.58
## - nTeam      1   506.15 518.15
## <none>           505.36 519.36
## - Weight     1   514.07 526.07
## - nPosition  1   514.53 526.53
## - Height_i   1   524.00 536.00
## - Age        1   548.40 560.40
##
## Step:  AIC=517.58
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   506.33 516.33
## <none>           505.58 517.58
## - Weight     1   514.18 524.18
## - nPosition  1   514.69 524.69
## - Height_i   1   524.00 534.00
## - Age        1   549.14 559.14
##
## Step:  AIC=516.33
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           506.33 516.33
## - Weight     1   514.91 522.91
## - nPosition  1   515.03 523.03
```

```
## - Height_i   1   524.40 532.40
## - Age        1   549.20 557.20
## Start:  AIC=547.09
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Height_i   1   533.37 545.37
## - nCollege   1   533.69 545.69
## - nPosition  1   533.94 545.94
## - nTeam      1   534.92 546.92
## <none>           533.09 547.09
## - Weight     1   542.62 554.62
## - Age        1   577.59 589.59
##
## Step:  AIC=545.37
## .outcome ~ nTeam + nPosition + nCollege + Age + Weight
##
##             Df Deviance    AIC
## - nPosition  1   534.04 544.04
## - nCollege   1   534.07 544.07
## - nTeam      1   535.05 545.05
## <none>           533.37 545.37
## - Weight     1   542.92 552.92
## - Age        1   579.03 589.03
##
## Step:  AIC=544.04
## .outcome ~ nTeam + nCollege + Age + Weight
##
##            Df Deviance    AIC
## - nCollege  1   534.93 542.93
## - nTeam     1   535.70 543.70
## <none>          534.04 544.04
## - Weight    1   545.45 553.45
## - Age       1   579.70 587.70
##
## Step:  AIC=542.93
## .outcome ~ nTeam + Age + Weight
##
##          Df Deviance    AIC
## - nTeam   1   536.81 542.81
## <none>        534.93 542.93
## - Weight  1   546.61 552.61
## - Age     1   579.89 585.89
##
## Step:  AIC=542.81
## .outcome ~ Age + Weight
##
##          Df Deviance    AIC
## <none>        536.81 542.81
## - Weight  1   549.13 553.13
## - Age     1   581.26 585.26
## Start:  AIC=527.84
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
```

```
##             Df Deviance    AIC
## - nCollege   1   514.67 526.67
## - nTeam      1   514.71 526.71
## <none>           513.84 527.84
## - nPosition  1   518.01 530.01
## - Weight     1   520.59 532.59
## - Height_i   1   520.64 532.64
## - Age        1   558.77 570.77
##
## Step:  AIC=526.67
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   515.68 525.68
## <none>           514.67 526.67
## - nPosition  1   519.28 529.28
## - Weight     1   521.90 531.90
## - Height_i   1   522.36 532.36
## - Age        1   558.91 568.91
##
## Step:  AIC=525.68
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           515.68 525.68
## - nPosition  1   520.01 528.01
## - Weight     1   522.80 530.80
## - Height_i   1   522.99 530.99
## - Age        1   559.20 567.20
## Start:  AIC=526.81
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   512.81 524.81
## - nCollege   1   512.82 524.82
## - nPosition  1   514.02 526.02
## <none>           512.81 526.81
## - Weight     1   522.38 534.38
## - Age        1   527.69 539.69
## - Height_i   1   536.12 548.12
##
## Step:  AIC=524.81
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   512.82 522.82
## - nPosition  1   514.03 524.03
## <none>           512.81 524.81
## - Weight     1   522.39 532.39
## - Age        1   527.71 537.71
## - Height_i   1   536.17 546.17
##
## Step:  AIC=522.82
## .outcome ~ nPosition + Age + Height_i + Weight
```

```
##
##             Df Deviance    AIC
## - nPosition  1   514.04 522.04
## <none>           512.82 522.82
## - Weight     1   522.53 530.53
## - Age        1   527.87 535.87
## - Height_i   1   536.20 544.20
##
## Step:  AIC=522.04
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          514.04 522.04
## - Weight    1   523.53 529.53
## - Age       1   528.43 534.43
## - Height_i  1   536.26 542.26
## Start:  AIC=532.45
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   518.53 530.53
## - nTeam      1   519.60 531.60
## <none>           518.45 532.45
## - nPosition  1   524.57 536.57
## - Height_i   1   524.99 536.99
## - Weight     1   526.74 538.74
## - Age        1   561.46 573.46
##
## Step:  AIC=530.53
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   519.69 529.69
## <none>           518.53 530.53
## - nPosition  1   524.85 534.85
## - Height_i   1   525.31 535.31
## - Weight     1   527.19 537.19
## - Age        1   561.54 571.54
##
## Step:  AIC=529.69
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           519.69 529.69
## - Height_i   1   526.48 534.48
## - nPosition  1   526.60 534.60
## - Weight     1   528.64 536.64
## - Age        1   562.27 570.27
## Start:  AIC=519.62
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   505.64 517.64
## - nCollege   1   505.88 517.88
```

```
## <none>           505.62 519.62
## - Height_i   1   509.02 521.02
## - nPosition  1   516.94 528.94
## - Weight     1   519.62 531.62
## - Age        1   546.09 558.09
##
## Step:  AIC=517.64
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   505.91 515.91
## <none>           505.64 517.64
## - Height_i   1   509.05 519.05
## - nPosition  1   516.95 526.95
## - Weight     1   519.63 529.63
## - Age        1   546.77 556.77
##
## Step:  AIC=515.91
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           505.91 515.91
## - Height_i   1   509.42 517.42
## - nPosition  1   517.37 525.37
## - Weight     1   520.64 528.64
## - Age        1   546.79 554.79
## Start:  AIC=507.09
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Weight     1   493.17 505.17
## - nPosition  1   493.79 505.79
## - Height_i   1   493.79 505.79
## <none>           493.09 507.09
## - nCollege   1   496.79 508.79
## - nTeam      1   498.14 510.14
## - Age        1   544.37 556.37
##
## Step:  AIC=505.17
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i
##
##             Df Deviance    AIC
## - Height_i   1   493.79 503.79
## <none>           493.17 505.17
## - nPosition  1   495.20 505.20
## - nCollege   1   496.79 506.79
## - nTeam      1   498.19 508.19
## - Age        1   546.67 556.67
##
## Step:  AIC=503.79
## .outcome ~ nTeam + nPosition + nCollege + Age
##
##             Df Deviance    AIC
## - nPosition  1   495.77 503.77
```

```
## <none>           493.79 503.79
## - nCollege   1   497.31 505.31
## - nTeam      1   498.48 506.48
## - Age        1   547.68 555.68
##
## Step:  AIC=503.77
## .outcome ~ nTeam + nCollege + Age
##
##            Df Deviance    AIC
## <none>          495.77 503.77
## - nCollege  1   499.54 505.54
## - nTeam     1   500.10 506.10
## - Age       1   549.47 555.47
## Start:  AIC=538.84
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   525.52 537.52
## - Weight     1   525.91 537.91
## - nPosition  1   526.19 538.19
## <none>           524.84 538.84
## - nCollege   1   526.96 538.96
## - Height_i   1   535.92 547.92
## - Age        1   554.34 566.34
##
## Step:  AIC=537.52
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Weight     1   526.59 536.59
## - nPosition  1   526.86 536.86
## - nCollege   1   527.50 537.50
## <none>           525.52 537.52
## - Height_i   1   536.44 546.44
## - Age        1   554.98 564.98
##
## Step:  AIC=536.59
## .outcome ~ nPosition + nCollege + Age + Height_i
##
##             Df Deviance    AIC
## - nPosition  1   526.99 534.99
## <none>           526.59 536.59
## - nCollege   1   528.96 536.96
## - Height_i   1   536.52 544.52
## - Age        1   556.78 564.78
##
## Step:  AIC=534.99
## .outcome ~ nCollege + Age + Height_i
##
##            Df Deviance    AIC
## <none>          526.99 534.99
## - nCollege  1   529.31 535.31
## - Height_i  1   537.64 543.64
## - Age       1   556.80 562.80
```

```
## Start:  AIC=490.42
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   476.55 488.55
## - nCollege   1   477.65 489.65
## - nPosition  1   478.09 490.09
## <none>           476.42 490.42
## - Height_i   1   487.17 499.17
## - Weight     1   487.34 499.34
## - Age        1   522.40 534.40
##
## Step:  AIC=488.55
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   477.81 487.81
## - nPosition  1   478.36 488.36
## <none>           476.55 488.55
## - Height_i   1   487.21 497.21
## - Weight     1   487.63 497.63
## - Age        1   522.41 532.41
##
## Step:  AIC=487.81
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   479.61 487.61
## <none>           477.81 487.81
## - Height_i   1   488.08 496.08
## - Weight     1   488.69 496.69
## - Age        1   523.86 531.86
##
## Step:  AIC=487.61
## .outcome ~ Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          479.61 487.61
## - Height_i  1   489.11 495.11
## - Weight    1   489.68 495.68
## - Age       1   524.49 530.49
## Start:  AIC=511.87
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   497.90 509.90
## - Height_i   1   498.65 510.65
## <none>           497.87 511.87
## - nTeam      1   499.95 511.95
## - nPosition  1   510.98 522.98
## - Weight     1   513.55 525.55
## - Age        1   545.92 557.92
##
## Step:  AIC=509.9
```

```
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - Height_i   1   498.67 508.67
## <none>           497.90 509.90
## - nTeam      1   499.98 509.98
## - nPosition  1   511.01 521.01
## - Weight     1   513.64 523.64
## - Age        1   546.03 556.03
##
## Step:  AIC=508.67
## .outcome ~ nTeam + nPosition + Age + Weight
##
##             Df Deviance    AIC
## <none>           498.67 508.67
## - nTeam      1   500.67 508.67
## - nPosition  1   511.03 519.03
## - Weight     1   514.09 522.09
## - Age        1   547.82 555.82
## Start:  AIC=560.53
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   547.17 559.17
## - nPosition  1   547.34 559.34
## <none>           546.53 560.53
## - nTeam      1   549.32 561.32
## - Weight     1   550.05 562.05
## - Height_i   1   554.89 566.89
## - Age        1   569.62 581.62
##
## Step:  AIC=559.17
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nPosition  1   547.82 557.82
## <none>           547.17 559.17
## - nTeam      1   549.95 559.95
## - Weight     1   550.30 560.30
## - Height_i   1   555.33 565.33
## - Age        1   570.73 580.73
##
## Step:  AIC=557.82
## .outcome ~ nTeam + Age + Height_i + Weight
##
##            Df Deviance    AIC
## <none>          547.82 557.82
## - Weight    1   550.42 558.42
## - nTeam     1   550.84 558.84
## - Height_i  1   555.56 563.56
## - Age       1   571.42 579.42
## Start:  AIC=531.56
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
```

```
##             Df Deviance    AIC
## - nTeam      1   517.56 529.56
## - nCollege   1   517.68 529.68
## <none>           517.56 531.56
## - nPosition  1   525.87 537.87
## - Weight     1   529.96 541.96
## - Height_i   1   531.84 543.84
## - Age        1   566.85 578.85
##
## Step:  AIC=529.56
## .outcome ~ nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   517.68 527.68
## <none>           517.56 529.56
## - nPosition  1   525.87 535.87
## - Weight     1   529.96 539.96
## - Height_i   1   531.84 541.84
## - Age        1   567.58 577.58
##
## Step:  AIC=527.68
## .outcome ~ nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## <none>           517.68 527.68
## - nPosition  1   525.92 533.92
## - Weight     1   530.17 538.17
## - Height_i   1   532.21 540.21
## - Age        1   567.72 575.72
## Start:  AIC=535.17
## .outcome ~ nTeam + nPosition + nCollege + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nCollege   1   521.17 533.17
## - nTeam      1   521.61 533.61
## <none>           521.17 535.17
## - nPosition  1   525.35 537.35
## - Height_i   1   526.51 538.51
## - Weight     1   527.96 539.96
## - Age        1   562.31 574.31
##
## Step:  AIC=533.17
## .outcome ~ nTeam + nPosition + Age + Height_i + Weight
##
##             Df Deviance    AIC
## - nTeam      1   521.62 531.62
## <none>           521.17 533.17
## - nPosition  1   525.41 535.41
## - Height_i   1   526.56 536.56
## - Weight     1   528.08 538.08
## - Age        1   562.45 572.45
##
## Step:  AIC=531.62
## .outcome ~ nPosition + Age + Height_i + Weight
```

```
##
##             Df Deviance    AIC
## <none>           521.62 531.62
## - nPosition  1   525.86 533.86
## - Height_i   1   526.90 534.90
## - Weight     1   528.62 536.62
## - Age        1   562.65 570.65
```

```
##
## Call:
## NULL
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.8917  -0.8587  -0.6293   1.1236   2.1465
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -3.488752   2.432577  -1.434  0.15152
## nPosition    0.140870   0.069198   2.036  0.04178 *
## Age          0.154183   0.025267   6.102 1.05e-09 ***
## Height_i    -0.809923   0.355835  -2.276  0.02284 *
## Weight       0.015820   0.006056   2.612  0.00899 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 576.54  on 444  degrees of freedom
## Residual deviance: 521.62  on 440  degrees of freedom
## AIC: 531.62
##
## Number of Fisher Scoring iterations: 4
```

```
confusionMatrix(glmFit)
```

```
## Bootstrapped (25 reps) Confusion Matrix
##
## (entries are percentual average cell counts across resamples)
##
##           Reference
## Prediction    0    1
##          0 55.5 23.9
##          1  9.6 11.1
##
##  Accuracy (average) : 0.6657
```

```
summary(glmFit2 <- train(fSalary.Dummy ~ nTeam+nPosition+nCollege+poly(Age,3)
                         +Height_i+Weight, data=ap_tibble, method="glmStepAIC"))
```

```
## Start:  AIC=523.72
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   505.72 521.72
```

```
## - nPosition        1   506.24 522.24
## - nCollege         1   506.54 522.54
## - Weight           1   507.15 523.15
## <none>                 505.72 523.72
## - Height_i         1   509.81 525.81
## - `poly(Age, 3)3`  1   511.78 527.78
## - `poly(Age, 3)2`  1   522.48 538.48
## - `poly(Age, 3)1`  1   541.95 557.95
##
## Step:  AIC=521.72
## .outcome ~ nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nPosition        1   506.24 520.24
## - nCollege         1   506.55 520.55
## - Weight           1   507.16 521.16
## <none>                 505.72 521.72
## - Height_i         1   509.83 523.83
## - `poly(Age, 3)3`  1   511.81 525.81
## - `poly(Age, 3)2`  1   522.56 536.56
## - `poly(Age, 3)1`  1   541.95 555.95
##
## Step:  AIC=520.24
## .outcome ~ nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   507.13 519.13
## - Weight           1   507.19 519.19
## <none>                 506.24 520.24
## - Height_i         1   509.92 521.92
## - `poly(Age, 3)3`  1   512.50 524.50
## - `poly(Age, 3)2`  1   523.64 535.64
## - `poly(Age, 3)1`  1   542.63 554.63
##
## Step:  AIC=519.13
## .outcome ~ `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - Weight           1   508.16 518.16
## <none>                 507.13 519.13
## - Height_i         1   511.04 521.04
## - `poly(Age, 3)3`  1   513.52 523.52
## - `poly(Age, 3)2`  1   523.98 533.98
## - `poly(Age, 3)1`  1   542.91 552.91
##
## Step:  AIC=518.16
## .outcome ~ `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i
##
##                   Df Deviance    AIC
## <none>                 508.16 518.16
```

```
## - Height_i         1   511.24 519.24
## - `poly(Age, 3)3`  1   514.20 522.20
## - `poly(Age, 3)2`  1   525.48 533.48
## - `poly(Age, 3)1`  1   547.18 555.18
## Start:  AIC=474.57
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - Weight           1   456.57 472.57
## - nPosition        1   456.58 472.58
## - nCollege         1   456.67 472.67
## - Height_i         1   457.25 473.25
## - nTeam            1   457.94 473.94
## <none>                 456.57 474.57
## - `poly(Age, 3)3`  1   466.08 482.08
## - `poly(Age, 3)1`  1   487.24 503.24
## - `poly(Age, 3)2`  1   488.14 504.14
##
## Step:  AIC=472.57
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i
##
##                   Df Deviance    AIC
## - nPosition        1   456.60 470.60
## - nCollege         1   456.67 470.67
## - Height_i         1   457.31 471.31
## - nTeam            1   457.95 471.95
## <none>                 456.57 472.57
## - `poly(Age, 3)3`  1   466.08 480.08
## - `poly(Age, 3)1`  1   488.61 502.61
## - `poly(Age, 3)2`  1   488.62 502.62
##
## Step:  AIC=470.6
## .outcome ~ nTeam + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i
##
##                   Df Deviance    AIC
## - nCollege         1   456.70 468.70
## - Height_i         1   457.33 469.33
## - nTeam            1   457.96 469.96
## <none>                 456.60 470.60
## - `poly(Age, 3)3`  1   466.18 478.18
## - `poly(Age, 3)2`  1   488.70 500.70
## - `poly(Age, 3)1`  1   489.13 501.13
##
## Step:  AIC=468.7
## .outcome ~ nTeam + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i
##
##                   Df Deviance    AIC
## - Height_i         1   457.52 467.52
## - nTeam            1   458.05 468.05
## <none>                 456.70 468.70
```

```
## - `poly(Age, 3)3`  1   466.22 476.22
## - `poly(Age, 3)2`  1   489.04 499.04
## - `poly(Age, 3)1`  1   489.14 499.14
##
## Step:  AIC=467.52
## .outcome ~ nTeam + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3`
##
##                   Df Deviance    AIC
## - nTeam            1   458.97 466.97
## <none>                 457.52 467.52
## - `poly(Age, 3)3`  1   467.28 475.28
## - `poly(Age, 3)1`  1   491.01 499.01
## - `poly(Age, 3)2`  1   491.11 499.11
##
## Step:  AIC=466.97
## .outcome ~ `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3`
##
##                   Df Deviance    AIC
## <none>                 458.97 466.97
## - `poly(Age, 3)3`  1   469.54 475.54
## - `poly(Age, 3)2`  1   493.15 499.15
## - `poly(Age, 3)1`  1   493.34 499.34
## Start:  AIC=494.02
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   476.44 492.44
## - nCollege         1   476.76 492.76
## - Height_i         1   476.83 492.83
## <none>                 476.02 494.02
## - nPosition        1   480.18 496.18
## - Weight           1   480.60 496.60
## - `poly(Age, 3)1`  1   488.38 504.38
## - `poly(Age, 3)3`  1   495.03 511.03
## - `poly(Age, 3)2`  1   508.74 524.74
##
## Step:  AIC=492.44
## .outcome ~ nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   477.17 491.17
## - Height_i         1   477.30 491.30
## <none>                 476.44 492.44
## - nPosition        1   480.62 494.62
## - Weight           1   480.88 494.88
## - `poly(Age, 3)1`  1   488.99 502.99
## - `poly(Age, 3)3`  1   496.06 510.06
## - `poly(Age, 3)2`  1   508.84 522.84
##
## Step:  AIC=491.17
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
```

```
##
##                   Df Deviance    AIC
## - Height_i         1   478.16 490.16
## <none>                 477.17 491.17
## - nPosition        1   481.33 493.33
## - Weight           1   481.76 493.76
## - `poly(Age, 3)1`  1   489.33 501.33
## - `poly(Age, 3)3`  1   496.82 508.82
## - `poly(Age, 3)2`  1   509.26 521.26
##
## Step:  AIC=490.16
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Weight
##
##                   Df Deviance    AIC
## <none>                 478.16 490.16
## - nPosition        1   481.80 491.80
## - Weight           1   481.82 491.82
## - `poly(Age, 3)1`  1   490.86 500.86
## - `poly(Age, 3)3`  1   498.63 508.63
## - `poly(Age, 3)2`  1   512.67 522.67
## Start:  AIC=495.45
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   477.54 493.54
## - nTeam            1   478.46 494.46
## <none>                 477.45 495.45
## - `poly(Age, 3)3`  1   479.83 495.83
## - nPosition        1   479.84 495.84
## - Weight           1   487.61 503.61
## - `poly(Age, 3)1`  1   503.71 519.71
## - `poly(Age, 3)2`  1   503.82 519.82
## - Height_i         1   510.12 526.12
##
## Step:  AIC=493.54
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   478.52 492.52
## <none>                 477.54 493.54
## - `poly(Age, 3)3`  1   479.87 493.87
## - nPosition        1   479.91 493.91
## - Weight           1   487.61 501.61
## - `poly(Age, 3)2`  1   503.91 517.91
## - `poly(Age, 3)1`  1   504.34 518.34
## - Height_i         1   510.14 524.14
##
## Step:  AIC=492.52
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
```

```
##                   Df Deviance    AIC
## <none>                 478.52 492.52
## - `poly(Age, 3)3`  1   480.62 492.62
## - nPosition        1   480.82 492.82
## - Weight           1   488.89 500.89
## - `poly(Age, 3)2`  1   504.69 516.69
## - `poly(Age, 3)1`  1   505.79 517.79
## - Height_i         1   511.69 523.69
## Start:  AIC=505.04
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   487.06 503.06
## - nCollege         1   487.09 503.09
## - Height_i         1   488.56 504.56
## <none>                 487.04 505.04
## - `poly(Age, 3)3`  1   491.86 507.86
## - Weight           1   496.71 512.71
## - nPosition        1   498.76 514.76
## - `poly(Age, 3)1`  1   509.36 525.36
## - `poly(Age, 3)2`  1   517.69 533.69
##
## Step:  AIC=503.06
## .outcome ~ nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   487.10 501.10
## - Height_i         1   488.61 502.61
## <none>                 487.06 503.06
## - `poly(Age, 3)3`  1   491.90 505.90
## - Weight           1   496.72 510.72
## - nPosition        1   498.76 512.76
## - `poly(Age, 3)1`  1   509.43 523.43
## - `poly(Age, 3)2`  1   517.85 531.85
##
## Step:  AIC=501.1
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - Height_i         1   488.71 500.71
## <none>                 487.10 501.10
## - `poly(Age, 3)3`  1   491.99 503.99
## - Weight           1   497.22 509.22
## - nPosition        1   499.27 511.27
## - `poly(Age, 3)1`  1   509.44 521.44
## - `poly(Age, 3)2`  1   518.22 530.22
##
## Step:  AIC=500.71
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Weight
##
```

```
##                   Df Deviance    AIC
## <none>                 488.71 500.71
## - `poly(Age, 3)3`  1   493.50 503.50
## - Weight           1   497.26 507.26
## - nPosition        1   499.95 509.95
## - `poly(Age, 3)1`  1   511.13 521.13
## - `poly(Age, 3)2`  1   520.57 530.57
## Start:  AIC=498.97
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   481.22 497.22
## <none>                 480.97 498.97
## - nTeam            1   484.00 500.00
## - Height_i         1   487.79 503.79
## - nPosition        1   490.19 506.19
## - `poly(Age, 3)3`  1   497.81 513.81
## - `poly(Age, 3)2`  1   498.44 514.44
## - Weight           1   500.43 516.43
## - `poly(Age, 3)1`  1   505.15 521.15
##
## Step:  AIC=497.22
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 481.22 497.22
## - nTeam            1   484.22 498.22
## - Height_i         1   488.41 502.41
## - nPosition        1   491.02 505.02
## - `poly(Age, 3)3`  1   497.97 511.97
## - `poly(Age, 3)2`  1   498.58 512.58
## - Weight           1   501.52 515.52
## - `poly(Age, 3)1`  1   505.25 519.25
## Start:  AIC=510.74
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   492.95 508.95
## - nTeam            1   493.75 509.75
## <none>                 492.74 510.74
## - `poly(Age, 3)3`  1   497.15 513.15
## - Weight           1   498.18 514.18
## - Height_i         1   498.96 514.96
## - nPosition        1   499.62 515.62
## - `poly(Age, 3)2`  1   510.48 526.48
## - `poly(Age, 3)1`  1   513.57 529.57
##
## Step:  AIC=508.95
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
```

```
##                   Df Deviance    AIC
## - nTeam            1   493.95 507.95
## <none>                 492.95 508.95
## - `poly(Age, 3)3`  1   497.62 511.62
## - Weight           1   498.89 512.89
## - Height_i         1   499.34 513.34
## - nPosition        1   500.27 514.27
## - `poly(Age, 3)2`  1   510.75 524.75
## - `poly(Age, 3)1`  1   513.67 527.67
##
## Step:  AIC=507.95
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 493.95 507.95
## - `poly(Age, 3)3`  1   498.26 510.26
## - Weight           1   499.81 511.81
## - Height_i         1   499.93 511.93
## - nPosition        1   500.93 512.93
## - `poly(Age, 3)2`  1   512.58 524.58
## - `poly(Age, 3)1`  1   514.71 526.71
## Start:  AIC=519.68
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   501.68 517.68
## - nCollege         1   501.78 517.78
## - `poly(Age, 3)3`  1   502.97 518.97
## - nPosition        1   503.24 519.24
## <none>                 501.68 519.68
## - Weight           1   503.75 519.75
## - Height_i         1   506.28 522.28
## - `poly(Age, 3)2`  1   511.95 527.95
## - `poly(Age, 3)1`  1   545.12 561.12
##
## Step:  AIC=517.68
## .outcome ~ nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   501.78 515.78
## - `poly(Age, 3)3`  1   502.99 516.99
## - nPosition        1   503.25 517.25
## <none>                 501.68 517.68
## - Weight           1   503.76 517.76
## - Height_i         1   506.28 520.28
## - `poly(Age, 3)2`  1   511.95 525.95
## - `poly(Age, 3)1`  1   545.12 559.12
##
## Step:  AIC=515.78
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
```

```
##
##                   Df Deviance    AIC
## - `poly(Age, 3)3`  1   503.00 515.00
## - nPosition        1   503.30 515.30
## <none>                 501.78 515.78
## - Weight           1   503.79 515.79
## - Height_i         1   506.31 518.31
## - `poly(Age, 3)2`  1   511.96 523.96
## - `poly(Age, 3)1`  1   546.02 558.02
##
## Step:  AIC=515
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + Height_i +
##     Weight
##
##                   Df Deviance    AIC
## - nPosition        1   504.51 514.51
## <none>                 503.00 515.00
## - Weight           1   505.03 515.03
## - Height_i         1   507.77 517.77
## - `poly(Age, 3)2`  1   512.10 522.10
## - `poly(Age, 3)1`  1   558.42 568.42
##
## Step:  AIC=514.51
## .outcome ~ `poly(Age, 3)1` + `poly(Age, 3)2` + Height_i + Weight
##
##                   Df Deviance    AIC
## - Weight           1   505.20 513.20
## <none>                 504.51 514.51
## - Height_i         1   508.77 516.77
## - `poly(Age, 3)2`  1   514.05 522.05
## - `poly(Age, 3)1`  1   561.48 569.48
##
## Step:  AIC=513.2
## .outcome ~ `poly(Age, 3)1` + `poly(Age, 3)2` + Height_i
##
##                   Df Deviance    AIC
## <none>                 505.20 513.20
## - Height_i         1   508.89 514.89
## - `poly(Age, 3)2`  1   514.82 520.82
## - `poly(Age, 3)1`  1   564.73 570.73
## Start:  AIC=488.23
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   470.91 486.91
## - nPosition        1   471.04 487.04
## - Weight           1   471.48 487.48
## <none>                 470.23 488.23
## - nCollege         1   472.62 488.62
## - Height_i         1   473.42 489.42
## - `poly(Age, 3)3`  1   480.28 496.28
## - `poly(Age, 3)1`  1   484.43 500.43
## - `poly(Age, 3)2`  1   502.73 518.73
```

```
##
## Step:  AIC=486.91
## .outcome ~ nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nPosition        1   471.94 485.94
## - Weight           1   472.46 486.46
## <none>                 470.91 486.91
## - nCollege         1   473.48 487.48
## - Height_i         1   474.01 488.01
## - `poly(Age, 3)3`  1   480.70 494.70
## - `poly(Age, 3)1`  1   484.66 498.66
## - `poly(Age, 3)2`  1   504.96 518.96
##
## Step:  AIC=485.94
## .outcome ~ nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - Weight           1   472.50 484.50
## <none>                 471.94 485.94
## - Height_i         1   474.41 486.41
## - nCollege         1   474.83 486.83
## - `poly(Age, 3)3`  1   482.09 494.09
## - `poly(Age, 3)1`  1   485.46 497.46
## - `poly(Age, 3)2`  1   508.52 520.52
##
## Step:  AIC=484.5
## .outcome ~ nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i
##
##                   Df Deviance    AIC
## <none>                 472.50 484.50
## - Height_i         1   474.53 484.53
## - nCollege         1   475.56 485.56
## - `poly(Age, 3)3`  1   482.46 492.46
## - `poly(Age, 3)1`  1   486.40 496.40
## - `poly(Age, 3)2`  1   508.94 518.94
## Start:  AIC=514.49
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - Weight           1   496.51 512.51
## - nPosition        1   496.54 512.54
## - Height_i         1   497.24 513.24
## - nCollege         1   497.69 513.69
## <none>                 496.49 514.49
## - nTeam            1   501.91 517.91
## - `poly(Age, 3)3`  1   507.61 523.61
## - `poly(Age, 3)1`  1   516.67 532.67
## - `poly(Age, 3)2`  1   520.43 536.43
##
```

```
## Step:  AIC=512.51
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i
##
##                   Df Deviance    AIC
## - nPosition        1   496.66 510.66
## - Height_i         1   497.28 511.28
## - nCollege         1   497.69 511.69
## <none>                 496.51 512.51
## - nTeam            1   501.93 515.93
## - `poly(Age, 3)3`  1   507.63 521.63
## - `poly(Age, 3)1`  1   517.01 531.01
## - `poly(Age, 3)2`  1   520.78 534.78
##
## Step:  AIC=510.66
## .outcome ~ nTeam + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i
##
##                   Df Deviance    AIC
## - Height_i         1   497.38 509.38
## - nCollege         1   497.84 509.84
## <none>                 496.66 510.66
## - nTeam            1   502.14 514.14
## - `poly(Age, 3)3`  1   507.79 519.79
## - `poly(Age, 3)1`  1   518.00 530.00
## - `poly(Age, 3)2`  1   520.96 532.96
##
## Step:  AIC=509.38
## .outcome ~ nTeam + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3`
##
##                   Df Deviance    AIC
## - nCollege         1   498.62 508.62
## <none>                 497.38 509.38
## - nTeam            1   502.67 512.67
## - `poly(Age, 3)3`  1   508.60 518.60
## - `poly(Age, 3)1`  1   520.17 530.17
## - `poly(Age, 3)2`  1   522.04 532.04
##
## Step:  AIC=508.62
## .outcome ~ nTeam + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3`
##
##                   Df Deviance    AIC
## <none>                 498.62 508.62
## - nTeam            1   503.28 511.28
## - `poly(Age, 3)3`  1   509.43 517.43
## - `poly(Age, 3)2`  1   522.63 530.63
## - `poly(Age, 3)1`  1   523.14 531.14
## Start:  AIC=491.03
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   473.17 489.17
```

```
## - nPosition        1   474.61 490.61
## <none>                 473.03 491.03
## - `poly(Age, 3)3`  1   475.76 491.76
## - nTeam            1   475.83 491.83
## - Weight           1   476.48 492.48
## - Height_i         1   477.40 493.40
## - `poly(Age, 3)2`  1   500.91 516.91
## - `poly(Age, 3)1`  1   508.65 524.65
##
## Step:  AIC=489.17
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nPosition        1   474.74 488.74
## <none>                 473.17 489.17
## - `poly(Age, 3)3`  1   475.87 489.87
## - nTeam            1   476.09 490.09
## - Weight           1   476.55 490.55
## - Height_i         1   477.46 491.46
## - `poly(Age, 3)2`  1   501.61 515.61
## - `poly(Age, 3)1`  1   509.70 523.70
##
## Step:  AIC=488.74
## .outcome ~ nTeam + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - Weight           1   476.56 488.56
## <none>                 474.74 488.74
## - `poly(Age, 3)3`  1   477.79 489.79
## - Height_i         1   478.23 490.23
## - nTeam            1   478.33 490.33
## - `poly(Age, 3)2`  1   506.27 518.27
## - `poly(Age, 3)1`  1   511.07 523.07
##
## Step:  AIC=488.56
## .outcome ~ nTeam + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i
##
##                   Df Deviance    AIC
## <none>                 476.56 488.56
## - Height_i         1   478.92 488.92
## - `poly(Age, 3)3`  1   479.25 489.25
## - nTeam            1   479.94 489.94
## - `poly(Age, 3)2`  1   507.68 517.68
## - `poly(Age, 3)1`  1   515.62 525.62
## Start:  AIC=508.11
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   490.15 506.15
## - nTeam            1   492.09 508.09
```

```
## <none>                 490.11 508.11
## - `poly(Age, 3)3`  1   500.64 516.64
## - Weight           1   501.16 517.16
## - nPosition        1   502.31 518.31
## - Height_i         1   503.15 519.15
## - `poly(Age, 3)2`  1   508.21 524.21
## - `poly(Age, 3)1`  1   517.47 533.47
##
## Step:  AIC=506.15
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   492.09 506.09
## <none>                 490.15 506.15
## - `poly(Age, 3)3`  1   500.65 514.65
## - Weight           1   501.19 515.19
## - nPosition        1   502.35 516.35
## - Height_i         1   503.15 517.15
## - `poly(Age, 3)2`  1   508.27 522.27
## - `poly(Age, 3)1`  1   518.37 532.37
##
## Step:  AIC=506.09
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 492.09 506.09
## - `poly(Age, 3)3`  1   502.02 514.02
## - Weight           1   503.07 515.07
## - nPosition        1   504.00 516.00
## - Height_i         1   504.40 516.40
## - `poly(Age, 3)2`  1   510.23 522.23
## - `poly(Age, 3)1`  1   519.75 531.75
## Start:  AIC=522.31
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - Height_i         1   504.32 520.32
## - nCollege         1   504.39 520.39
## - nTeam            1   504.61 520.61
## - nPosition        1   505.65 521.65
## <none>                 504.31 522.31
## - Weight           1   508.51 524.51
## - `poly(Age, 3)2`  1   517.99 533.99
## - `poly(Age, 3)3`  1   520.54 536.54
## - `poly(Age, 3)1`  1   538.41 554.41
##
## Step:  AIC=520.32
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Weight
##
##                   Df Deviance    AIC
```

```
## - nCollege         1   504.39 518.39
## - nTeam            1   504.61 518.61
## - nPosition        1   505.69 519.69
## <none>                 504.32 520.32
## - Weight           1   508.81 522.81
## - `poly(Age, 3)2`  1   517.99 531.99
## - `poly(Age, 3)3`  1   520.55 534.55
## - `poly(Age, 3)1`  1   538.58 552.58
##
## Step:  AIC=518.39
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   504.67 516.67
## - nPosition        1   505.73 517.73
## <none>                 504.39 518.39
## - Weight           1   508.84 520.84
## - `poly(Age, 3)2`  1   518.19 530.19
## - `poly(Age, 3)3`  1   520.60 532.60
## - `poly(Age, 3)1`  1   539.25 551.25
##
## Step:  AIC=516.67
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Weight
##
##                   Df Deviance    AIC
## - nPosition        1   506.14 516.14
## <none>                 504.67 516.67
## - Weight           1   509.34 519.34
## - `poly(Age, 3)2`  1   518.86 528.86
## - `poly(Age, 3)3`  1   520.64 530.64
## - `poly(Age, 3)1`  1   539.33 549.33
##
## Step:  AIC=516.14
## .outcome ~ `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Weight
##
##                   Df Deviance    AIC
## <none>                 506.14 516.14
## - Weight           1   509.42 517.42
## - `poly(Age, 3)2`  1   522.14 530.14
## - `poly(Age, 3)3`  1   522.28 530.28
## - `poly(Age, 3)1`  1   540.86 548.86
## Start:  AIC=547.4
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - `poly(Age, 3)3`  1   529.40 545.40
## - nPosition        1   529.48 545.48
## - nCollege         1   529.62 545.62
## <none>                 529.40 547.40
## - Weight           1   531.48 547.48
```

```
## - Height_i         1   533.40 549.40
## - nTeam            1   533.42 549.42
## - `poly(Age, 3)2`  1   552.10 568.10
## - `poly(Age, 3)1`  1   556.86 572.86
##
## Step:  AIC=545.4
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - nPosition        1   529.48 543.48
## - nCollege         1   529.63 543.63
## <none>                 529.40 545.40
## - Weight           1   531.48 545.48
## - Height_i         1   533.40 547.40
## - nTeam            1   533.42 547.42
## - `poly(Age, 3)2`  1   553.14 567.14
## - `poly(Age, 3)1`  1   559.77 573.77
##
## Step:  AIC=543.48
## .outcome ~ nTeam + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   529.68 541.68
## <none>                 529.48 543.48
## - nTeam            1   533.56 545.56
## - Height_i         1   533.75 545.75
## - Weight           1   534.40 546.40
## - `poly(Age, 3)2`  1   553.25 565.25
## - `poly(Age, 3)1`  1   560.13 572.13
##
## Step:  AIC=541.68
## .outcome ~ nTeam + `poly(Age, 3)1` + `poly(Age, 3)2` + Height_i +
##     Weight
##
##                   Df Deviance    AIC
## <none>                 529.68 541.68
## - nTeam            1   533.98 543.98
## - Height_i         1   533.99 543.99
## - Weight           1   534.82 544.82
## - `poly(Age, 3)2`  1   553.64 563.64
## - `poly(Age, 3)1`  1   560.28 570.28
## Start:  AIC=505.01
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   487.63 503.63
## - nCollege         1   487.86 503.86
## <none>                 487.01 505.01
## - Weight           1   489.65 505.65
## - Height_i         1   489.77 505.77
## - `poly(Age, 3)3`  1   491.35 507.35
```

```
## - nPosition        1   491.67 507.67
## - `poly(Age, 3)1`  1   503.53 519.53
## - `poly(Age, 3)2`  1   521.46 537.46
##
## Step:  AIC=503.63
## .outcome ~ nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   488.45 502.45
## <none>                 487.63 503.63
## - Weight           1   490.04 504.04
## - Height_i         1   490.28 504.28
## - nPosition        1   492.17 506.17
## - `poly(Age, 3)3`  1   492.21 506.21
## - `poly(Age, 3)1`  1   504.24 518.24
## - `poly(Age, 3)2`  1   521.49 535.49
##
## Step:  AIC=502.45
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 488.45 502.45
## - Weight           1   490.61 502.61
## - Height_i         1   490.84 502.84
## - nPosition        1   492.58 504.58
## - `poly(Age, 3)3`  1   492.84 504.84
## - `poly(Age, 3)1`  1   506.19 518.19
## - `poly(Age, 3)2`  1   522.19 534.19
## Start:  AIC=514.4
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - Height_i         1   496.41 512.41
## - nCollege         1   496.54 512.54
## - nTeam            1   496.84 512.84
## <none>                 496.40 514.40
## - `poly(Age, 3)3`  1   498.84 514.84
## - nPosition        1   501.62 517.62
## - Weight           1   503.20 519.20
## - `poly(Age, 3)2`  1   513.78 529.78
## - `poly(Age, 3)1`  1   523.13 539.13
##
## Step:  AIC=512.41
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   496.54 510.54
## - nTeam            1   496.87 510.87
## <none>                 496.41 512.41
## - `poly(Age, 3)3`  1   498.86 512.86
```

```
## - nPosition        1   501.72 515.72
## - Weight           1   504.20 518.20
## - `poly(Age, 3)2`  1   513.88 527.88
## - `poly(Age, 3)1`  1   523.25 537.25
##
## Step:  AIC=510.54
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   496.99 508.99
## <none>                 496.54 510.54
## - `poly(Age, 3)3`  1   498.94 510.94
## - nPosition        1   501.75 513.75
## - Weight           1   504.21 516.21
## - `poly(Age, 3)2`  1   514.05 526.05
## - `poly(Age, 3)1`  1   523.99 535.99
##
## Step:  AIC=508.99
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Weight
##
##                   Df Deviance    AIC
## <none>                 496.99 508.99
## - `poly(Age, 3)3`  1   499.38 509.38
## - nPosition        1   502.13 512.13
## - Weight           1   504.35 514.35
## - `poly(Age, 3)2`  1   514.12 524.12
## - `poly(Age, 3)1`  1   524.98 534.98
## Start:  AIC=464.52
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   446.53 462.53
## - nTeam            1   446.78 462.78
## <none>                 446.52 464.52
## - Weight           1   452.09 468.09
## - Height_i         1   454.43 470.43
## - `poly(Age, 3)3`  1   457.96 473.96
## - nPosition        1   458.69 474.69
## - `poly(Age, 3)1`  1   464.46 480.46
## - `poly(Age, 3)2`  1   480.84 496.84
##
## Step:  AIC=462.53
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   446.82 460.82
## <none>                 446.53 462.53
## - Weight           1   452.24 466.24
## - Height_i         1   454.65 468.65
## - `poly(Age, 3)3`  1   458.12 472.12
```

```
## - nPosition        1   458.95 472.95
## - `poly(Age, 3)1`  1   464.55 478.55
## - `poly(Age, 3)2`  1   480.84 494.84
##
## Step:  AIC=460.82
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 446.82 460.82
## - Weight           1   452.51 464.51
## - Height_i         1   454.69 466.69
## - `poly(Age, 3)3`  1   458.29 470.29
## - nPosition        1   459.08 471.08
## - `poly(Age, 3)1`  1   464.59 476.59
## - `poly(Age, 3)2`  1   481.37 493.37
## Start:  AIC=487.44
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   469.47 485.47
## - `poly(Age, 3)3`  1   469.49 485.49
## - nTeam            1   469.50 485.50
## <none>                 469.44 487.44
## - nPosition        1   474.03 490.03
## - Height_i         1   476.34 492.34
## - Weight           1   478.61 494.61
## - `poly(Age, 3)2`  1   502.85 518.85
## - `poly(Age, 3)1`  1   518.07 534.07
##
## Step:  AIC=485.47
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   469.53 483.53
## - `poly(Age, 3)3`  1   469.54 483.54
## <none>                 469.47 485.47
## - nPosition        1   474.12 488.12
## - Height_i         1   476.45 490.45
## - Weight           1   478.85 492.85
## - `poly(Age, 3)2`  1   502.86 516.86
## - `poly(Age, 3)1`  1   518.61 532.61
##
## Step:  AIC=483.53
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - `poly(Age, 3)3`  1   469.59 481.59
## <none>                 469.53 483.53
## - nPosition        1   474.20 486.20
## - Height_i         1   476.51 488.51
```

```
## - Weight           1   478.94 490.94
## - `poly(Age, 3)2`  1   502.91 514.91
## - `poly(Age, 3)1`  1   518.63 530.63
##
## Step:  AIC=481.59
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + Height_i +
##     Weight
##
##                   Df Deviance    AIC
## <none>                 469.59 481.59
## - nPosition        1   474.23 484.23
## - Height_i         1   476.70 486.70
## - Weight           1   478.96 488.96
## - `poly(Age, 3)2`  1   504.17 514.17
## - `poly(Age, 3)1`  1   531.42 541.42
## Start:  AIC=476.05
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   458.13 474.13
## - nTeam            1   458.75 474.75
## - Height_i         1   459.72 475.72
## <none>                 458.05 476.05
## - nPosition        1   463.47 479.47
## - `poly(Age, 3)3`  1   464.41 480.41
## - Weight           1   468.39 484.39
## - `poly(Age, 3)2`  1   468.92 484.92
## - `poly(Age, 3)1`  1   481.54 497.54
##
## Step:  AIC=474.13
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   458.94 472.94
## - Height_i         1   459.77 473.77
## <none>                 458.13 474.13
## - nPosition        1   463.49 477.49
## - `poly(Age, 3)3`  1   464.58 478.58
## - Weight           1   468.48 482.48
## - `poly(Age, 3)2`  1   469.11 483.11
## - `poly(Age, 3)1`  1   482.53 496.53
##
## Step:  AIC=472.94
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - Height_i         1   460.68 472.68
## <none>                 458.94 472.94
## - nPosition        1   464.33 476.33
## - `poly(Age, 3)3`  1   465.56 477.56
## - Weight           1   468.96 480.96
```

```
## - `poly(Age, 3)2`  1   469.39 481.39
## - `poly(Age, 3)1`  1   484.74 496.74
##
## Step:  AIC=472.68
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Weight
##
##                   Df Deviance    AIC
## <none>                 460.68 472.68
## - nPosition        1   465.02 475.02
## - `poly(Age, 3)3`  1   467.85 477.85
## - Weight           1   469.25 479.25
## - `poly(Age, 3)2`  1   471.74 481.74
## - `poly(Age, 3)1`  1   488.50 498.50
## Start:  AIC=510.34
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   492.41 508.41
## - nCollege         1   492.94 508.94
## <none>                 492.34 510.34
## - nPosition        1   496.17 512.17
## - `poly(Age, 3)3`  1   496.91 512.91
## - Weight           1   497.96 513.96
## - Height_i         1   498.33 514.33
## - `poly(Age, 3)1`  1   516.21 532.21
## - `poly(Age, 3)2`  1   518.53 534.53
##
## Step:  AIC=508.41
## .outcome ~ nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   493.03 507.03
## <none>                 492.41 508.41
## - nPosition        1   496.21 510.21
## - `poly(Age, 3)3`  1   497.01 511.01
## - Weight           1   498.01 512.01
## - Height_i         1   498.43 512.43
## - `poly(Age, 3)1`  1   516.46 530.46
## - `poly(Age, 3)2`  1   518.54 532.54
##
## Step:  AIC=507.03
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 493.03 507.03
## - nPosition        1   497.33 509.33
## - `poly(Age, 3)3`  1   497.84 509.84
## - Weight           1   498.89 510.89
## - Height_i         1   499.34 511.34
## - `poly(Age, 3)1`  1   516.57 528.57
```

```
## - `poly(Age, 3)2`  1   519.01 531.01
## Start:  AIC=510.23
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   492.30 508.30
## - nCollege         1   492.45 508.45
## - Weight           1   493.23 509.23
## - nPosition        1   493.70 509.70
## <none>                 492.23 510.23
## - Height_i         1   498.80 514.80
## - `poly(Age, 3)3`  1   499.56 515.56
## - `poly(Age, 3)1`  1   511.78 527.78
## - `poly(Age, 3)2`  1   524.63 540.63
##
## Step:  AIC=508.3
## .outcome ~ nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   492.50 506.50
## - Weight           1   493.31 507.31
## - nPosition        1   493.75 507.75
## <none>                 492.30 508.30
## - Height_i         1   498.81 512.81
## - `poly(Age, 3)3`  1   499.57 513.57
## - `poly(Age, 3)1`  1   511.93 525.93
## - `poly(Age, 3)2`  1   525.12 539.12
##
## Step:  AIC=506.5
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - Weight           1   493.62 505.62
## - nPosition        1   494.11 506.11
## <none>                 492.50 506.50
## - Height_i         1   499.33 511.33
## - `poly(Age, 3)3`  1   499.81 511.81
## - `poly(Age, 3)1`  1   511.99 523.99
## - `poly(Age, 3)2`  1   525.25 537.25
##
## Step:  AIC=505.62
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i
##
##                   Df Deviance    AIC
## - nPosition        1   494.19 504.19
## <none>                 493.62 505.62
## - Height_i         1   499.39 509.39
## - `poly(Age, 3)3`  1   501.41 511.41
## - `poly(Age, 3)1`  1   513.68 523.68
## - `poly(Age, 3)2`  1   526.68 536.68
```

```
##
## Step:  AIC=504.19
## .outcome ~ `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i
##
##                   Df Deviance    AIC
## <none>                 494.19 504.19
## - Height_i         1   499.85 507.85
## - `poly(Age, 3)3`  1   502.21 510.21
## - `poly(Age, 3)1`  1   514.00 522.00
## - `poly(Age, 3)2`  1   527.08 535.08
## Start:  AIC=484.33
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   466.49 482.49
## - nTeam            1   467.18 483.18
## - Height_i         1   467.54 483.54
## <none>                 466.33 484.33
## - nPosition        1   469.22 485.22
## - `poly(Age, 3)3`  1   469.82 485.82
## - Weight           1   475.49 491.49
## - `poly(Age, 3)1`  1   487.21 503.21
## - `poly(Age, 3)2`  1   512.13 528.13
##
## Step:  AIC=482.49
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   467.43 481.43
## - Height_i         1   467.71 481.71
## <none>                 466.49 482.49
## - nPosition        1   469.48 483.48
## - `poly(Age, 3)3`  1   470.22 484.22
## - Weight           1   475.96 489.96
## - `poly(Age, 3)1`  1   487.23 501.23
## - `poly(Age, 3)2`  1   512.24 526.24
##
## Step:  AIC=481.43
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## - Height_i         1   468.62 480.62
## <none>                 467.43 481.43
## - nPosition        1   470.47 482.47
## - `poly(Age, 3)3`  1   470.81 482.81
## - Weight           1   477.42 489.42
## - `poly(Age, 3)1`  1   487.60 499.60
## - `poly(Age, 3)2`  1   514.07 526.07
##
## Step:  AIC=480.62
```

```
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Weight
##
##                   Df Deviance    AIC
## <none>                 468.62 480.62
## - nPosition        1   470.82 480.82
## - `poly(Age, 3)3`  1   472.05 482.05
## - Weight           1   477.42 487.42
## - `poly(Age, 3)1`  1   489.86 499.86
## - `poly(Age, 3)2`  1   516.03 526.03
## Start:  AIC=449.44
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   431.44 447.44
## - nTeam            1   433.23 449.23
## <none>                 431.44 449.44
## - nPosition        1   435.81 451.81
## - `poly(Age, 3)3`  1   437.97 453.97
## - Height_i         1   449.35 465.35
## - Weight           1   449.47 465.47
## - `poly(Age, 3)2`  1   455.70 471.70
## - `poly(Age, 3)1`  1   476.09 492.09
##
## Step:  AIC=447.44
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   433.23 447.23
## <none>                 431.44 447.44
## - nPosition        1   435.82 449.82
## - `poly(Age, 3)3`  1   438.06 452.06
## - Height_i         1   449.38 463.38
## - Weight           1   449.60 463.60
## - `poly(Age, 3)2`  1   455.71 469.71
## - `poly(Age, 3)1`  1   476.41 490.41
##
## Step:  AIC=447.23
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 433.23 447.23
## - nPosition        1   437.58 449.58
## - `poly(Age, 3)3`  1   439.27 451.27
## - Height_i         1   451.23 463.23
## - Weight           1   451.65 463.65
## - `poly(Age, 3)2`  1   458.83 470.83
## - `poly(Age, 3)1`  1   478.74 490.74
## Start:  AIC=490.59
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
```

```
##
##                   Df Deviance    AIC
## - nCollege         1   473.46 489.46
## <none>                 472.59 490.59
## - Weight           1   475.97 491.97
## - nTeam            1   476.42 492.42
## - nPosition        1   479.13 495.13
## - `poly(Age, 3)3`  1   479.39 495.39
## - Height_i         1   484.87 500.87
## - `poly(Age, 3)1`  1   487.24 503.24
## - `poly(Age, 3)2`  1   504.93 520.93
##
## Step:  AIC=489.46
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 473.46 489.46
## - Weight           1   476.59 490.59
## - nTeam            1   477.12 491.12
## - nPosition        1   479.76 493.76
## - `poly(Age, 3)3`  1   479.98 493.98
## - Height_i         1   485.26 499.26
## - `poly(Age, 3)1`  1   489.00 503.00
## - `poly(Age, 3)2`  1   505.21 519.21
## Start:  AIC=523.31
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   505.34 521.34
## <none>                 505.31 523.31
## - nTeam            1   507.37 523.37
## - `poly(Age, 3)3`  1   508.09 524.09
## - Weight           1   508.64 524.64
## - nPosition        1   508.90 524.90
## - Height_i         1   511.32 527.32
## - `poly(Age, 3)2`  1   521.70 537.70
## - `poly(Age, 3)1`  1   534.89 550.89
##
## Step:  AIC=521.34
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 505.34 521.34
## - nTeam            1   507.40 521.40
## - `poly(Age, 3)3`  1   508.13 522.13
## - Weight           1   508.81 522.81
## - nPosition        1   509.11 523.11
## - Height_i         1   511.64 525.64
## - `poly(Age, 3)2`  1   521.71 535.71
## - `poly(Age, 3)1`  1   535.04 549.04
## Start:  AIC=508.85
```

```
## .outcome ~ nTeam + nPosition + nCollege + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nCollege         1   490.86 506.86
## - nTeam            1   491.18 507.18
## <none>                 490.85 508.85
## - nPosition        1   493.32 509.32
## - Height_i         1   494.55 510.55
## - Weight           1   495.93 511.93
## - `poly(Age, 3)3`  1   497.01 513.01
## - `poly(Age, 3)2`  1   513.89 529.89
## - `poly(Age, 3)1`  1   518.66 534.66
##
## Step:  AIC=506.86
## .outcome ~ nTeam + nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` +
##     `poly(Age, 3)3` + Height_i + Weight
##
##                   Df Deviance    AIC
## - nTeam            1   491.18 505.18
## <none>                 490.86 506.86
## - nPosition        1   493.37 507.37
## - Height_i         1   494.60 508.60
## - Weight           1   496.04 510.04
## - `poly(Age, 3)3`  1   497.05 511.05
## - `poly(Age, 3)2`  1   513.89 527.89
## - `poly(Age, 3)1`  1   518.78 532.78
##
## Step:  AIC=505.18
## .outcome ~ nPosition + `poly(Age, 3)1` + `poly(Age, 3)2` + `poly(Age, 3)3` +
##     Height_i + Weight
##
##                   Df Deviance    AIC
## <none>                 491.18 505.18
## - nPosition        1   493.69 505.69
## - Height_i         1   494.83 506.83
## - Weight           1   496.44 508.44
## - `poly(Age, 3)3`  1   497.25 509.25
## - `poly(Age, 3)2`  1   514.55 526.55
## - `poly(Age, 3)1`  1   518.98 530.98
##
## Call:
## NULL
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.7211  -0.8556  -0.5179   0.9954   2.3404
##
## Coefficients:
##                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)       0.11247    2.39580   0.047   0.9626
## nPosition         0.11246    0.07163   1.570   0.1164
## `poly(Age, 3)1`  14.48770    2.78133   5.209 1.90e-07 ***
```

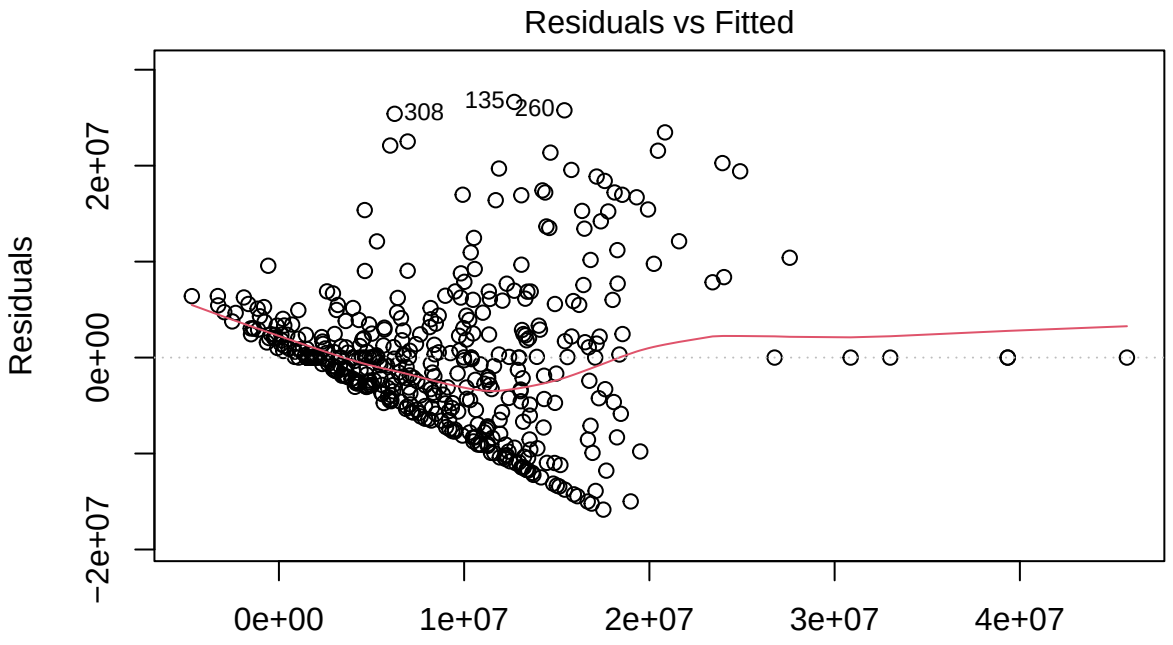
```
## `poly(Age, 3)2` -12.71575    2.84126  -4.475 7.63e-06 ***
## `poly(Age, 3)3`  -8.55996    3.49842  -2.447   0.0144 *
## Height_i         -0.69734    0.36772  -1.896   0.0579 .
## Weight            0.01433    0.00631   2.271   0.0232 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 576.54  on 444  degrees of freedom
## Residual deviance: 491.18  on 438  degrees of freedom
## AIC: 505.18
##
## Number of Fisher Scoring iterations: 4
```

```
confusionMatrix(glmFit2)
```

```
## Bootstrapped (25 reps) Confusion Matrix
##
## (entries are percentual average cell counts across resamples)
##
##           Reference
## Prediction    0    1
##          0 52.7 17.7
##          1 12.3 17.3
##
##  Accuracy (average) : 0.6999
```

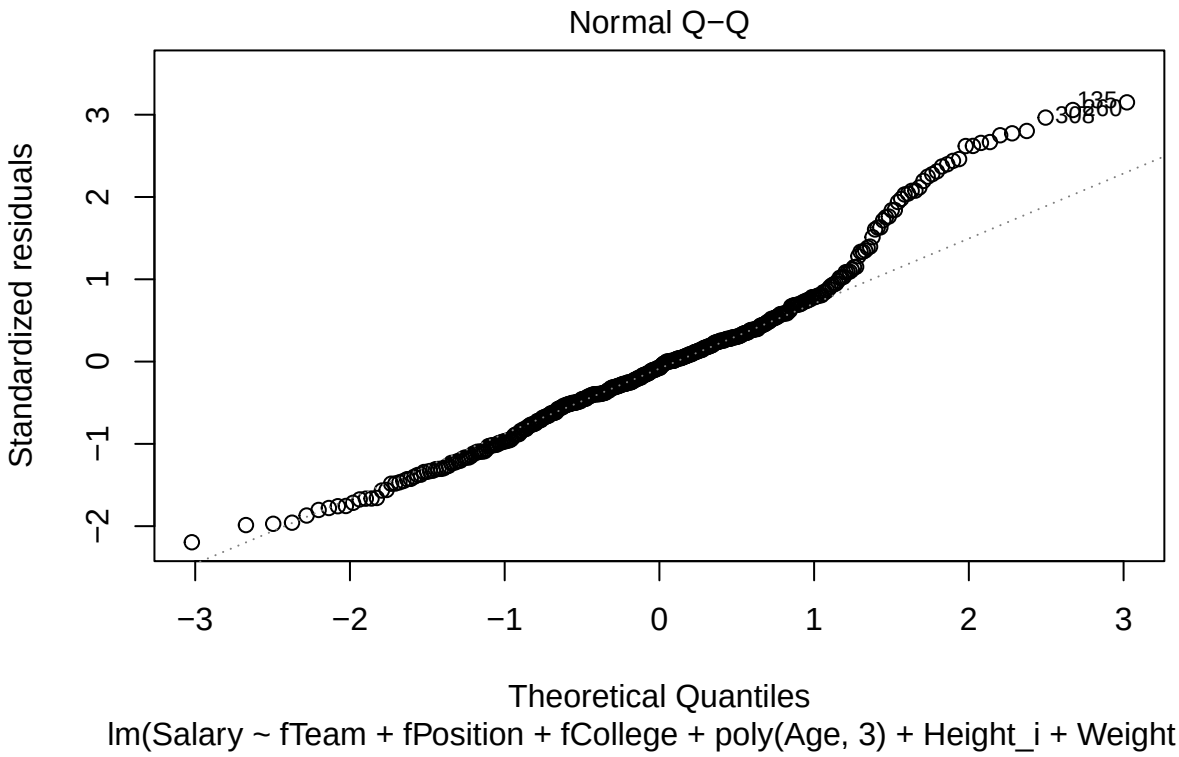
```
#comparing the plots

plot(lm1, which = 1)
```



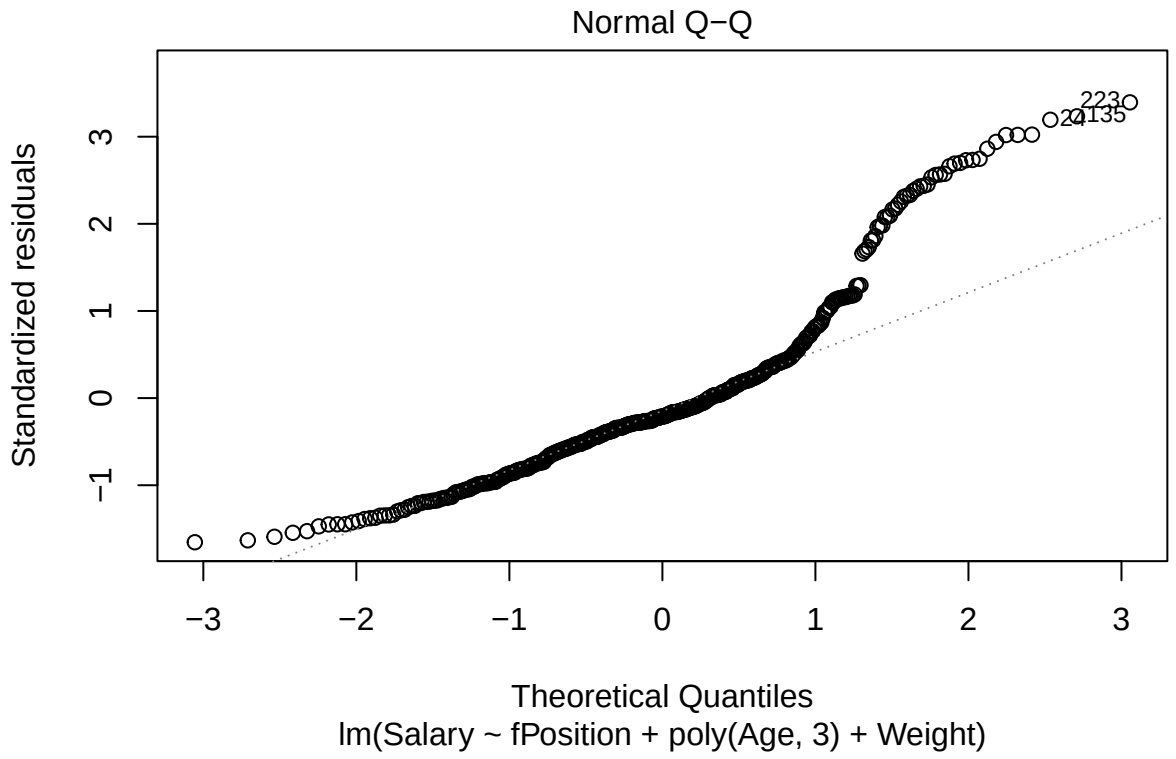

```
plot(lm1, which = 2)
```

```
## Warning: not plotting observations with leverage one:
##   1, 27, 46, 69, 74, 77, 85, 102, 104, 122, 133, 137, 138, 141, 190, 217, 223, 227, 231, 241, 249, 25
```

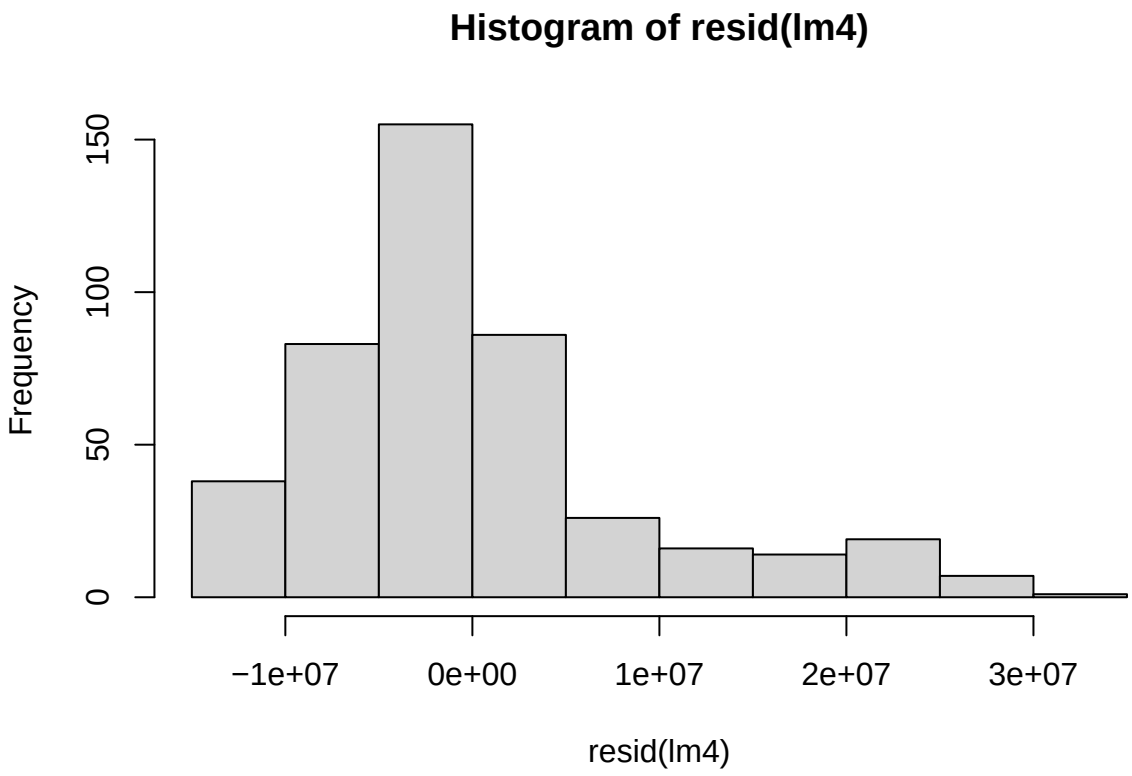



```
plot(lm4, which = 1)
```

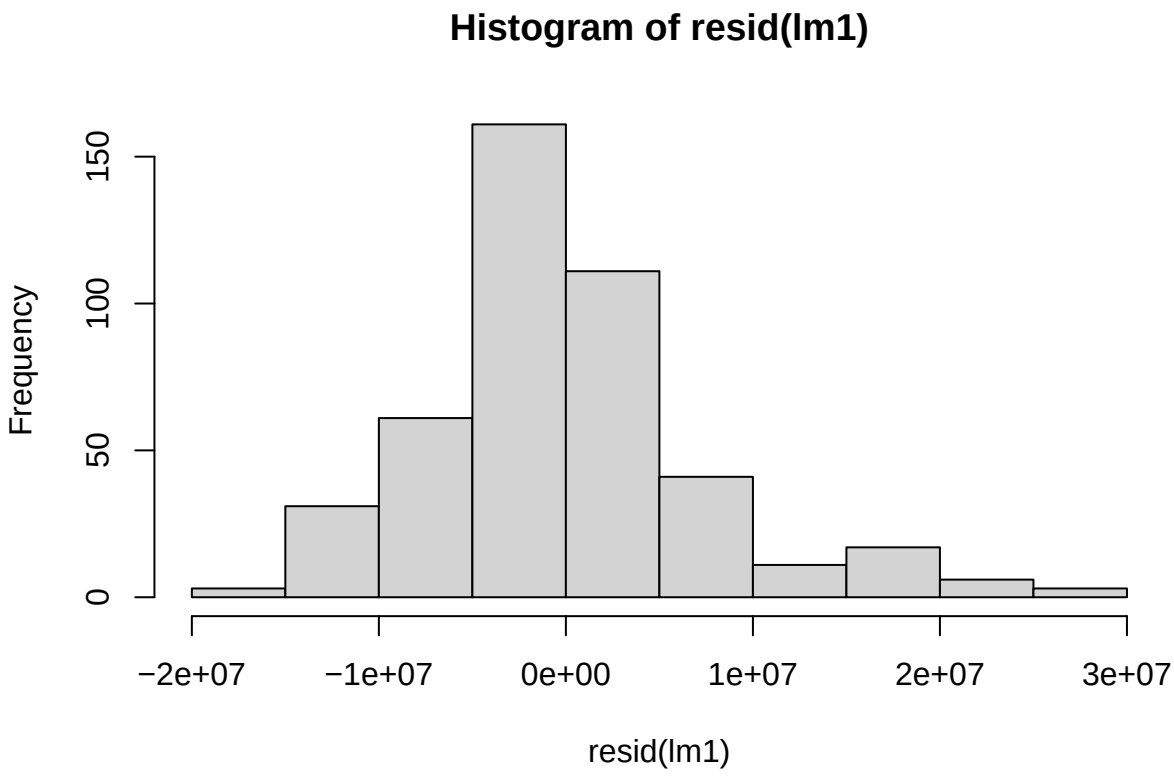

```
plot(lm4, which = 2)
```




```
hist(resid(lm4))
```



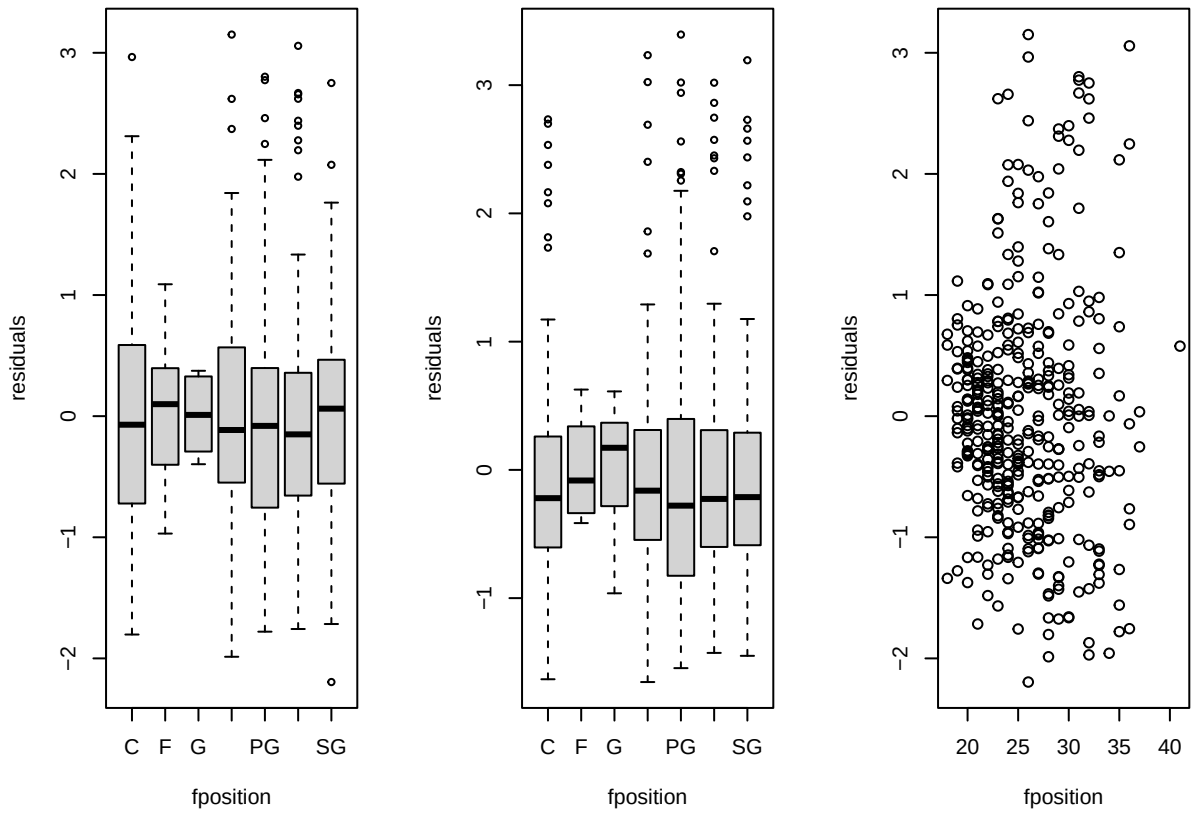

```
hist(resid(lm1))
```




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

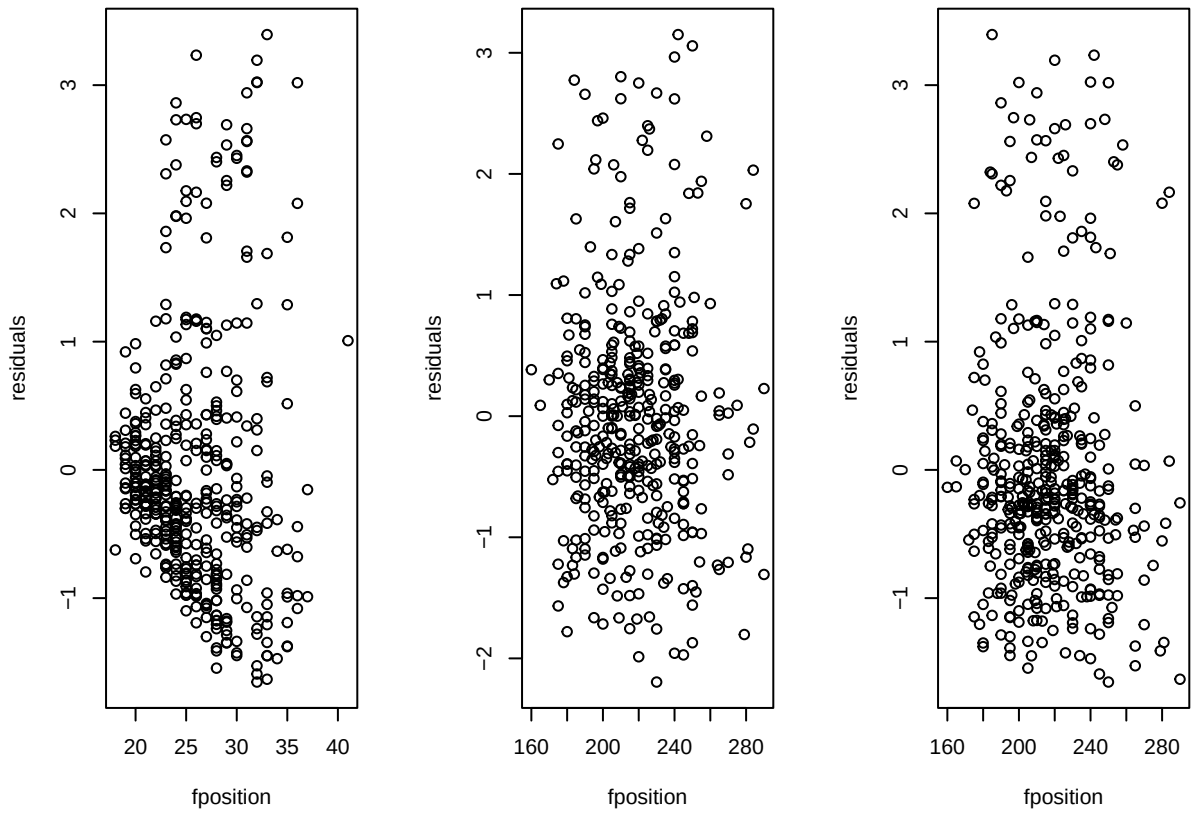
plot(ap_tibble$fPosition, rstandard(lm1), xlab ="fposition", ylab = "residuals")
plot(ap_tibble$fPosition, rstandard(lm4), xlab ="fposition", ylab = "residuals")

plot(ap_tibble$Age, rstandard(lm1), xlab ="fposition", ylab = "residuals")
```



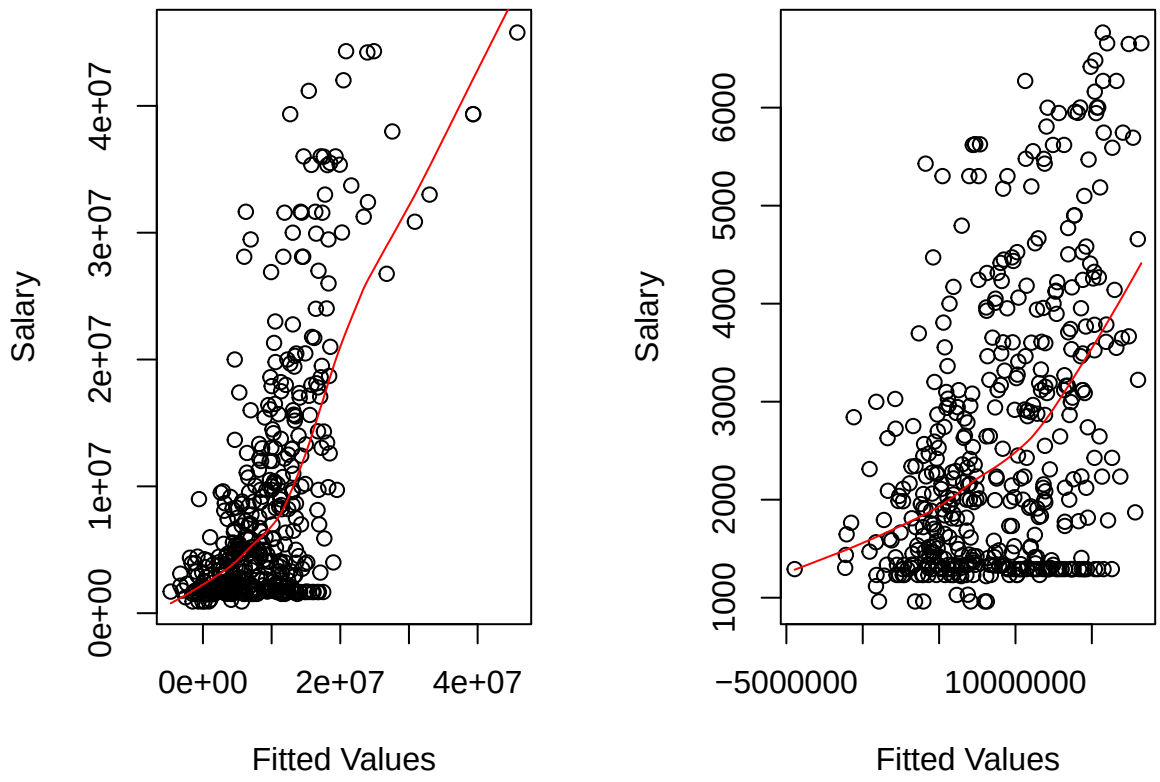

```
plot(ap_tibble$Age, rstandard(lm4), xlab ="fposition", ylab = "residuals")

plot(ap_tibble$Weight, rstandard(lm1), xlab ="fposition", ylab = "residuals")
plot(ap_tibble$Weight, rstandard(lm4), xlab ="fposition", ylab = "residuals")
```



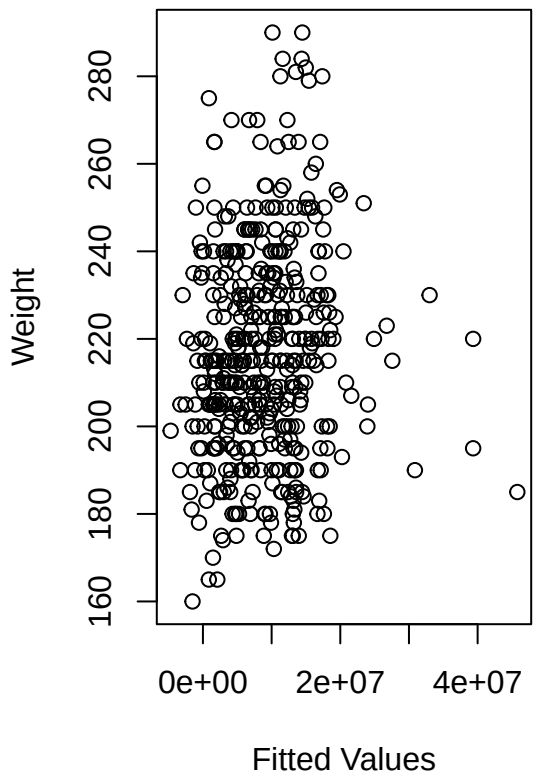

```
#normality check
par(mfrow=c(1,2), mar=c(4.5, 4.5, 2, 2))
plot(predict(lm1), ap_tibble$Salary,
       xlab = "Fitted Values", ylab = "Salary")
abline()
lines(lowess(predict(lm1), ap_tibble$Salary), col='red')

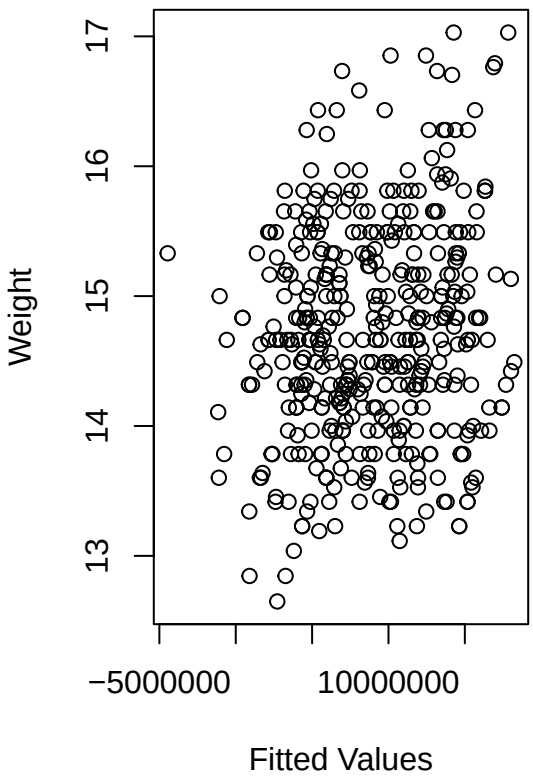
plot(predict(lm4), sqrt(ap_tibble$Salary),
       xlab = "Fitted Values", ylab = "Salary")
lines(lowess(predict(lm4), sqrt(ap_tibble$Salary)), col='red')
```




```
plot(predict(lm1), ap_tibble$Weight,
     xlab = "Fitted Values", ylab = "Weight")

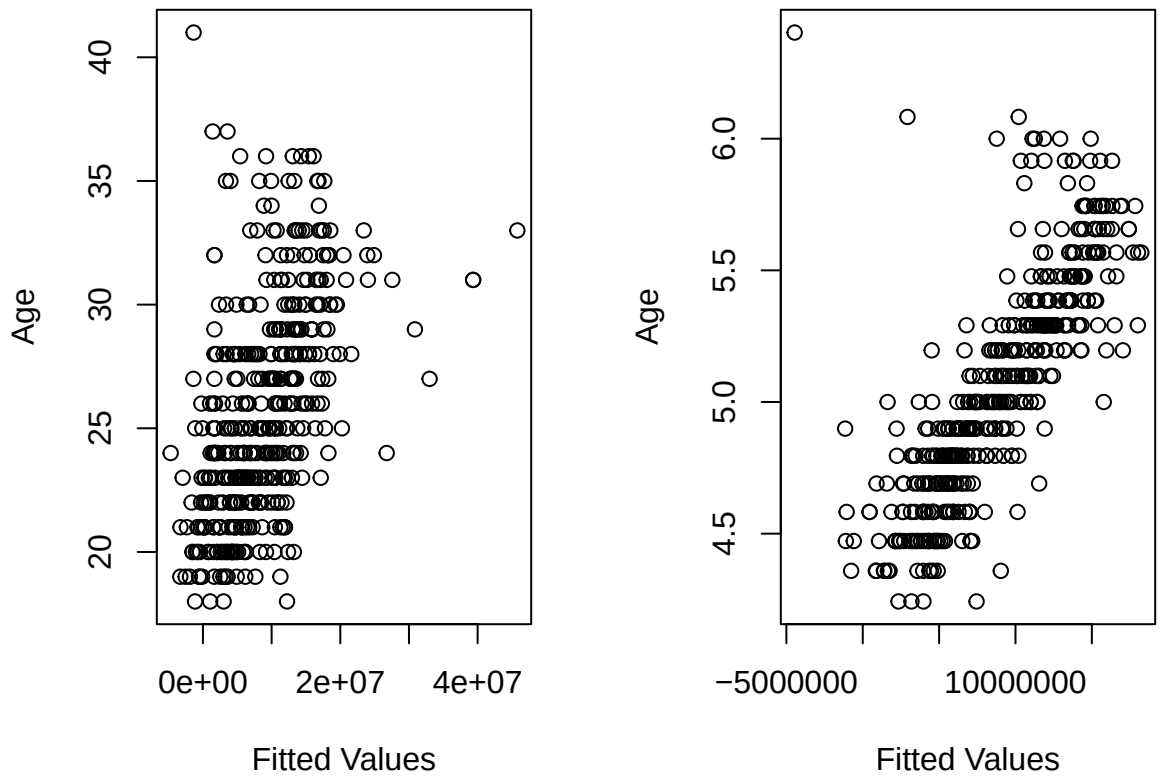
plot(predict(lm4), sqrt(ap_tibble$Weight),
     xlab = "Fitted Values", ylab = "Weight")
```






```
plot(predict(lm1), ap_tibble$Age,
     xlab = "Fitted Values", ylab = "Age")

plot(predict(lm4), sqrt(ap_tibble$Age),
     xlab = "Fitted Values", ylab = "Age")
```



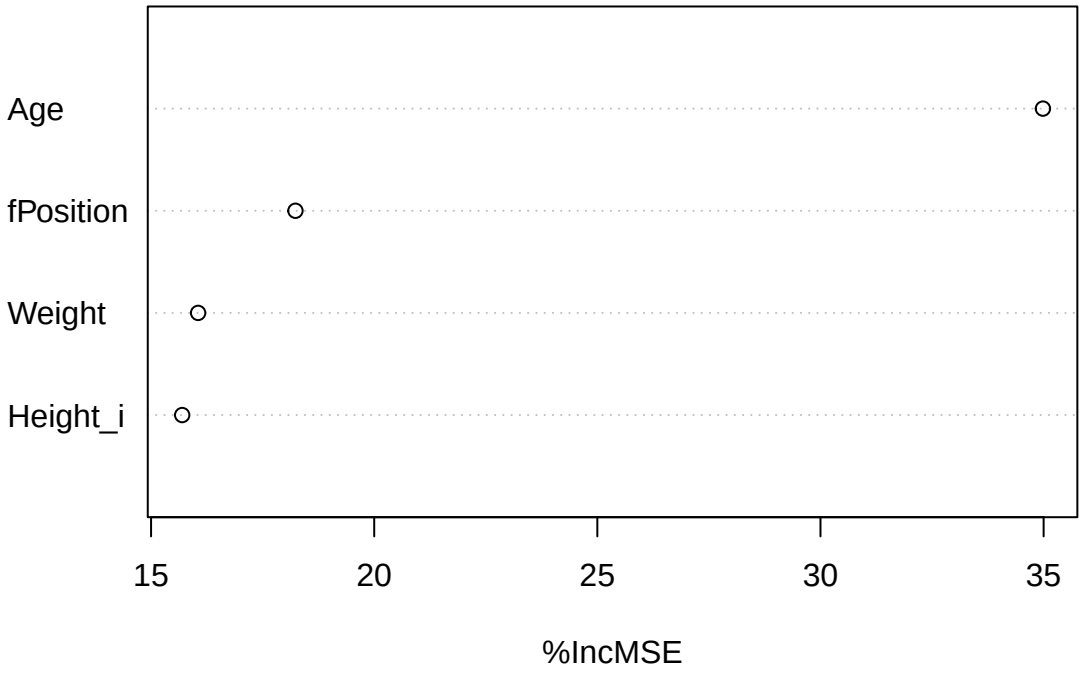
Random Forest

```
rf_model <- caret::train(log(Salary) ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+Weight,
                         data = ap_tibble,
                         method = "rf")

rf_model
```

```
## Random Forest
##
## 445 samples
##   6 predictor
##
## No pre-processing
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 445, 445, 445, 445, 445, 445, ...
## Resampling results across tuning parameters:
##
##   mtry  RMSE      Rsquared    MAE
##     2   1.008550  0.05767455  0.8669962
##    80   1.005981  0.09706057  0.8229822
##   158   1.018274  0.09237418  0.8303405
##
## RMSE was used to select the optimal model using the smallest value.
## The final value used for the model was mtry = 80.
```

```
set.seed(999)
rf3 <- randomForest(log(Salary) ~ fPosition+Age+Height_i+Weight,
                          data = ap_tibble, n.var = 10, importance=TRUE)
rf_preds_3 <- predict(rf3, type = "response")
varImpPlot(rf3, type=1, main=" ")
```



Model Checking

Outliers

```
# Remove outliers & high leverage from data
ap_cl_f_wo <- ap_tibble[-which(abs(rstandard(lm_step)) > 2
                               | hatvalues(lm_step) > .1),]
```

```
summary(lm1_wo <- lm(Salary ~ fTeam+fPosition+fCollege+poly(Age,3)+Height_i+Weight,
                     data=ap_cl_f_wo))
```

```
##
## Call:
## lm(formula = Salary ~ fTeam + fPosition + fCollege + poly(Age,
##     3) + Height_i + Weight, data = ap_cl_f_wo)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -13400538  -2659627         0   2124378  19099238
##
```

```
## Coefficients:
##                                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)                     -7573267   11013983  -0.688 0.492355
## fTeamBoston Celtics             -1797126    2813321  -0.639 0.523558
## fTeamBrooklyn Nets              -5908233    2689871  -2.196 0.028999 *
## fTeamCharlotte Hornets            -53390    2432000  -0.022 0.982503
## fTeamChicago Bulls               1333869    2734152   0.488 0.626091
## fTeamCleveland Cavaliers         2986053    2729807   1.094 0.275091
## fTeamDallas Mavericks           -4682983    2542342  -1.842 0.066689 .
## fTeamDenver Nuggets             -1328128    2617977  -0.507 0.612395
## fTeamDetroit Pistons            -2669880    2551324  -1.046 0.296380
## fTeamGolden State Warriors      -4443378    2795349  -1.590 0.113229
## fTeamHouston Rockets            -2873931    2597834  -1.106 0.269695
## fTeamIndiana Pacers              -806484    2581081  -0.312 0.754958
## fTeamLos Angeles Clippers       -1418991    2681105  -0.529 0.597109
## fTeamLos Angeles Lakers         -8570677    3272025  -2.619 0.009361 **
## fTeamMemphis Grizzlies          -3490713    2690668  -1.297 0.195739
## fTeamMiami Heat                 -4134462    2844539  -1.453 0.147377
## fTeamMilwaukee Bucks            -3974668    2769078  -1.435 0.152461
## fTeamMinnesota Timberwolves      -624199    2916858  -0.214 0.830728
## fTeamNew Orleans Pelicans       -2255414    2522190  -0.894 0.372081
## fTeamNew York Knicks            -2557181    2590383  -0.987 0.324531
## fTeamOklahoma City Thunder      -3077692    2593270  -1.187 0.236461
## fTeamOrlando Magic              -1283240    2571647  -0.499 0.618232
## fTeamPhiladelphia Sixers        -2197220    2716518  -0.809 0.419397
## fTeamPhoenix Suns               -2779492    2855629  -0.973 0.331349
## fTeamPortland Trail Blazers     -3715140    2924965  -1.270 0.205242
## fTeamSacremento Kings            -337721    2745822  -0.123 0.902213
## fTeamSan Antonio Spurs          -1252657    2519326  -0.497 0.619482
## fTeamToronto Raptors             2286897    2993585   0.764 0.445645
## fTeamUtah Jazz                    -96002    2970317  -0.032 0.974243
## fTeamWashington Wizards         -3068237    2453594  -1.251 0.212312
## fPositionPF                      3318247    1324978   2.504 0.012920 *
## fPositionPG                      7050315    2049842   3.439 0.000685 ***
## fPositionSF                      4421515    1467737   3.012 0.002864 **
## fPositionSG                      6127187    1765674   3.470 0.000615 ***
## fCollegeArizona                  2272071    3734460   0.608 0.543484
## fCollegeArizona State            -818192    5402360  -0.151 0.879745
## fCollegeArkansas                 2410492    4363632   0.552 0.581177
## fCollegeAuburn                  -1543736    4677895  -0.330 0.741678
## fCollegeBaylor                  -2022485    4260078  -0.475 0.635388
## fCollegeBelmont                 -6711345    6964625  -0.964 0.336184
## fCollegeBoise State               440091    7139033   0.062 0.950895
## fCollegeBoston College          -1580956    7072283  -0.224 0.823300
## fCollegeBowling Green            4015403    7150475   0.562 0.574933
## fCollegeBucknell                -2721818    7130144  -0.382 0.702991
## fCollegeButler                   4978663    5444092   0.915 0.361353
## fCollegeBYU                     -3546273    7116112  -0.498 0.618690
## fCollegeCal Poly                -2252645    7089656  -0.318 0.750956
## fCollegeCalifornia              20038672    7129844   2.811 0.005347 **
## fCollegeCharleston              -7425239    7291524  -1.018 0.309526
## fCollegeCleveland State         -4864170    6972739  -0.698 0.486093
## fCollegeColorado                 5198136    4718281   1.102 0.271677
## fCollegeConnecticut             -2740307    4395965  -0.623 0.533625
```

```
## fCollegeCreighton                   200430    5389656   0.037 0.970366
## fCollegeDayton                     3380168    7061508   0.479 0.632598
## fCollegeDePaul                    -1532765    5462730  -0.281 0.779266
## fCollegeDrexel                    -4277046    7131078  -0.600 0.549212
## fCollegeDuke                        263379    3271497   0.081 0.935900
## fCollegeFlorida                    8068621    4732984   1.705 0.089511 .
## fCollegeFlorida State              1186154    3707793   0.320 0.749312
## fCollegeGeorge Washington         -7719042    7210894  -1.070 0.285466
## fCollegeGeorgetown                -1881110    4747177  -0.396 0.692261
## fCollegeGeorgia                    4848296    4754321   1.020 0.308849
## fCollegeGeorgia Tech               1975597    4756349   0.415 0.678243
## fCollegeGonzaga                    3149299    3873792   0.813 0.417025
## fCollegeHouston                   -5748675    5336162  -1.077 0.282408
## fCollegeIllinois                  -5313941    7079171  -0.751 0.453590
## fCollegeIndiana                     706764    3862169   0.183 0.854953
## fCollegeIowa State                 1748639    4334357   0.403 0.686980
## fCollegeKansas                     -562824    3987996  -0.141 0.887884
## fCollegeKansas State              -5998857    4690898  -1.279 0.202172
## fCollegeKentucky                   2554292    3247083   0.787 0.432255
## fCollegeLiberty                   -2229237    7058807  -0.316 0.752417
## fCollegeLouisiana-Lafayette       -5220869    7154211  -0.730 0.466236
## fCollegeLouisville                 2321439    4378984   0.530 0.596503
## fCollegeLoyola (MD)                1502885    7081050   0.212 0.832097
## fCollegeLSU                        5474374    4318377   1.268 0.206116
## fCollegeMarquette                  -813567    5467323  -0.149 0.881830
## fCollegeMarshall                  -8849014    7226006  -1.225 0.221905
## fCollegeMaryland                   -920957    4380744  -0.210 0.833665
## fCollegeMemphis                    8304170    4658732   1.782 0.075912 .
## fCollegeMiami (FL)                 2320198    5407678   0.429 0.668261
## fCollegeMichigan                   4106255    3770622   1.089 0.277223
## fCollegeMichigan State             7432495    4191236   1.773 0.077419 .
## fCollegeMinnesota                  2906791    7090685   0.410 0.682206
## fCollegeMississippi State         -4500492    7136148  -0.631 0.528852
## fCollegeMissouri                    259724    4707070   0.055 0.956042
## fCollegeMissouri State             2379100    7184047   0.331 0.740805
## fCollegeMurray State               4748625    5458482   0.870 0.385181
## fCollegenan                        1533979    3031377   0.506 0.613290
## fCollegeNebraska                  -2079566    5483907  -0.379 0.704860
## fCollegeNevada                    -3670742    5449668  -0.674 0.501221
## fCollegeNew Mexico                -4349522    7159721  -0.607 0.544085
## fCollegeNew Mexico JC             -1532660    7348299  -0.209 0.834955
## fCollegeNew Mexico State          18654798    7282068   2.562 0.011017 *
## fCollegeNorth Carolina             1393618    3588872   0.388 0.698120
## fCollegeNorth Carolina State       4333657    7048921   0.615 0.539262
## fCollegeNotre Dame                -1228731    7101977  -0.173 0.862785
## fCollegeOhio                      -2630969    7069536  -0.372 0.710100
## fCollegeOhio State                 3285775    5466872   0.601 0.548375
## fCollegeOklahoma                   3235096    4746893   0.682 0.496190
## fCollegeOklahoma State             4693269    5441718   0.862 0.389281
## fCollegeOld Dominion                906151    7300063   0.124 0.901315
## fCollegeOle Miss                  -2405061    7125018  -0.338 0.735991
## fCollegeOregon                     1437565    4095396   0.351 0.725876
## fCollegeOregon State              -4314823    7015952  -0.615 0.539127
## fCollegePittsburgh                10263663    7151216   1.435 0.152501
```

```
## fCollegeProvidence                  -3812579    7083424  -0.538 0.590902
## fCollegePurdue                      -5277988    7242778  -0.729 0.466869
## fCollegeRadford                    -10899112    7081142  -1.539 0.125058
## fCollegeSaint Joseph's              -2281740    7152871  -0.319 0.750002
## fCollegeSaint Mary's                -1899135    5392933  -0.352 0.725028
## fCollegeSalt Lake CC UT             -4021284    7141401  -0.563 0.573888
## fCollegeSan Diego State             -3124152    5493079  -0.569 0.570053
## fCollegeSMU                         -2231803    4793802  -0.466 0.641946
## fCollegeSouth Carolina              -3576467    6954434  -0.514 0.607528
## fCollegeSt. John's                  -4880273    7107488  -0.687 0.492963
## fCollegeStanford                     2696924    3974744   0.679 0.498088
## fCollegeSyracuse                     1213731    4192576   0.289 0.772448
## fCollegeTCU                         -1904171    5447269  -0.350 0.726967
## fCollegeTennessee                     234192    4416276   0.053 0.957752
## fCollegeTennessee State              8055166    7197742   1.119 0.264188
## fCollegeTexas                        4205455    3554715   1.183 0.237935
## fCollegeTexas A&M                    -213765    4784708  -0.045 0.964402
## fCollegeTexas Tech                  -2281541    7112286  -0.321 0.748645
## fCollegeUC Santa Barbara            -2696805    7100554  -0.380 0.704423
## fCollegeUCLA                         8836914    3601592   2.454 0.014843 *
## fCollegeUNLV                         4702775    4897341   0.960 0.337869
## fCollegeUSC                          3745041    3663827   1.022 0.307714
## fCollegeUSC Upstate                 -5188798    7042677  -0.737 0.461973
## fCollegeUtah                         4061725    4709542   0.862 0.389289
## fCollegeUtah State                  -2888614    7068905  -0.409 0.683165
## fCollegeVanderbilt                  -1550158    4307687  -0.360 0.719264
## fCollegeVillanova                    2434138    3687139   0.660 0.509768
## fCollegeVirginia                     2588201    3802818   0.681 0.496769
## fCollegeVirginia Commonwealth         728425    6909624   0.105 0.916128
## fCollegeVirginia Tech                -614247    6821138  -0.090 0.928321
## fCollegeWake Forest                  2367341    4376940   0.541 0.589093
## fCollegeWashington                   2960491    3731818   0.793 0.428368
## fCollegeWashington State              480558    7155068   0.067 0.946507
## fCollegeWest Virginia                -961979    5416490  -0.178 0.859183
## fCollegeWestern Texas Coll. (J.C.)  -5905002    7020356  -0.841 0.401101
## fCollegeWichita State                4496550    5557829   0.809 0.419276
## fCollegeWisconsin                   -5446386    7186279  -0.758 0.449250
## fCollegeWyoming                       227931    5491491   0.042 0.966926
## fCollegeXavier                      -3380284    5273997  -0.641 0.522167
## fCollegeYale                        -5184150    7221952  -0.718 0.473547
## poly(Age, 3)1                       42214456    7676980   5.499 9.63e-08 ***
## poly(Age, 3)2                       -8540547    8176187  -1.045 0.297259
## poly(Age, 3)3                      -15264736    7607304  -2.007 0.045897 *
## Height_i                            -1527667    1331504  -1.147 0.252371
## Weight                                94552      26602   3.554 0.000455 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 6042000 on 244 degrees of freedom
## Multiple R-squared:  0.4858, Adjusted R-squared:  0.1697
## F-statistic: 1.537 on 150 and 244 DF,  p-value: 0.001463
```

```
summary(lm_step_wo <- step(lm1_wo))
```

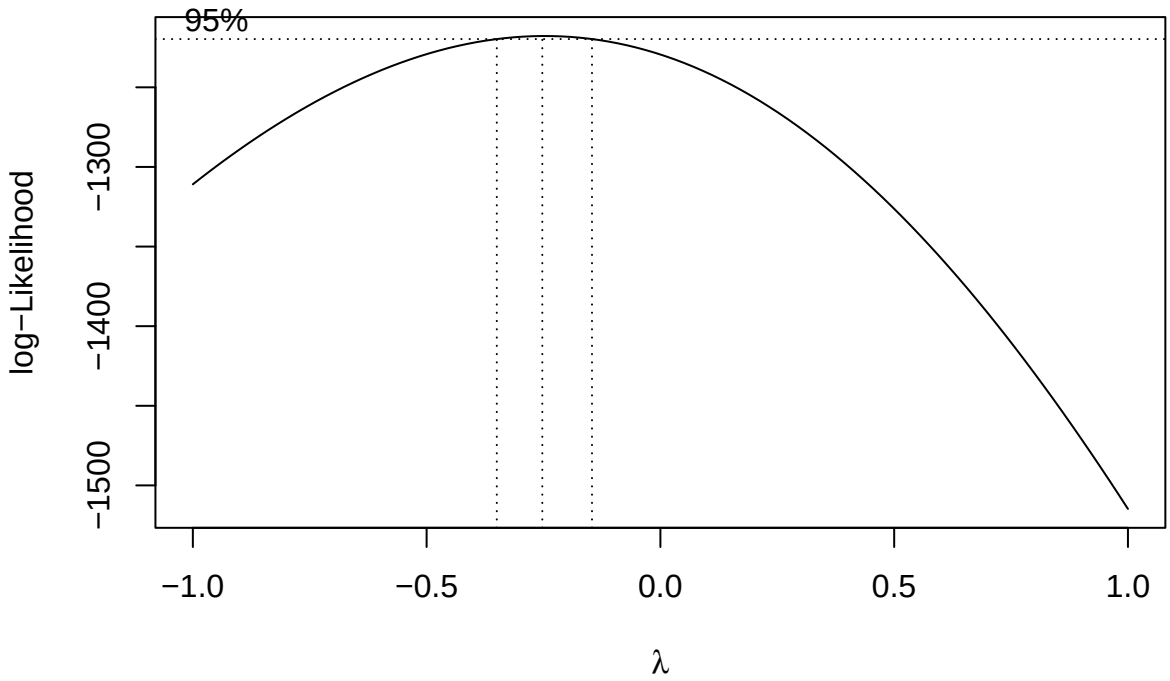
```
## Start:  AIC=12446.93
```

```
## Salary ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##
##                 Df  Sum of Sq        RSS   AIC
## - fCollege     112 4.0534e+15 1.2960e+16 12371
## - fTeam         29 1.1985e+15 1.0105e+16 12439
## <none>                        8.9065e+15 12447
## - Height_i       1 4.8049e+13 8.9545e+15 12447
## - fPosition      4 4.9461e+14 9.4011e+15 12460
## - Weight         1 4.6115e+14 9.3676e+15 12465
## - poly(Age, 3)   3 1.3545e+15 1.0261e+16 12497
##
## Step:  AIC=12371.09
## Salary ~ fTeam + fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df  Sum of Sq        RSS   AIC
## - fTeam        29 1.4663e+15 1.4426e+16 12355
## - Height_i      1 2.3127e+13 1.2983e+16 12370
## <none>                       1.2960e+16 12371
## - fPosition     4 5.6467e+14 1.3525e+16 12380
## - Weight        1 5.7576e+14 1.3536e+16 12386
## - poly(Age, 3)  3 2.1214e+15 1.5081e+16 12425
##
## Step:  AIC=12355.43
## Salary ~ fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df  Sum of Sq        RSS   AIC
## - Height_i      1 4.4364e+12 1.4431e+16 12354
## <none>                       1.4426e+16 12355
## - fPosition     4 6.1095e+14 1.5037e+16 12364
## - Weight        1 5.1591e+14 1.4942e+16 12367
## - poly(Age, 3)  3 1.8662e+15 1.6292e+16 12398
##
## Step:  AIC=12353.55
## Salary ~ fPosition + poly(Age, 3) + Weight
##
##                Df  Sum of Sq        RSS   AIC
## <none>                       1.4431e+16 12354
## - fPosition     4 6.5329e+14 1.5084e+16 12363
## - Weight        1 5.1149e+14 1.4942e+16 12365
## - poly(Age, 3)  3 1.9028e+15 1.6333e+16 12396
##
## Call:
## lm(formula = Salary ~ fPosition + poly(Age, 3) + Weight, data = ap_cl_f_wo)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -10346019  -4126044  -1144238   2333755  21329358
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -13644578    5383031  -2.535 0.011647 *
## fPositionPF     2248812    1110177   2.026 0.043490 *
```

```
## fPositionPG     6451777    1574088   4.099 5.07e-05 ***
## fPositionSF     2932747    1220594   2.403 0.016745 *
## fPositionSG     4074470    1383041   2.946 0.003414 **
## poly(Age, 3)1  39491886    6224860   6.344 6.27e-10 ***
## poly(Age, 3)2 -11330383    6188410  -1.831 0.067886 .
## poly(Age, 3)3 -16294790    6122866  -2.661 0.008109 **
## Weight            79280      21434   3.699 0.000248 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 6114000 on 386 degrees of freedom
## Multiple R-squared:  0.1668, Adjusted R-squared:  0.1496
## F-statistic: 9.662 on 8 and 386 DF,  p-value: 3.115e-12
```

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
```

```
summary(lm_step_trans <- step(lm1_trans <- lm(log(Salary)~fTeam + fPosition + fCollege + poly(Age,3) + H
```

```
## Start:  AIC=63.13
## log(Salary) ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##
##                 Df Sum of Sq    RSS     AIC
## - fCollege     118   112.484 363.45  -8.079
## - fTeam         29    15.575 266.54  31.921
## - Height_i       1     0.107 251.08  61.317
## <none>                       250.97  63.127
## - Weight         1     8.165 259.13  75.375
## - fPosition      6    14.621 265.59  76.325
## - poly(Age, 3)   3    45.448 296.42 131.192
##
## Step:  AIC=-8.08
## log(Salary) ~ fTeam + fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df Sum of Sq    RSS     AIC
## - fTeam        29    16.550 380.00 -46.264
## - Height_i      1     0.007 363.46 -10.070
## <none>                      363.45  -8.079
## - fPosition     6    15.007 378.46  -2.075
## - Weight        1     8.063 371.52  -0.316
## - poly(Age, 3)  3    65.521 428.97  59.678
##
## Step:  AIC=-46.26
## log(Salary) ~ fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df Sum of Sq    RSS     AIC
## - Height_i      1     0.002 380.00 -48.261
## <none>                      380.00 -46.264
## - fPosition     6    13.866 393.87 -42.315
## - Weight        1     6.228 386.23 -41.030
## - poly(Age, 3)  3    62.593 442.60  15.589
##
## Step:  AIC=-48.26
## log(Salary) ~ fPosition + poly(Age, 3) + Weight
##
##                Df Sum of Sq    RSS     AIC
## <none>                      380.00 -48.261
## - fPosition     6    14.709 394.71 -43.361
## - Weight        1     6.254 386.26 -42.997
## - poly(Age, 3)  3    63.348 443.35  14.350
```

```
##
## Call:
## lm(formula = log(Salary) ~ fPosition + poly(Age, 3) + Weight,
```

```
##     data = ap_tibble)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.83384 -0.75300  0.00348  0.68066  2.13764
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)   13.330870   0.782775  17.030  < 2e-16 ***
## fPositionF    -0.489098   0.340488  -1.436  0.15159
## fPositionG     0.737585   0.412128   1.790  0.07420 .
## fPositionPF    0.174562   0.163833   1.065  0.28725
## fPositionPG    0.711135   0.231400   3.073  0.00225 **
## fPositionSF    0.316997   0.179784   1.763  0.07857 .
## fPositionSG    0.403881   0.202448   1.995  0.04667 *
## poly(Age, 3)1  6.769471   0.952473   7.107 4.89e-12 ***
## poly(Age, 3)2 -3.110142   0.948675  -3.278  0.00113 **
## poly(Age, 3)3 -3.153257   0.942313  -3.346  0.00089 ***
## Weight         0.008296   0.003104   2.673  0.00781 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9357 on 434 degrees of freedom
## Multiple R-squared:  0.1893, Adjusted R-squared:  0.1706
## F-statistic: 10.13 on 10 and 434 DF,  p-value: 2.258e-15
```

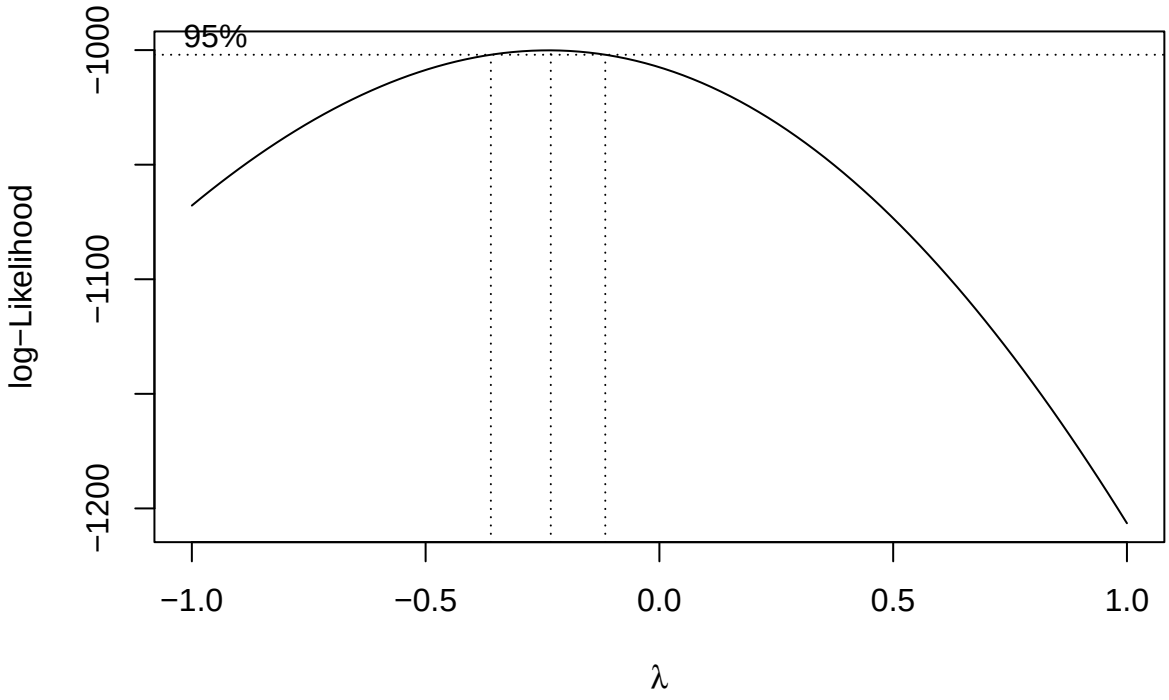
```
lm_step_trans
```

```
##
## Call:
## lm(formula = log(Salary) ~ fPosition + poly(Age, 3) + Weight,
##     data = ap_tibble)
##
## Coefficients:
##   (Intercept)     fPositionF     fPositionG    fPositionPF    fPositionPG
##     13.330870      -0.489098       0.737585       0.174562       0.711135
##   fPositionSF    fPositionSG  poly(Age, 3)1  poly(Age, 3)2  poly(Age, 3)3
##      0.316997       0.403881       6.769471      -3.110142      -3.153257
##        Weight
##      0.008296
```

Box-Cox w/o outliers and high leverage

Very poor results compared to keeping the high leverage points and the outliers.

```
boxcox(lm1_wo,lambda=seq(-1, 1, by=0.05))
```




```
BoxCoxTrans(ap_cl_f_wo$Salary)
```

```
## Box-Cox Transformation
##
## 395 data points used to estimate Lambda
##
## Input data summary:
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
##   925258  1782621  4000000  6771992  9569680 33003936
##
## Largest/Smallest: 35.7
## Sample Skewness: 1.64
##
## Estimated Lambda: -0.2
## With fudge factor, Lambda = 0 will be used for transformations
```

```
summary(lm_step_trans_wo <- step(lm1_trans_wo <- lm(log(Salary)~fTeam + fPosition + fCollege + poly(Age
```

```
## Start:  AIC=-44.72
## log(Salary) ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##
##                 Df Sum of Sq    RSS      AIC
## - fCollege     112    82.182 246.39 -108.431
## - fTeam         29    25.136 189.34  -46.454
## - Height_i       1     0.199 164.41  -46.238
## <none>                       164.21  -44.716
```

```
## - fPosition      4     8.400 172.61  -33.010
## - Weight         1     6.013 170.22  -32.509
## - poly(Age, 3)   3    25.455 189.66    6.210
##
## Step:  AIC=-108.43
## log(Salary) ~ fTeam + fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df Sum of Sq    RSS     AIC
## - fTeam        29    33.216 279.60 -116.48
## - Height_i      1     0.424 246.81 -109.75
## <none>                      246.39 -108.43
## - fPosition     4     5.192 251.58 -108.19
## - Weight        1     5.190 251.58 -102.20
## - poly(Age, 3)  3    42.152 288.54  -52.05
##
## Step:  AIC=-116.48
## log(Salary) ~ fPosition + poly(Age, 3) + Height_i + Weight
##
##                Df Sum of Sq    RSS      AIC
## - Height_i      1     0.134 279.74 -118.288
## - fPosition     4     4.854 284.46 -117.679
## <none>                      279.60 -116.477
## - Weight        1     3.839 283.44 -113.090
## - poly(Age, 3)  3    35.155 314.76  -75.695
##
## Step:  AIC=-118.29
## log(Salary) ~ fPosition + poly(Age, 3) + Weight
##
##                Df Sum of Sq    RSS      AIC
## - fPosition     4     5.392 285.13 -118.746
## <none>                      279.74 -118.288
## - Weight        1     3.735 283.47 -115.048
## - poly(Age, 3)  3    35.881 315.62  -76.618
##
## Step:  AIC=-118.75
## log(Salary) ~ poly(Age, 3) + Weight
##
##                Df Sum of Sq    RSS      AIC
## - Weight        1     0.197 285.33 -120.473
## <none>                      285.13 -118.746
## - poly(Age, 3)  3    38.376 323.51  -74.869
##
## Step:  AIC=-120.47
## log(Salary) ~ poly(Age, 3)
##
##                Df Sum of Sq    RSS      AIC
## <none>                      285.33 -120.473
## - poly(Age, 3)  3    39.537 324.86  -75.214
##
## Call:
## lm(formula = log(Salary) ~ poly(Age, 3), data = ap_cl_f_wo)
##
## Residuals:
```

```
##      Min       1Q   Median       3Q      Max
## -1.53206 -0.71489 -0.03863  0.67631  2.04346
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)   15.30842    0.04298 356.160  < 2e-16 ***
## poly(Age, 3)1  5.43870    0.85425   6.367 5.42e-10 ***
## poly(Age, 3)2 -1.52348    0.85425  -1.783  0.07529 .
## poly(Age, 3)3 -2.76344    0.85425  -3.235  0.00132 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8542 on 391 degrees of freedom
## Multiple R-squared:  0.1217, Adjusted R-squared:  0.115
## F-statistic: 18.06 on 3 and 391 DF,  p-value: 5.385e-11
```

Comparing Models

```
anova(lm_step,lm3,lm2,lm1)
```

```
## Analysis of Variance Table
##
## Model 1: Salary ~ fPosition + poly(Age, 3) + Weight
## Model 2: Salary ~ fPosition + fCollege + poly(Age, 3) + Weight
## Model 3: Salary ~ fPosition + fCollege + poly(Age, 3) + Height_i + Weight
## Model 4: Salary ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##   Res.Df        RSS  Df  Sum of Sq      F Pr(>F)
## 1    434 3.4811e+16
## 2    316 2.5028e+16 118 9.7829e+15 0.9937 0.5077
## 3    315 2.5022e+16   1 5.9446e+12 0.0713 0.7897
## 4    286 2.3861e+16  29 1.1609e+15 0.4798 0.9902
```

```
performance::compare_performance(lm1,lm2,lm3,lm_step, rank = TRUE)
```

```
## # Comparison of Model Performance Indices
##
## Name    | Model |    R2 | R2 (adj.) |      RMSE |     Sigma | AIC weights | BIC weights | Performanc
## ----------------------------------------------------------------------------------------------------
## lm3     |    lm | 0.423 |     0.190 | 7.500e+06 | 8.900e+06 |     < 0.001 |     < 0.001 |
## lm2     |    lm | 0.423 |     0.187 | 7.499e+06 | 8.913e+06 |     < 0.001 |     < 0.001 |
## lm_step |    lm | 0.198 |     0.179 | 8.845e+06 | 8.956e+06 |        1.00 |        1.00 |
## lm1     |    lm | 0.450 |     0.146 | 7.323e+06 | 9.134e+06 |     < 0.001 |     < 0.001 |
```

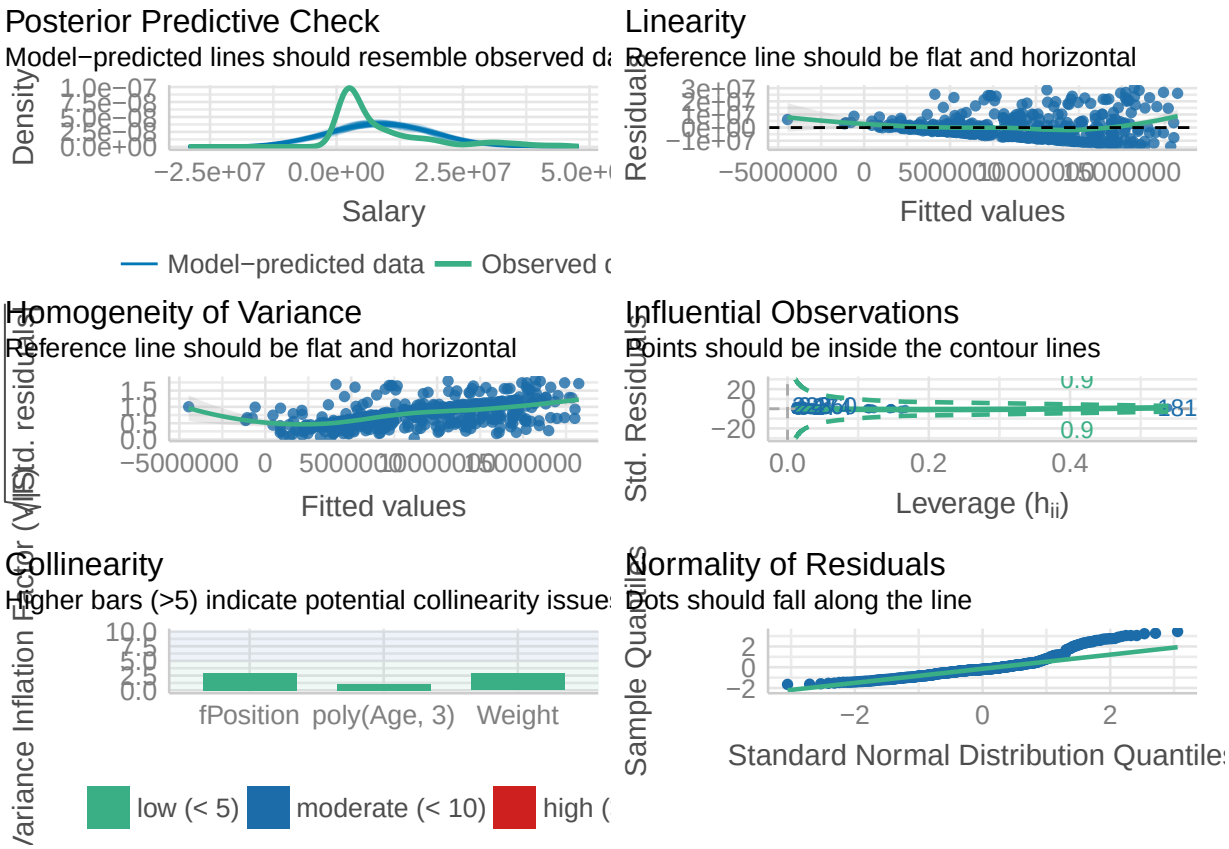
```
anova(lm_step_trans,lm1_trans)
```

```
## Analysis of Variance Table
##
## Model 1: log(Salary) ~ fPosition + poly(Age, 3) + Weight
## Model 2: log(Salary) ~ fTeam + fPosition + fCollege + poly(Age, 3) + Height_i +
##     Weight
##   Res.Df    RSS  Df Sum of Sq      F Pr(>F)
## 1    434 380.00
## 2    286 250.97 148    129.04 0.9936 0.5119
```

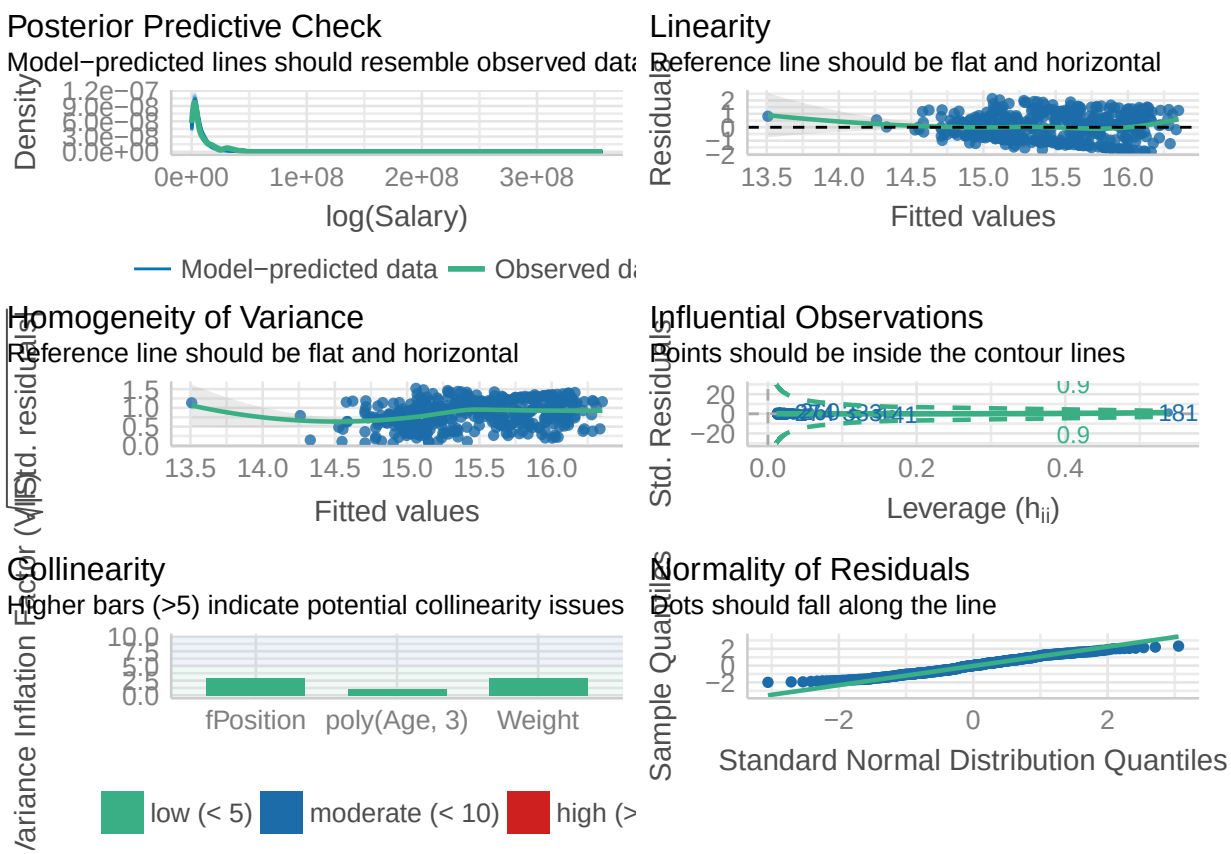
```
compare_performance(lm_step_trans,lm1_trans, rank = TRUE)
```

```
## # Comparison of Model Performance Indices
##
## Name          | Model |    R2 | R2 (adj.) |  RMSE | Sigma | AIC weights | BIC weights | Performance-S
## ----------------------------------------------------------------------------------------------------
## lm_step_trans |    lm | 0.189 |     0.171 | 0.924 | 0.936 |        1.00 |        1.00 |            6
## lm1_trans     |    lm | 0.465 |     0.169 | 0.751 | 0.937 |     < 0.001 |     < 0.001 |            3
```

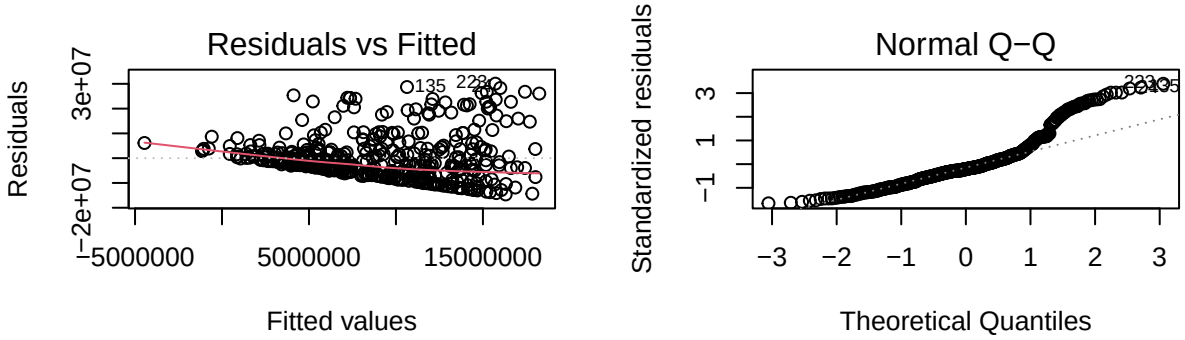
```
performance::check_model(lm_step)
```

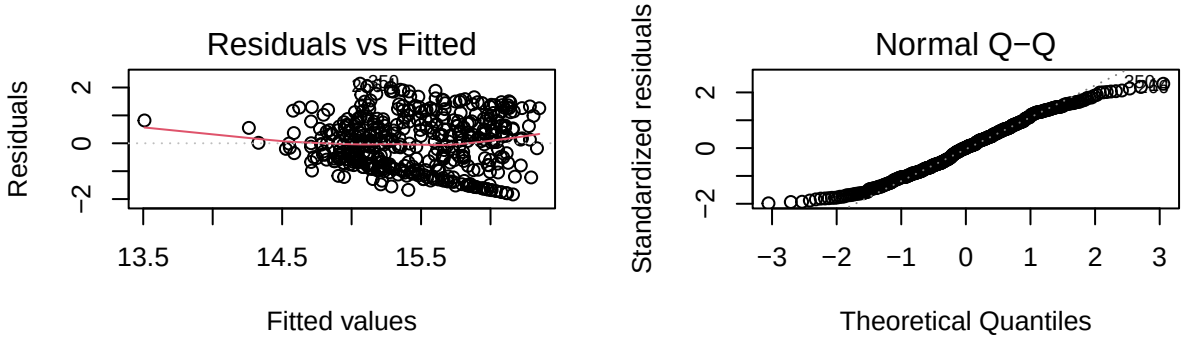



```
performance::check_model(lm_step_trans)
```




```
par(mfrow=c(2,2))
plot(lm_step,1:2)
plot(lm_step_trans,1:2)
```





VIF

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

```
##              GVIF Df GVIF^(1/(2*Df))
## fPosition    2.97  6            1.09
## poly(Age, 3) 1.08  3            1.01
## Weight       2.89  1            1.70
```

```
round(vif(lm_step_trans),2)
```

```
##              GVIF Df GVIF^(1/(2*Df))
## fPosition    2.97  6            1.09
## poly(Age, 3) 1.08  3            1.01
## Weight       2.89  1            1.70
```

Tests

```
shapiro.test(resid(lm_step_trans))
```

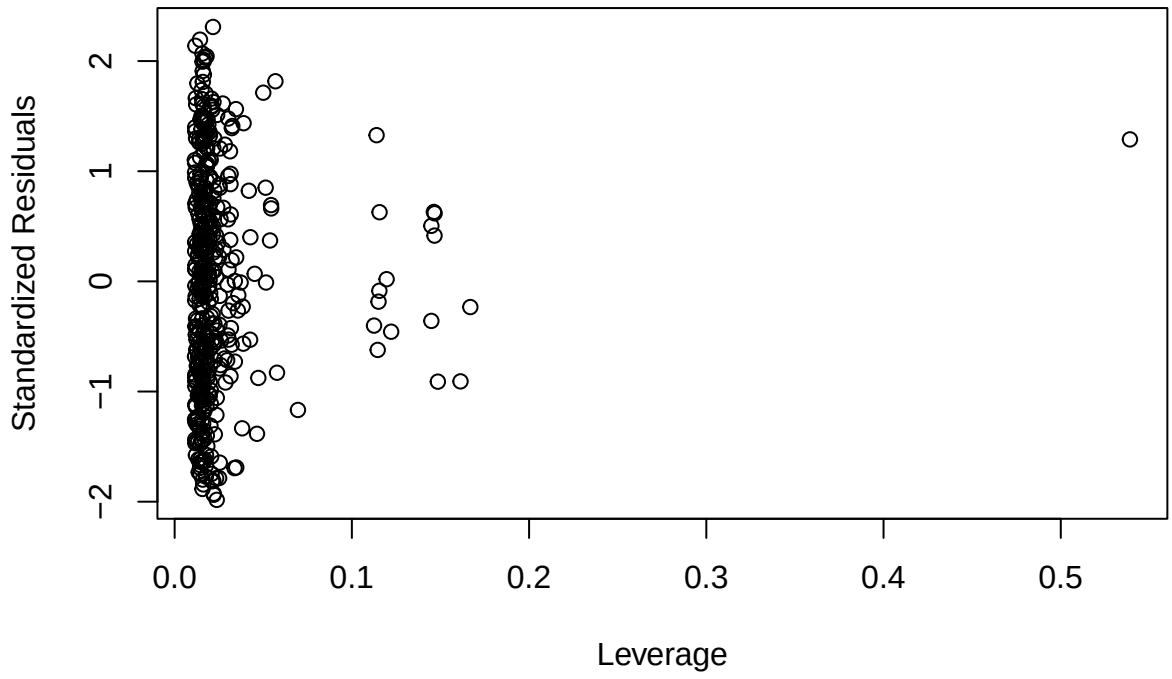
```
##
##  Shapiro-Wilk normality test
##
## data:  resid(lm_step_trans)
## W = 0.9816, p-value = 1.996e-05
```

```
bptest(lm_step_trans)
```

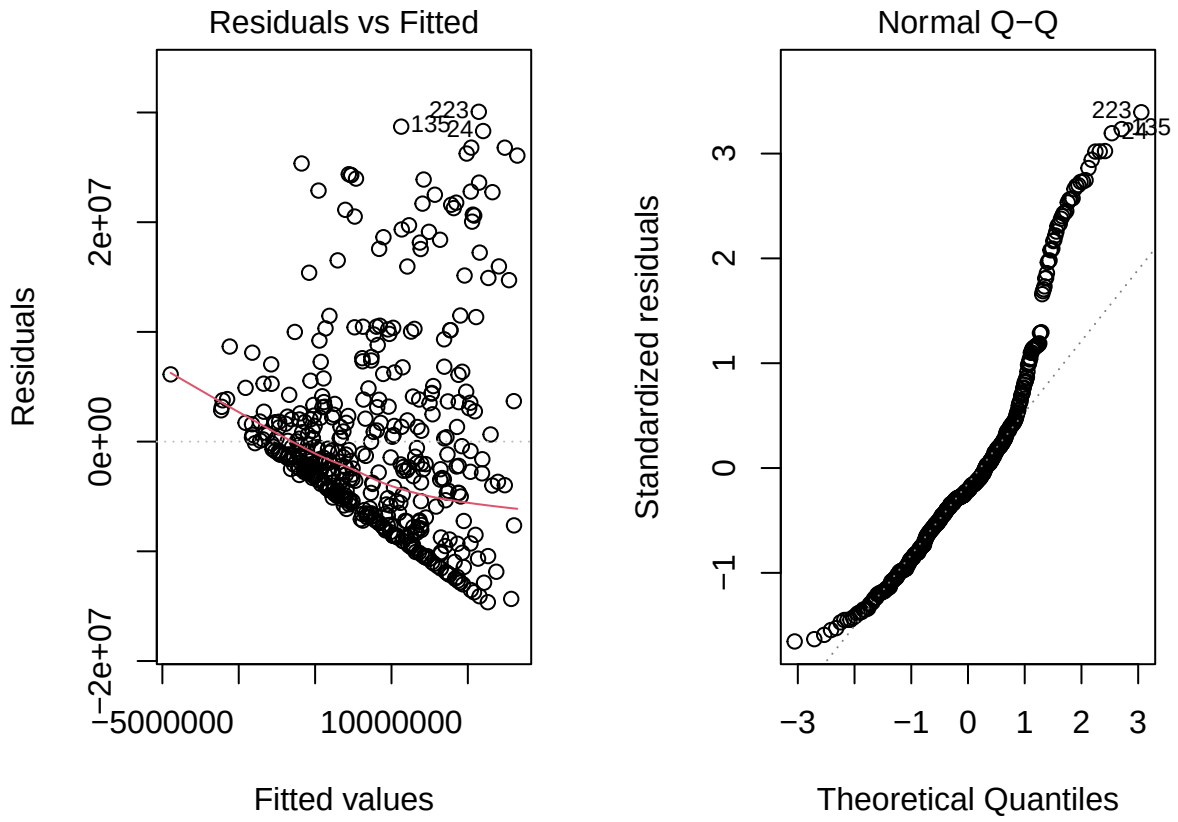
```
##
##  studentized Breusch-Pagan test
##
## data:  lm_step_trans
## BP = 47.163, df = 10, p-value = 8.819e-07
```

Plots

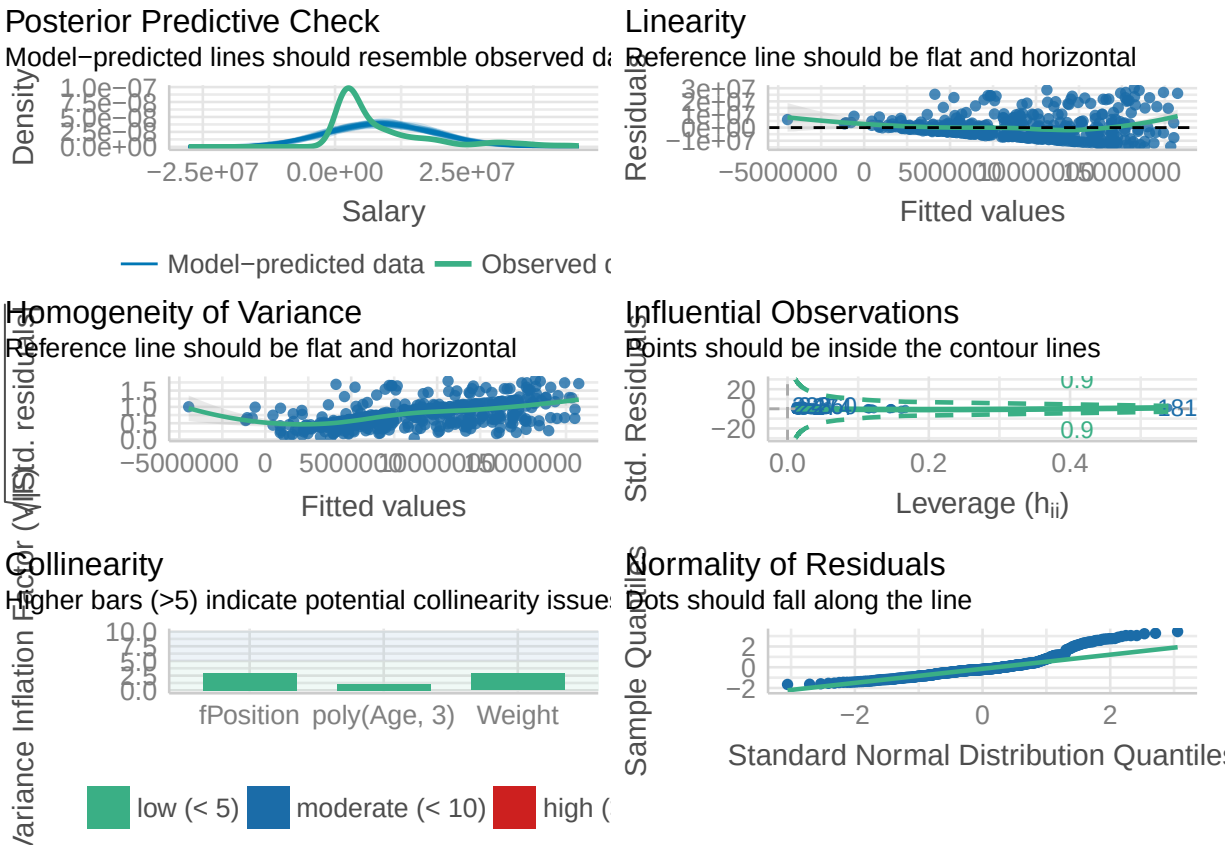
```
plot(hatvalues(lm_step), rstandard(lm_step_trans),xlab='Leverage', ylab='Standardized Residuals')
```




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




```
performance::check_model(lm_step)
```



Final Model

$$\widehat{log(Salary)} = 13.330870 - 0.489098(fPositionF) + 0.73758(fPositionG)$$
$$+ 0.174562(fPositionPF) + 0.711135(fPositionPG)$$
$$+ 0.316997(fPositionSF) + 0.403881(fPositionSG)$$
$$+ 6.769471(Age) - 3.110142(Age)^2 - 3.153257(Age)^3 + 0.008296(Weight)$$

Prediction

```
# Steph Curry, Age = 34, Weigth = 185, fPosition = PG, Salary = 45780966
newdata <- data.frame(fPosition='PG', Age=34, Weight = 185)
exp(predict(lm_step_trans, newdata, type='response'))
```

```
##       1
## 9417917
```

```
# Miles McBride Age = 20, Weight = 200, fPosition = PG, Salary = 925258
newdata <- data.frame(fPosition='PG', Age=20, Weight = 200)
exp(predict(lm_step_trans, newdata, type='response'))
```

```
##       1
## 4033461
```

```
newdata <- data.frame(fPosition=ap_tibble$fPosition, Age=ap_tibble$Age, Weight = ap_tibble$Weight)
exp(predict(lm_step_trans, newdata, type='response'))
```

```
##        1        2        3        4        5        6        7        8
##  4984308  8537257  4995094  2096032  6411921  7581163  3537132  3215994
```

```
##         9        10        11        12        13        14        15        16
##   6130537   4792147   6023740   6492755   9668497   3659307   3572870   3334280
##        17        18        19        20        21        22        23        24
##   6544753   4349617   6344794   3001652   3488085   9613913  10445453  10243254
##        25        26        27        28        29        30        31        32
##   8787662   9782022   4098449   8691070   9735534   5568847   3374611   3202418
##        33        34        35        36        37        38        39        40
##   6318667   3478931   9119907   9857477   4956691   3228654   3461139   4033461
##        41        42        43        44        45        46        47        48
##   4748071   3068207   6390165   3418300  11798381   3448000   6643243  10172390
##        49        50        51        52        53        54        55        56
##   7543747   8710380   7810515   8144495   7397451   2493543   4187434   4033461
##        57        58        59        60        61        62        63        64
##   4292953   3557067   3320515   8841498   4298707   4152841   1560487   4923749
##        65        66        67        68        69        70        71        72
##   4353689   3402350   5947200   3663361   5385604   2887368   8623718   4059532
##        73        74        75        76        77        78        79        80
##   5484426  10504758   3591998   5875679   5511577   7857625   4597446   3652850
##        81        82        83        84        85        86        87        88
##   3461139   5363253   9390844   3097476   9600161   4102384   5308460   8918911
##        89        90        91        92        93        94        95        96
##   4040480   2671086   3504438   6544753   3941167   4163656  10259389   4563090
##        97        98        99       100       101       102       103       104
##   2243245   3346367   6241896  10434012   4171798   2162760   4130727   3984114
##       105       106       107       108       109       110       111       112
##   3461139   4730899   3735171   6000120   3869584   5206636   4364772  11040561
##       113       114       115       116       117       118       119       120
##   3936446   3808902   4919026   8463813   8996403   2998965   3370109   3659307
##       121       122       123       124       125       126       127       128
##  11715032   8860864   3790666   6739013   2442713   6352569   6278845   6808475
##       129       130       131       132       133       134       135       136
##   9384586   5170057   6137715   4717492   7330729   4589586   5979852   8048625
##       137       138       139       140       141       142       143       144
##   5767607   7298787   4222316   4130727   8709163  12108208   7238490  11142797
##       145       146       147       148       149       150       151       152
##   8934675   3760504   5881458   8852333   5604945   3904882   8781433   8836347
##       153       154       155       156       157       158       159       160
##   9236121   3381255   4144188   3189861   3153131   3548355   6375131   6621600
##       161       162       163       164       165       166       167       168
##   3839690   3416832   2730311   4144188   3540182   9637449   4668977   2738395
##       169       170       171       172       173       174       175       176
##   4459222   3044575   4783954   8928341   3563065   5544203   9339986   2442713
##       177       178       179       180       181       182       183       184
##   3746230   4339986  10045595   8415937    735930   4040480   9063810  10021062
##       185       186       187       188       189       190       191       192
##   3461139   8352929   6821923   5284690   6574131   6344794   4569882   3718827
##       193       194       195       196       197       198       199       200
##   3172385   3978305   9384586   5382302   3278009   5767607   3746230  11050744
##       201       202       203       204       205       206       207       208
##   3715281   8534317   3092094   3210407   3994490   2954833   7178691   7641185
##       209       210       211       212       213       214       215       216
##   4095146   7002243  10430511   2951213   6907417   3746230   5604945   4944707
##       217       218       219       220       221       222       223       224
##   4292953   3607718   5792848   8637499   2546162   8909954  10147833   8711984
```

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##      225      226      227      228      229      230      231      232
##  2037101  2992018  7359586  3739688  3229094  5275005  8835913  3171724
##      233      234      235      236      237      238      239      240
##  6107839  9675387  6691406  4747086  2760224  8848571  9595456  7673710
##      241      242      243      244      245      246      247      248
## 10085139  7626396 12413322  2624297  4904505  9159819  4664265  9236325
##      249      250      251      252      253      254      255      256
##  4069257  4452937  3832196  4787387  5910384  7631975  8359455  8957654
##      257      258      259      260      261      262      263      264
##  5998659  3933066  7889616  7901517  3673711  6821304  7937203 11798381
##      265      266      267      268      269      270      271      272
##  3713961  4328714  4609671  9080936  4648070  4648070  7504863 10086993
##      273      274      275      276      277      278      279      280
##  6795174  6290415  7113098  7857625  5893075  3790666  2789052  3543354
##      281      282      283      284      285      286      287      288
##  8459369  4152841  4410655  3718827  7330729  7996142  5377220  3790666
##      289      290      291      292      293      294      295      296
##  5148578  6847918  4029196  5206636  2730311  8485854  3796378  3004185
##      297      298      299      300      301      302      303      304
##  5697531  5839699  7759482  8132505  6302770  5813418  6357532  2966465
##      305      306      307      308      309      310      311      312
##  7166115  8308450 11907371  4939395  7555403  2894473  9980858  3338040
##      313      314      315      316      317      318      319      320
##  3005662  9827078  2455790  7330729  3079970  7270168  3175529  2631131
##      321      322      323      324      325      326      327      328
##  5486897  7273145  5069977 12620990  3499562  7755311  2671086  7082949
##      329      330      331      332      333      334      335      336
##  4160501  5263969  3708440  4465027  2145859  3489231  6137715  5069977
##      337      338      339      340      341      342      343      344
##  3673711  4863988  3653254  2882127  3431819  3233184  2602617  3829293
##      345      346      347      348      349      350      351      352
##  3413220  7110186  6011865  2441512  6089736  3475219  3320515  3144826
##      353      354      355      356      357      358      359      360
##  2698595  3975812  3255549  8147618  6060887  8585714  4943602  7621049
##      361      362      363      364      365      366      367      368
##  4422304  4756336  7060572  5067693  3352191  3718827  4917277  8459369
##      369      370      371      372      373      374      375      376
##  4743807  4525823  2814889  3080982  3097476  3446057  7538375  8984175
##      377      378      379      380      381      382      383      384
##  6358691  2441512 10591991  5089871  4292953  4960001  8497847  7324633
##      385      386      387      388      389      390      391      392
##  3017054  7115295  6268464  6341936  3286666  3910394  7499004  3697493
##      393      394      395      396      397      398      399      400
##  9735534  3346367  5950552  2082604  3361355  3751517  5560618  3785139
##      401      402      403      404      405      406      407      408
##  5986853  4639869  2631708  1672339  6293891  3461139  9296626  3187880
##      409      410      411      412      413      414      415      416
##  3112081  3951200  3278009  3360611  7555403  2156909  3341650  3146177
##      417      418      419      420      421      422      423      424
##  5287646  2458447  6956407  3097476 11144300  3352191  6902024  6498495
##      425      426      427      428      429      430      431      432
##  7822693  8486073  7032887  2847477  7657825  6302770  4016256  9870085
##      433      434      435      436      437      438      439      440
##  5617233  2971628  9701211  9339986  9565003  8101351  3814278  9977678
```

```
##      441      442      443      444      445
##  5284690  6681975  4328714  2661191  9934743
```

Conclusion

Given that the estimated/predicted salaries are way way off, and that the adjusted R^2 of the `lm_step_trans` is only 0.171, there are obviously other predictors responsible for the majority of variance in the salaries of NBA players, most likely factors such as points scored, assists, rebounds, etc.

It was never expected that `Age`, `Weight`, and `fPosition` would be responsible for explaining the majority of variance.