```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
train <- read.csv("data/Train.csv")
head(train)
```

```
##   ATTEND BFACIL  BMI CIG_0 DBWT DMAR FAGECOMB FEDUC FRACE6 LD_INDL MAGER
## 1      1      1 22.3 FALSE 3572    2       23     4      1       N    22
## 2      1      1 28.3 FALSE 3355    1       31     6      5       N    31
## 3      1      1 22.3 FALSE 3550    1       39     1      1       Y    38
## 4      1      1 30.2 FALSE 3190    1       32     7      1       Y    36
## 5      1      1 21.9 FALSE 2725    1       32     4      1       N    32
## 6      1      1 18.9 FALSE 3577    1       26     3      2       N    29
##   MBSTATE_REC MEDUC MRAVE6 M_Ht_In NO_INFEC NO_MMORB NO_RISKS PAY_REC PRECARE
## 1           1     5      1      64        1        1        1       2       1
## 2           2     6      4      64        1        1        0       2       1
## 3           2     2      1      60        1        1        0       1       1
## 4           1     7      1      67        1        1        1       2       1
## 5           1     7      1      67        1        1        1       2       1
## 6           1     6      2      67        1        1        0       2       1
##   PREVIS PRIORDEAD PRIORLIVE PRIORTERM RDMETH_REC RESTATUS RF_CESAR SEX
## 1     11     FALSE     FALSE     FALSE          1        1        N   M
## 2     13     FALSE      TRUE      TRUE          1        2        N   M
## 3     18     FALSE      TRUE      TRUE          1        2        N   F
## 4      9     FALSE     FALSE      TRUE          1        2        N   M
## 5     11     FALSE     FALSE     FALSE          1        2        N   M
## 6     12     FALSE      TRUE      TRUE          4        1        Y   F
##   PREG_LEN WTGAIN_PER FIRST_BIRTH
## 1        9  0.3923077        TRUE
## 2        9  0.1393939       FALSE
## 3        8  0.2543860       FALSE
## 4       10  0.1036269        TRUE
## 5        8  0.1571429        TRUE
## 6       10  0.1735537       FALSE
```

```
# Factorize categorical variables
fac_train <- train %>% mutate_if(is.character, as.factor)
fac_train <- fac_train %>% mutate_if(is.logical, as.factor)
fac_train <- fac_train %>% mutate(ATTEND = factor(ATTEND), BFACIL = factor(BFACIL),
                                  DMAR = factor(DMAR), FEDUC = factor(FEDUC),
                                  FRACE6 = factor(FRACE6), MBSTATE_REC = factor(MBSTATE_REC),
                                  MEDUC = factor(MEDUC), MRAVE6 = factor(MRAVE6),
```

```
                                  NO_INFEC = factor(NO_INFEC),NO_MMORB = factor(NO_MMORB),
                                  NO_RISKS = factor(NO_RISKS), PAY_REC = factor(PAY_REC),
                                  PRECARE = factor(PRECARE), RDMETH_REC = factor(RDMETH_REC),
                                  RESTATUS = factor(RESTATUS))
head(fac_train)
```

```
##   ATTEND BFACIL  BMI CIG_0 DBWT DMAR FAGECOMB FEDUC FRACE6 LD_INDL MAGER
## 1      1      1 22.3 FALSE 3572    2       23     4      1       N    22
## 2      1      1 28.3 FALSE 3355    1       31     6      5       N    31
## 3      1      1 22.3 FALSE 3550    1       39     1      1       Y    38
## 4      1      1 30.2 FALSE 3190    1       32     7      1       Y    36
## 5      1      1 21.9 FALSE 2725    1       32     4      1       N    32
## 6      1      1 18.9 FALSE 3577    1       26     3      2       N    29
##   MBSTATE_REC MEDUC MRAVE6 M_Ht_In NO_INFEC NO_MMORB NO_RISKS PAY_REC PRECARE
## 1           1     5      1      64        1        1        1       2       1
## 2           2     6      4      64        1        1        0       2       1
## 3           2     2      1      60        1        1        0       1       1
## 4           1     7      1      67        1        1        1       2       1
## 5           1     7      1      67        1        1        1       2       1
## 6           1     6      2      67        1        1        0       2       1
##   PREVIS PRIORDEAD PRIORLIVE PRIORTERM RDMETH_REC RESTATUS RF_CESAR SEX
## 1     11     FALSE     FALSE     FALSE          1        1        N   M
## 2     13     FALSE      TRUE      TRUE          1        2        N   M
## 3     18     FALSE      TRUE      TRUE          1        2        N   F
## 4      9     FALSE     FALSE      TRUE          1        2        N   M
## 5     11     FALSE     FALSE     FALSE          1        2        N   M
## 6     12     FALSE      TRUE      TRUE          4        1        Y   F
##   PREG_LEN WTGAIN_PER FIRST_BIRTH
## 1        9  0.3923077        TRUE
## 2        9  0.1393939       FALSE
## 3        8  0.2543860       FALSE
## 4       10  0.1036269        TRUE
## 5        8  0.1571429        TRUE
## 6       10  0.1735537       FALSE
```

```
biggest.model = lm(DBWT ~ ., data = fac_train)
summary(biggest.model)
```

```
##
## Call:
## lm(formula = DBWT ~ ., data = fac_train)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2860.5  -287.8     0.7   292.7  5085.9
##
## Coefficients: (1 not defined because of singularities)
##                  Estimate Std. Error  t value Pr(>|t|)
## (Intercept)       705.1593    61.4070   11.483  < 2e-16 ***
## ATTEND2             9.7153     5.3888    1.803 0.071409 .
## ATTEND3            55.1169     5.4497   10.114  < 2e-16 ***
## ATTEND4            60.2146    20.1735    2.985 0.002838 **
```

```
## ATTEND5           42.3606    19.7243    2.148 0.031746 *
## BFACIL2          100.9285    19.8738    5.078 3.81e-07 ***
## BFACIL3          102.8994    19.9946    5.146 2.66e-07 ***
## BFACIL4          -13.5561    49.2222   -0.275 0.783004
## BFACIL5          -45.8778   143.1461   -0.320 0.748593
## BFACIL6           46.1928   101.2902    0.456 0.648360
## BFACIL7           38.0374    62.0247    0.613 0.539704
## BMI               17.8620     0.2887   61.878  < 2e-16 ***
## CIG_0TRUE       -133.6952     5.9722  -22.386  < 2e-16 ***
## DMAR2             -7.8587     4.0356   -1.947 0.051496 .
## FAGECOMB          -1.1404     0.3402   -3.352 0.000802 ***
## FEDUC2           -26.2678    12.4626   -2.108 0.035057 *
## FEDUC3            -9.9934    11.9633   -0.835 0.403531
## FEDUC4            -2.9890    12.3174   -0.243 0.808269
## FEDUC5             3.7545    13.0609    0.287 0.773761
## FEDUC6            11.9601    12.5816    0.951 0.341807
## FEDUC7             7.5306    13.3721    0.563 0.573326
## FEDUC8            15.5179    14.8549    1.045 0.296196
## FRACE62          -49.4896     7.5229   -6.579 4.77e-11 ***
## FRACE63           41.3405    20.1554    2.051 0.040261 *
## FRACE64         -116.3867    11.2027  -10.389  < 2e-16 ***
## FRACE65           19.1574    39.8306    0.481 0.630537
## FRACE66          -17.1602    10.5979   -1.619 0.105407
## LD_INDLY          38.7008     3.5002   11.057  < 2e-16 ***
## MAGER             -0.2122     0.4504   -0.471 0.637619
## MBSTATE_REC2      60.9607     4.5797   13.311  < 2e-16 ***
## MEDUC2           -30.2572    13.6131   -2.223 0.026242 *
## MEDUC3           -25.2133    13.0989   -1.925 0.054252 .
## MEDUC4           -15.9619    13.3527   -1.195 0.231931
## MEDUC5            -8.8007    13.9111   -0.633 0.526972
## MEDUC6            -8.0424    13.6377   -0.590 0.555382
## MEDUC7           -10.3083    14.1956   -0.726 0.467744
## MEDUC8           -25.0269    16.0609   -1.558 0.119178
## MRAVE62         -135.8173     7.9104  -17.169  < 2e-16 ***
## MRAVE63           30.8027    19.6755    1.566 0.117461
## MRAVE64          -28.2806    11.0505   -2.559 0.010492 *
## MRAVE65          -57.1388    42.8188   -1.334 0.182065
## MRAVE66          -24.6624    10.3574   -2.381 0.017261 *
## M_Ht_In           30.1376     0.5628   53.547  < 2e-16 ***
## NO_INFEC1         37.9773    10.6534    3.565 0.000364 ***
## NO_MMORB1        -80.7438    12.4449   -6.488 8.73e-11 ***
## NO_RISKS1        123.3718     4.3348   28.461  < 2e-16 ***
## PAY_REC2          31.1965     4.1210    7.570 3.76e-14 ***
## PAY_REC3          28.1636     8.9995    3.129 0.001752 **
## PAY_REC4          28.5946     8.2624    3.461 0.000539 ***
## PRECARE1         -71.9759    16.7024   -4.309 1.64e-05 ***
## PRECARE2         -20.5926    16.6852   -1.234 0.217136
## PRECARE3          20.6583    17.7479    1.164 0.244433
## PREVIS            10.0083     0.4470   22.392  < 2e-16 ***
## PRIORDEADTRUE    -19.2426    15.8146   -1.217 0.223696
## PRIORLIVETRUE     97.2590    40.4994    2.401 0.016330 *
## PRIORTERMTRUE     -3.2222     3.4387   -0.937 0.348733
## RDMETH_REC2      121.6138    11.3450   10.720  < 2e-16 ***
## RDMETH_REC3      -40.4019     4.1946   -9.632  < 2e-16 ***
```

```
## RDMETH_REC4       124.2193     6.1361   20.244  < 2e-16 ***
## RESTATUS2          -7.6216     3.3106   -2.302 0.021328 *
## RESTATUS3         -26.7035     9.1075   -2.932 0.003368 **
## RESTATUS4         -64.1177    29.1537   -2.199 0.027859 *
## RF_CESARY              NA         NA       NA       NA
## SEXM              119.2049     2.9981   39.761  < 2e-16 ***
## PREG_LEN8        -534.8140     5.8212  -91.874  < 2e-16 ***
## PREG_LEN9        -120.5358     4.3483  -27.720  < 2e-16 ***
## PREG_LENEarly   -1457.0530    11.0853 -131.440  < 2e-16 ***
## PREG_LENLate     -128.3443    15.3201   -8.378  < 2e-16 ***
## WTGAIN_PER        911.0908    16.4123   55.513  < 2e-16 ***
## FIRST_BIRTHTRUE    -5.1290    40.6020   -0.126 0.899476
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 473.4 on 99931 degrees of freedom
## Multiple R-squared:  0.3188, Adjusted R-squared:  0.3183
## F-statistic: 687.6 on 68 and 99931 DF,  p-value: < 2.2e-16
```

```
# Remove the columns causing singularity
fac_train <- fac_train %>% select(!c(RF_CESAR))
biggest.model = lm(DBWT ~ ., data = fac_train)
min.model = lm(DBWT ~ 1, data = fac_train)
summary(biggest.model)
```

```
##
## Call:
## lm(formula = DBWT ~ ., data = fac_train)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2860.5  -287.8     0.7   292.7  5085.9
##
## Coefficients:
##                   Estimate Std. Error  t value Pr(>|t|)
## (Intercept)       705.1593    61.4070   11.483  < 2e-16 ***
## ATTEND2             9.7153     5.3888    1.803 0.071409 .
## ATTEND3            55.1169     5.4497   10.114  < 2e-16 ***
## ATTEND4            60.2146    20.1735    2.985 0.002838 **
## ATTEND5            42.3606    19.7243    2.148 0.031746 *
## BFACIL2           100.9285    19.8738    5.078 3.81e-07 ***
## BFACIL3           102.8994    19.9946    5.146 2.66e-07 ***
## BFACIL4           -13.5561    49.2222   -0.275 0.783004
## BFACIL5           -45.8778   143.1461   -0.320 0.748593
## BFACIL6            46.1928   101.2902    0.456 0.648360
## BFACIL7            38.0374    62.0247    0.613 0.539704
## BMI                17.8620     0.2887   61.878  < 2e-16 ***
## CIG_0TRUE        -133.6952     5.9722  -22.386  < 2e-16 ***
## DMAR2              -7.8587     4.0356   -1.947 0.051496 .
## FAGECOMB           -1.1404     0.3402   -3.352 0.000802 ***
## FEDUC2            -26.2678    12.4626   -2.108 0.035057 *
## FEDUC3             -9.9934    11.9633   -0.835 0.403531
## FEDUC4             -2.9890    12.3174   -0.243 0.808269
## FEDUC5              3.7545    13.0609    0.287 0.773761
```

```
## FEDUC6             11.9601    12.5816    0.951 0.341807
## FEDUC7              7.5306    13.3721    0.563 0.573326
## FEDUC8             15.5179    14.8549    1.045 0.296196
## FRACE62           -49.4896     7.5229   -6.579 4.77e-11 ***
## FRACE63            41.3405    20.1554    2.051 0.040261 *
## FRACE64          -116.3867    11.2027  -10.389  < 2e-16 ***
## FRACE65            19.1574    39.8306    0.481 0.630537
## FRACE66           -17.1602    10.5979   -1.619 0.105407
## LD_INDLY           38.7008     3.5002   11.057  < 2e-16 ***
## MAGER              -0.2122     0.4504   -0.471 0.637619
## MBSTATE_REC2       60.9607     4.5797   13.311  < 2e-16 ***
## MEDUC2            -30.2572    13.6131   -2.223 0.026242 *
## MEDUC3            -25.2133    13.0989   -1.925 0.054252 .
## MEDUC4            -15.9619    13.3527   -1.195 0.231931
## MEDUC5             -8.8007    13.9111   -0.633 0.526972
## MEDUC6             -8.0424    13.6377   -0.590 0.555382
## MEDUC7            -10.3083    14.1956   -0.726 0.467744
## MEDUC8            -25.0269    16.0609   -1.558 0.119178
## MRAVE62          -135.8173     7.9104  -17.169  < 2e-16 ***
## MRAVE63            30.8027    19.6755    1.566 0.117461
## MRAVE64           -28.2806    11.0505   -2.559 0.010492 *
## MRAVE65           -57.1388    42.8188   -1.334 0.182065
## MRAVE66           -24.6624    10.3574   -2.381 0.017261 *
## M_Ht_In            30.1376     0.5628   53.547  < 2e-16 ***
## NO_INFEC1          37.9773    10.6534    3.565 0.000364 ***
## NO_MMORB1         -80.7438    12.4449   -6.488 8.73e-11 ***
## NO_RISKS1         123.3718     4.3348   28.461  < 2e-16 ***
## PAY_REC2           31.1965     4.1210    7.570 3.76e-14 ***
## PAY_REC3           28.1636     8.9995    3.129 0.001752 **
## PAY_REC4           28.5946     8.2624    3.461 0.000539 ***
## PRECARE1          -71.9759    16.7024   -4.309 1.64e-05 ***
## PRECARE2          -20.5926    16.6852   -1.234 0.217136
## PRECARE3           20.6583    17.7479    1.164 0.244433
## PREVIS             10.0083     0.4470   22.392  < 2e-16 ***
## PRIORDEADTRUE     -19.2426    15.8146   -1.217 0.223696
## PRIORLIVETRUE      97.2590    40.4994    2.401 0.016330 *
## PRIORTERMTRUE      -3.2222     3.4387   -0.937 0.348733
## RDMETH_REC2       121.6138    11.3450   10.720  < 2e-16 ***
## RDMETH_REC3       -40.4019     4.1946   -9.632  < 2e-16 ***
## RDMETH_REC4       124.2193     6.1361   20.244  < 2e-16 ***
## RESTATUS2          -7.6216     3.3106   -2.302 0.021328 *
## RESTATUS3         -26.7035     9.1075   -2.932 0.003368 **
## RESTATUS4         -64.1177    29.1537   -2.199 0.027859 *
## SEXM              119.2049     2.9981   39.761  < 2e-16 ***
## PREG_LEN8        -534.8140     5.8212  -91.874  < 2e-16 ***
## PREG_LEN9        -120.5358     4.3483  -27.720  < 2e-16 ***
## PREG_LENEarly   -1457.0530    11.0853 -131.440  < 2e-16 ***
## PREG_LENLate     -128.3443    15.3201   -8.378  < 2e-16 ***
## WTGAIN_PER        911.0908    16.4123   55.513  < 2e-16 ***
## FIRST_BIRTHTRUE    -5.1290    40.6020   -0.126 0.899476
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 473.4 on 99931 degrees of freedom
```

```
## Multiple R-squared:  0.3188, Adjusted R-squared:  0.3183
## F-statistic: 687.6 on 68 and 99931 DF,  p-value: < 2.2e-16
```

```
# Forward selection with BIC
forward.BIC = step(min.model, direction="forward", scope = formula(biggest.model),
                   k = log(nrow(fac_train)), trace = 0)
forward.BIC$anova
```

```
##             Step Df   Deviance Resid. Df  Resid. Dev     AIC
## 1               NA         NA     99999 32872141631 1270308
## 2     + PREG_LEN -4 7112585860     99995 25759555772 1245972
## 3      + M_Ht_In -1  666514879     99994 25093040893 1243362
## 4       + MRAVE6 -5  424558483     99989 24668482409 1241713
## 5          + SEX -1  379634941     99988 24288847468 1240174
## 6          + BMI -1  276182289     99987 24012665179 1239042
## 7   + WTGAIN_PER -1  584294723     99986 23428370456 1236590
## 8    + PRIORLIVE -1  266996405     99985 23161374051 1235455
## 9        + CIG_0 -1  199587409     99984 22961786642 1234601
## 10    + NO_RISKS -1   87667890     99983 22874118752 1234230
## 11  + RDMETH_REC -3  116339934     99980 22757778818 1233755
## 12      + PREVIS -1   87688575     99979 22670090243 1233380
## 13     + PRECARE -3   47988617     99976 22622101626 1233203
## 14     + PAY_REC -3   43922230     99973 22578179396 1233043
## 15 + MBSTATE_REC -1   31544321     99972 22546635076 1232915
## 16      + ATTEND -4   42832566     99968 22503802510 1232771
## 17     + LD_INDL -1   25861158     99967 22477941352 1232667
## 18      + FRACE6 -5   33673772     99962 22444267580 1232575
## 19    + NO_MMORB -1    9716767     99961 22434550813 1232543
## 20    + NO_INFEC -1    3547531     99960 22431003282 1232539
## 21        + DMAR -1    2890556     99959 22428112726 1232538
```

```
# Backward selection with BIC
backward.BIC = step(biggest.model, direction="backward",
                    k = log(nrow(fac_train)), trace = 0)
backward.BIC
```

```
##
## Call:
## lm(formula = DBWT ~ ATTEND + BMI + CIG_0 + DMAR + FRACE6 + LD_INDL +
##     MBSTATE_REC + MRAVE6 + M_Ht_In + NO_INFEC + NO_MMORB + NO_RISKS +
##     PAY_REC + PRECARE + PREVIS + PRIORLIVE + RDMETH_REC + SEX +
##     PREG_LEN + WTGAIN_PER, data = fac_train)
##
## Coefficients:
##   (Intercept)        ATTEND2        ATTEND3        ATTEND4        ATTEND5
##        627.76          10.27          62.74         135.08          70.84
##           BMI      CIG_0TRUE          DMAR2        FRACE62        FRACE63
##         17.56        -143.02         -13.84         -49.21          38.02
##       FRACE64        FRACE65        FRACE66      LD_INDLY   MBSTATE_REC2
##       -113.90          18.79         -16.86          37.21          54.66
##       MRAVE62        MRAVE63        MRAVE64        MRAVE65        MRAVE66
##       -136.78          27.80         -25.15         -59.95         -24.10
##       M_Ht_In      NO_INFEC1      NO_MMORB1      NO_RISKS1       PAY_REC2
```

```
##         30.32          40.26         -81.43         125.05          38.91
##      PAY_REC3       PAY_REC4       PRECARE1       PRECARE2       PRECARE3
##         42.97          31.85         -66.89         -15.85          25.12
##        PREVIS  PRIORLIVETRUE    RDMETH_REC2    RDMETH_REC3    RDMETH_REC4
##         10.02          97.42         121.53         -41.14         123.99
##          SEXM      PREG_LEN8      PREG_LEN9  PREG_LENEarly   PREG_LENLate
##        119.37        -537.42        -121.45       -1460.80        -130.48
##    WTGAIN_PER
##        910.58
```

```
# Forward selection with AIC
forward.AIC = step(min.model, direction="forward", scope = formula(biggest.model),
                k = 2, trace = 0)
forward.AIC
```

```
##
## Call:
## lm(formula = DBWT ~ PREG_LEN + M_Ht_In + MRAVE6 + SEX + BMI +
##     WTGAIN_PER + PRIORLIVE + CIG_0 + NO_RISKS + RDMETH_REC +
##     PREVIS + ATTEND + PRECARE + PAY_REC + MBSTATE_REC + FRACE6 +
##     LD_INDL + FEDUC + NO_MMORB + BFACIL + FAGECOMB + NO_INFEC +
##     RESTATUS + MEDUC + DMAR, data = fac_train)
##
## Coefficients:
##   (Intercept)      PREG_LEN8      PREG_LEN9  PREG_LENEarly   PREG_LENLate
##       697.937       -535.031       -120.623      -1457.473       -128.477
##       M_Ht_In        MRAVE62        MRAVE63        MRAVE64        MRAVE65
##        30.133       -135.947         30.663        -28.325        -57.180
##       MRAVE66           SEXM            BMI     WTGAIN_PER  PRIORLIVETRUE
##       -24.832        119.226         17.855        911.112        101.560
##     CIG_0TRUE      NO_RISKS1    RDMETH_REC2    RDMETH_REC3    RDMETH_REC4
##      -134.069        123.775        121.468        -40.561        124.192
##        PREVIS        ATTEND2        ATTEND3        ATTEND4        ATTEND5
##         9.988          9.694         55.124         60.403         42.256
##      PRECARE1       PRECARE2       PRECARE3       PAY_REC2       PAY_REC3
##       -71.969        -20.505         20.763         31.168         28.229
##      PAY_REC4   MBSTATE_REC2        FRACE62        FRACE63        FRACE64
##        28.556         61.018        -49.674         41.231       -116.223
##       FRACE65        FRACE66       LD_INDLY         FEDUC2         FEDUC3
##        19.317        -17.280         38.643        -26.112         -9.834
##        FEDUC4         FEDUC5         FEDUC6         FEDUC7         FEDUC8
##        -2.844          3.895         12.075          7.627         15.615
##     NO_MMORB1        BFACIL2        BFACIL3        BFACIL4        BFACIL5
##       -80.732        100.554        102.203        -14.058        -46.466
##       BFACIL6        BFACIL7       FAGECOMB      NO_INFEC1      RESTATUS2
##        45.619         38.069         -1.279         37.908         -7.624
##     RESTATUS3      RESTATUS4         MEDUC2         MEDUC3         MEDUC4
##       -26.751        -63.986        -29.733        -24.764        -15.725
##        MEDUC5         MEDUC6         MEDUC7         MEDUC8          DMAR2
##        -8.664         -7.896        -10.305        -25.059         -7.712
```

```
# Backward selection with AIC
backward.AIC = step(biggest.model, direction="backward",
```

```
                k = 2, trace = 0)
backward.AIC
```

```
##
## Call:
## lm(formula = DBWT ~ ATTEND + BFACIL + BMI + CIG_0 + DMAR + FAGECOMB +
##     FEDUC + FRACE6 + LD_INDL + MBSTATE_REC + MEDUC + MRAVE6 +
##     M_Ht_In + NO_INFEC + NO_MMORB + NO_RISKS + PAY_REC + PRECARE +
##     PREVIS + PRIORLIVE + RDMETH_REC + RESTATUS + SEX + PREG_LEN +
##     WTGAIN_PER, data = fac_train)
##
## Coefficients:
##   (Intercept)        ATTEND2        ATTEND3        ATTEND4        ATTEND5
##       697.937          9.694         55.124         60.403         42.256
##       BFACIL2        BFACIL3        BFACIL4        BFACIL5        BFACIL6
##       100.554        102.203        -14.058        -46.466         45.619
##       BFACIL7            BMI      CIG_0TRUE          DMAR2       FAGECOMB
##        38.069         17.855       -134.069         -7.712         -1.279
##        FEDUC2         FEDUC3         FEDUC4         FEDUC5         FEDUC6
##       -26.112         -9.834         -2.844          3.895         12.075
##        FEDUC7         FEDUC8        FRACE62        FRACE63        FRACE64
##         7.627         15.615        -49.674         41.231       -116.223
##       FRACE65        FRACE66       LD_INDLY   MBSTATE_REC2         MEDUC2
##        19.317        -17.280         38.643         61.018        -29.733
##        MEDUC3         MEDUC4         MEDUC5         MEDUC6         MEDUC7
##       -24.764        -15.725         -8.664         -7.896        -10.305
##        MEDUC8        MRAVE62        MRAVE63        MRAVE64        MRAVE65
##       -25.059       -135.947         30.663        -28.325        -57.180
##       MRAVE66        M_Ht_In      NO_INFEC1      NO_MMORB1      NO_RISKS1
##       -24.832         30.133         37.908        -80.732        123.775
##      PAY_REC2       PAY_REC3       PAY_REC4       PRECARE1       PRECARE2
##        31.168         28.229         28.556        -71.969        -20.505
##      PRECARE3         PREVIS  PRIORLIVETRUE    RDMETH_REC2    RDMETH_REC3
##        20.763          9.988        101.560        121.468        -40.561
##   RDMETH_REC4      RESTATUS2      RESTATUS3      RESTATUS4           SEXM
##       124.192         -7.624        -26.751        -63.986        119.226
##     PREG_LEN8      PREG_LEN9  PREG_LENEarly   PREG_LENLate     WTGAIN_PER
##      -535.031       -120.623      -1457.473       -128.477        911.112
```

```
# Compute the leave-one-out cross-validation errors
for_AIC.cv = mean((residuals(forward.AIC) / (1 - hatvalues(forward.AIC))) ^ 2)
back_AIC.cv = mean((residuals(backward.AIC) / (1 - hatvalues(backward.AIC))) ^ 2)
for_BIC.cv = mean((residuals(forward.BIC) / (1 - hatvalues(forward.BIC))) ^ 2)
back_BIC.cv = mean((residuals(backward.BIC) / (1 - hatvalues(backward.BIC))) ^ 2)
which.min(c(for_AIC.cv, back_AIC.cv, for_BIC.cv, back_BIC.cv))
```

```
## [1] 2
```

```
# Add interaction terms by F-test

best_model <- backward.AIC
```