

# Predicting parkinsons

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```
rm(list=ls())
```

```
library(tidyverse)
```

```
## Loading tidyverse: ggplot2
## Loading tidyverse: tibble
## Loading tidyverse: tidyr
## Loading tidyverse: readr
## Loading tidyverse: purrr
## Loading tidyverse: dplyr
```

```
## Conflicts with tidy packages -----
```

```
## filter(): dplyr, stats
## lag():    dplyr, stats
```

```
library(GGally)
```

```
##
## Attaching package: 'GGally'
## The following object is masked from 'package:dplyr':
##
##      nasa
```

```
library(glmulti)
```

```
## Loading required package: rJava
```

```
library(AICcmodavg)
library(MASS)
```

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

```
library(glmulti)
library(ggfortify)
```

```
dd <- read_csv("https://archive.ics.uci.edu/ml/machine-learning-databases/parkinsons/telemonitoring/parkinsons_telemonitoring.csv")
```

```
## Parsed with column specification:
## cols(
##   .default = col_double(),
##   `subject#` = col_integer(),
##   age = col_integer(),
##   sex = col_integer()
## )
```

```
## See spec(...) for full column specifications.
```

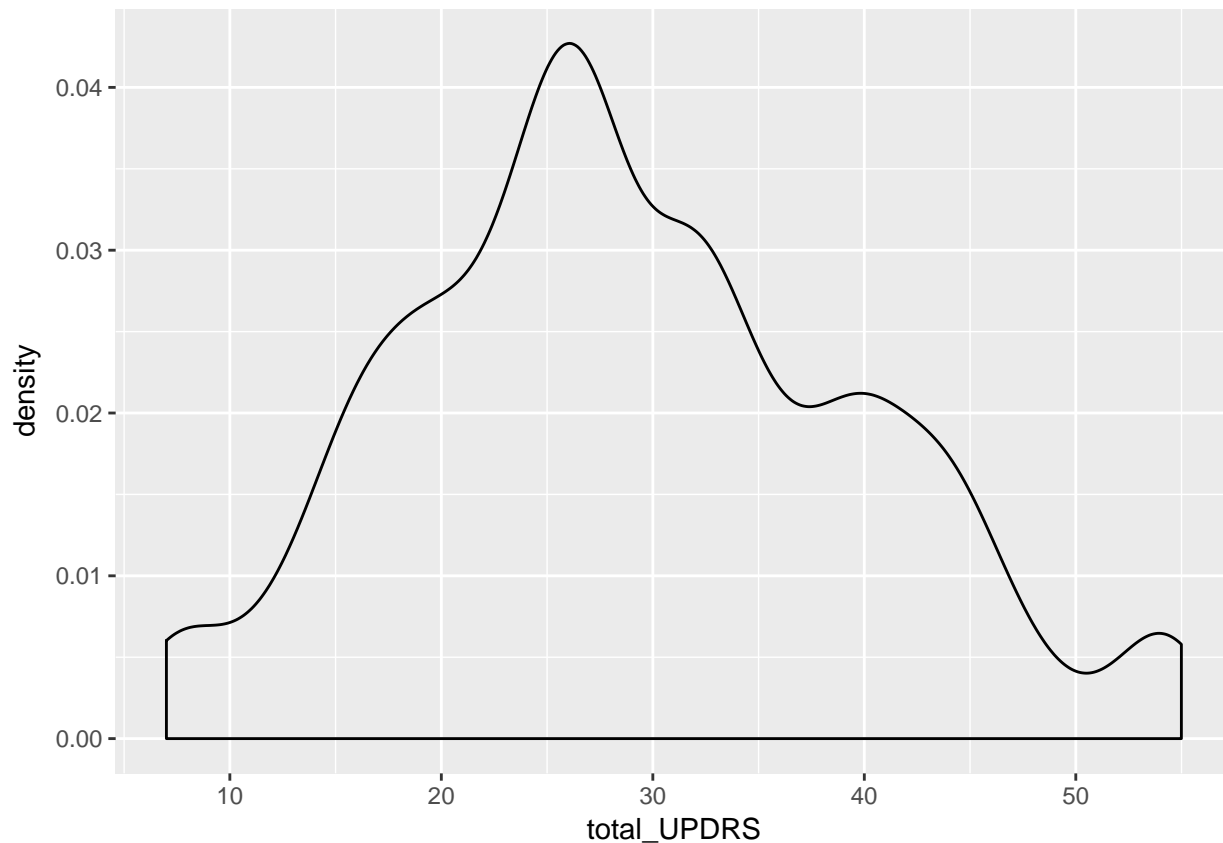
```
names(dd)
```

```
## [1] "subject#"      "age"           "sex"           "test_time"
## [5] "motor_UPDRS"   "total_UPDRS"   "Jitter(%)"     "Jitter(Abs)"
## [9] "Jitter:RAP"    "Jitter:PPQ5"   "Jitter:DDP"     "Shimmer"
## [13] "Shimmer(dB)"   "Shimmer:APQ3"  "Shimmer:APQ5"   "Shimmer:APQ11"
## [17] "Shimmer:DDA"   "NHR"           "HNR"           "RPDE"
## [21] "DFA"           "PPE"
```

```
dd <- dplyr::rename(dd,
  Subject=`subject#`,
  Jitter_perc=`Jitter(%)`,
  Jitter_abs=`Jitter(Abs)`,
  Jitter_rap=`Jitter:RAP`,
  Jitter_ppq5=`Jitter:PPQ5`,
  Jitter_ddp=`Jitter:DDP`,
  Shimmer_dB=`Shimmer(dB)`,
  Shimmer_apq3=`Shimmer:APQ3`,
  Shimmer_apq5=`Shimmer:APQ5`,
  Shimmer_apq11=`Shimmer:APQ11`,
  Shimmer_dda=`Shimmer:DDA`)
```

```
#ggplot(dd, aes(x=total_UPDRS)) + geom_density(bw=5)
```

```
ggplot(dd, aes(x=total_UPDRS)) + geom_density(bw=2)
```

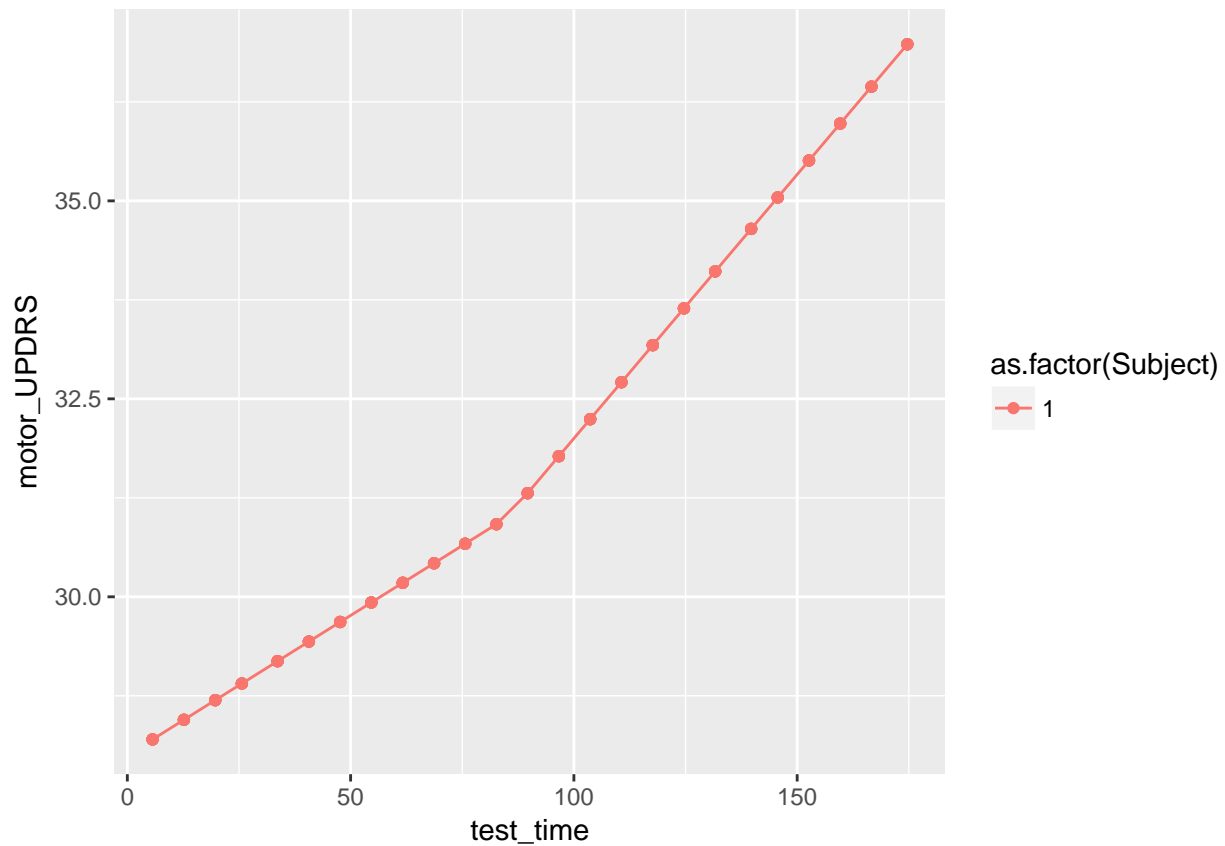


```
#ggplot(dd, aes(x=total_UPDRS)) + geom_density(bw=0.5)
```

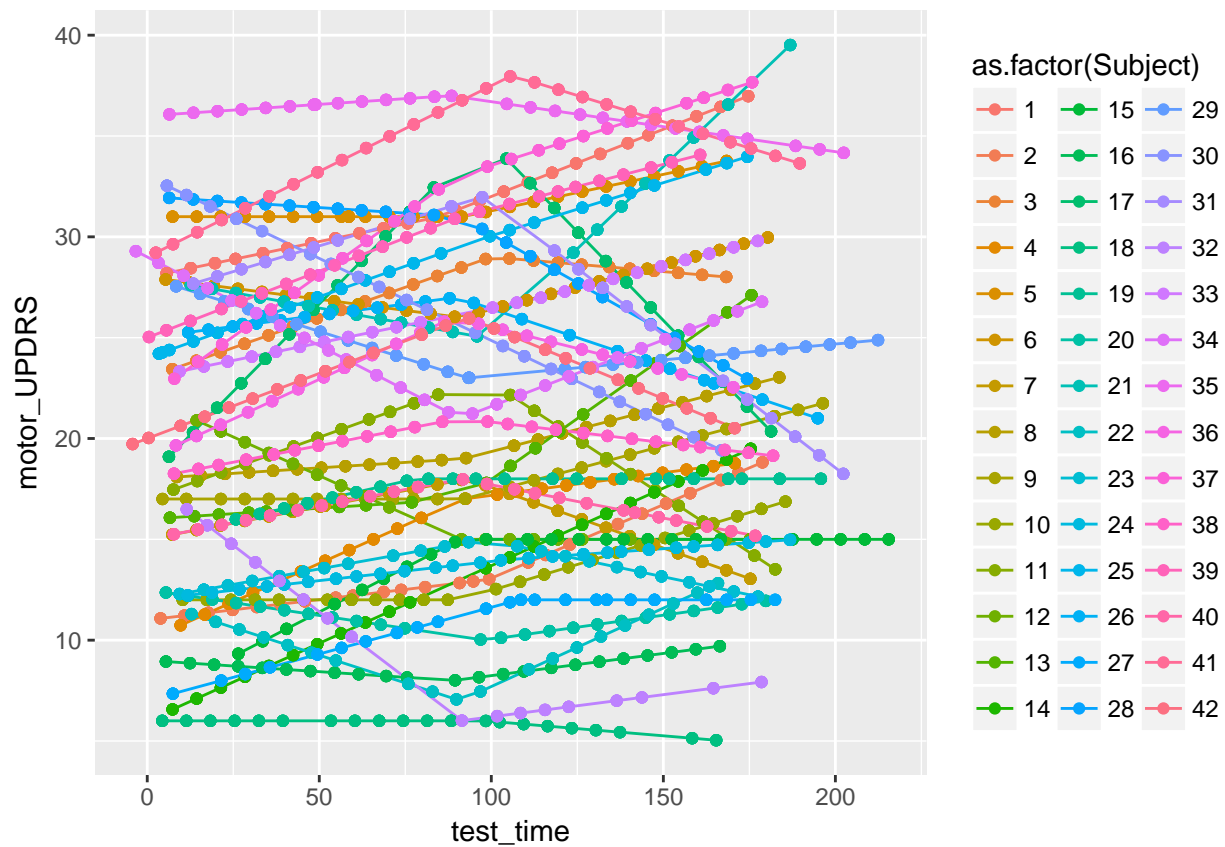
```
#ggplot(dd, aes(x=total_UPDRS)) + geom_density(bw=0.05)
```

```
#ggpairs(dd)
```

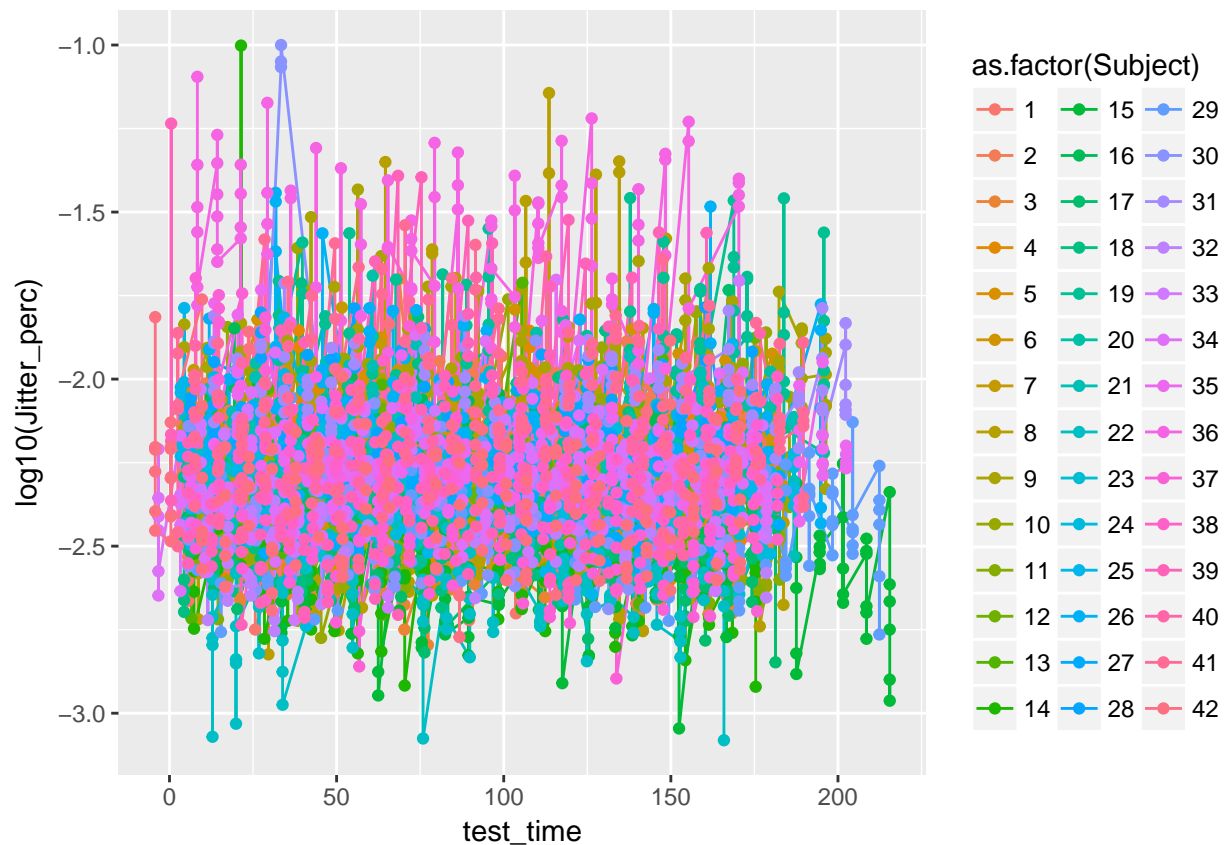
```
ggplot(filter(dd, Subject==1), aes(x=test_time, y=motor_UPDRS, col=as.factor(Subject))) +  
  geom_line() +  
  geom_point()
```



```
ggplot(dd, aes(x=test_time, y=motor_UPDRS, col=as.factor(Subject))) +  
  geom_line() +  
  geom_point()
```



```
ggplot(dd, aes(x=test_time, y=log10(Jitter_perc), col=as.factor(Subject))) +
  geom_line() +
  geom_point()
```

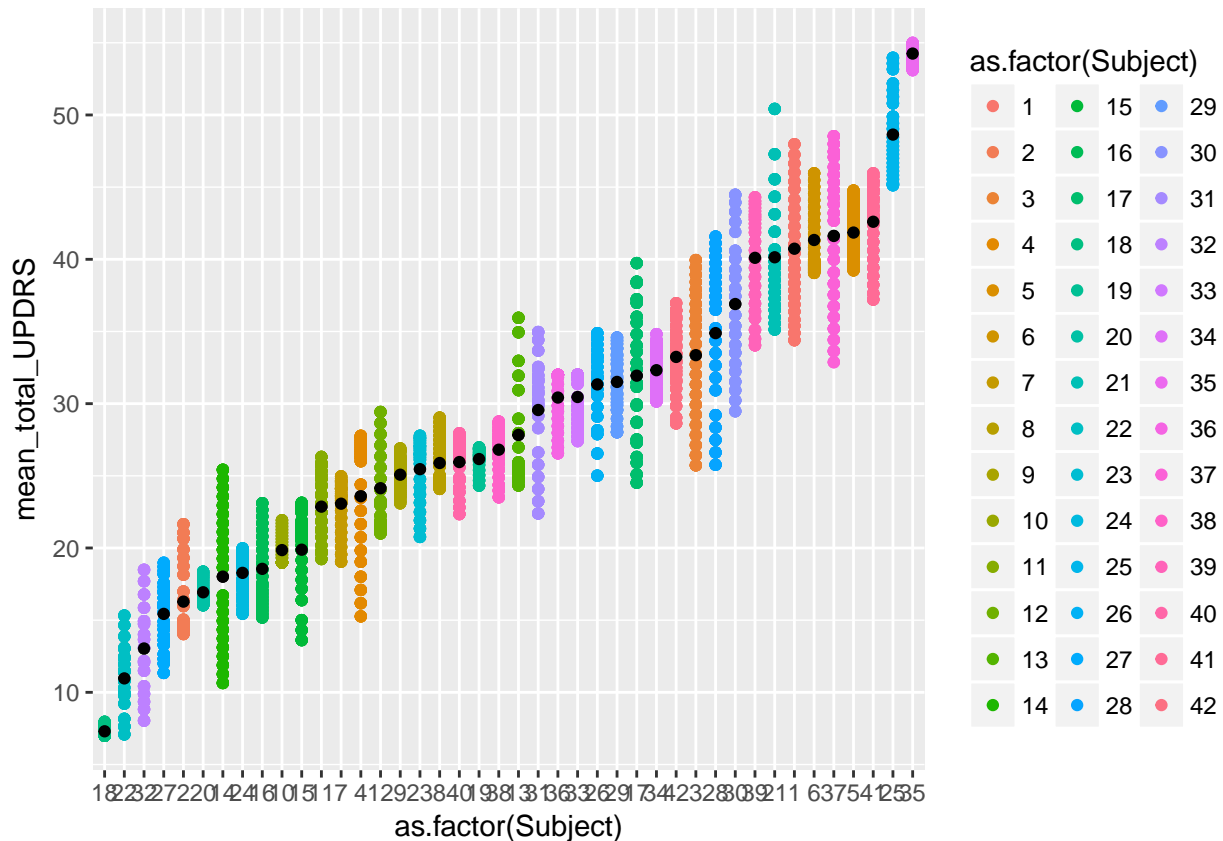


```
## will need to try some variable transformations... some are very skewed
```

```
subject_mean <- group_by(dd, Subject) %>%
  summarise_all(mean)
```

```
subject_UPDRS_mean <- group_by(dd, Subject) %>%
  summarise(mean_total_UPDRS=mean(total_UPDRS)) %>%
  arrange(mean_total_UPDRS)
```

```
subject_UPDRS_mean <- mutate(subject_UPDRS_mean, Subject=reorder(subject_UPDRS_mean$Subject, order(subject_UPDRS_mean$mean_total_UPDRS)))
ggplot(subject_UPDRS_mean, aes(x=as.factor(Subject), y=mean_total_UPDRS, col=as.factor(Subject))) +
  geom_point(col="black") +
  geom_point(data=dd, aes(x=as.factor(Subject), y=total_UPDRS)) +
  geom_point(col="black")
```



```
## Modelling subject means
m1 <- lm(total_UPDRS ~ age + sex +
  Jitter_perc + Jitter_abs + Jitter_rap + Jitter_ppq5 + Jitter_ddp +
  Shimmer + Shimmer_dB + Shimmer_apq3 + Shimmer_apq + Shimmer_apq11 + Shimmer_dda +
  NHR + HNR + RPDE + DFA + PPE,
  data=subject_mean)
aictab(list(m1))

## Warning in aictab.AIClm(list(m1)):
## Model names have been supplied automatically in the table

##
## Model selection based on AICc:
##
##      K   AICc Delta_AICc AICcWt Cum.Wt      LL
## Mod1 20 371.35         0      1      1 -145.68

multi1 <- glmulti(total_UPDRS ~ age + sex +
  Jitter_perc + Jitter_abs + Jitter_rap + Jitter_ppq5 + Jitter_ddp +
  Shimmer + Shimmer_dB + Shimmer_apq3 + Shimmer_apq + Shimmer_apq11 + Shimmer_dda,
  data=subject_mean,
  level = 1,
  method = "h",
  crit = "aicc",
  confsetsize = 10,
  plotty=F, report=F,
  fitfunction = "lm")
summary(multi1)
```

```

## $name
## [1] "glmulti.analysis"
##
## $method
## [1] "h"
##
## $fitting
## [1] "lm"
##
## $crit
## [1] "aicc"
##
## $level
## [1] 1
##
## $marginality
## [1] FALSE
##
## $confsetsize
## [1] 10
##
## $bestic
## [1] 316.8807
##
## $icvalues
## [1] 316.8807 318.3774 318.4155 318.4157 318.4718 318.6901 318.7259
## [8] 318.7573 318.8035 318.8447
##
## $bestmodel
## [1] "total_UPDRS ~ 1 + age"
##
## $modelweights
## [1] 0.20819488 0.09850500 0.09664816 0.09663749 0.09396512 0.08424898
## [7] 0.08275101 0.08146543 0.07960182 0.07798210
##
## $includeobjects
## [1] TRUE

```

```
print(multi1)
```

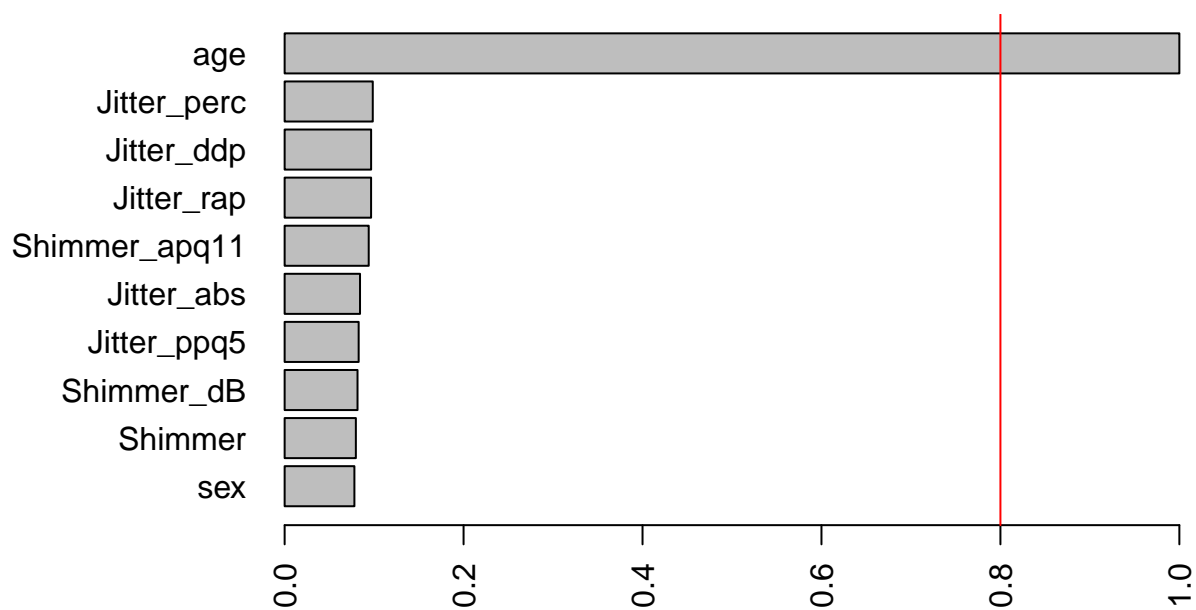
```

## glmulti.analysis
## Method: h / Fitting: lm / IC used: aicc
## Level: 1 / Marginality: FALSE
## From 10 models:
## Best IC: 316.880660622662
## Best model:
## [1] "total_UPDRS ~ 1 + age"
## Evidence weight: 0.2081948764112
## Worst IC: 318.844650964754
## 10 models within 2 IC units.
## 9 models to reach 95% of evidence weight.

```

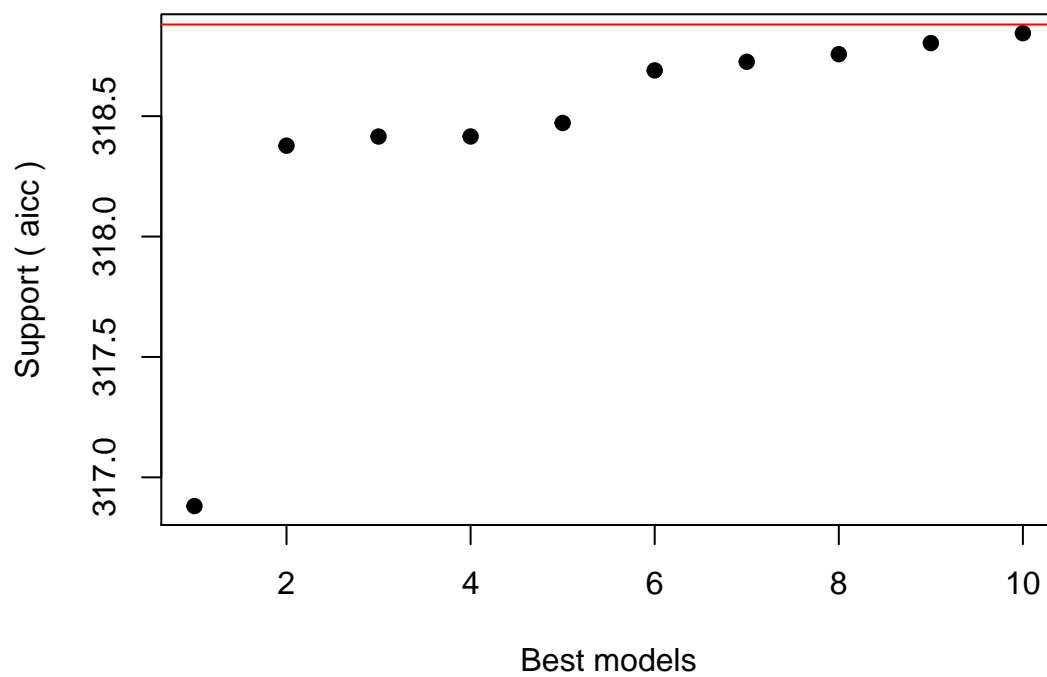
```
plot(multi1, type="s")
```

## Model-averaged importance of terms



```
plot(multi1, type="p")
```

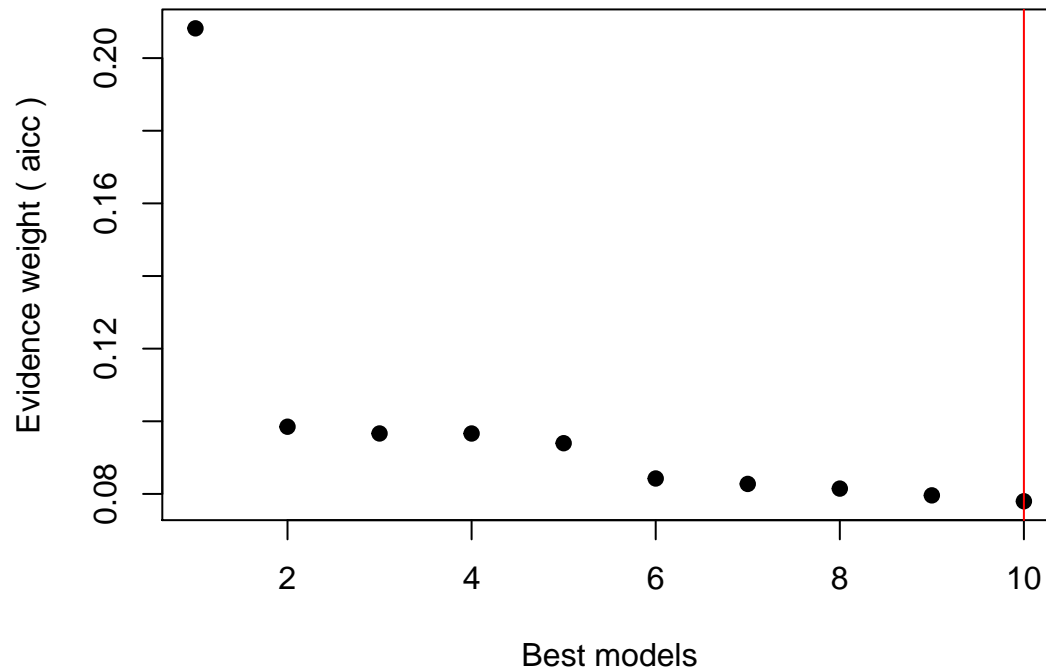
## IC profile



```
plot(multi1, type="w")
```



## Profile of model weights



```
coef(multi1)
```

```
##           Estimate Uncond. variance Nb models Importance
## sex          -0.1727958      2.128575e-01          1 0.07798210
## Shimmer       4.3957081      1.323567e+02          1 0.07960182
## Shimmer_dB     0.5268968      1.826442e+00          1 0.08146543
## Jitter_ppq5   40.5813691     1.056690e+04          1 0.08275101
## Jitter_abs   4191.4700515     1.097577e+08          1 0.08424898
## Shimmer_apq11  8.8357576      4.283031e+02          1 0.09396512
## Jitter_rap    82.8088412      3.661701e+04          1 0.09663749
## Jitter_ddp    27.6080352      4.069639e+03          1 0.09664816
## Jitter_perc   43.8017044      1.006850e+04          1 0.09850500
## (Intercept)   3.2031789      1.244636e+02         10 1.00000000
## age           0.3688346      2.886755e-02         10 1.00000000
##           +/- (alpha=0.05)
## sex           9.330401e-01
## Shimmer       2.326638e+01
## Shimmer_dB    2.733120e+00
## Jitter_ppq5   2.078881e+02
## Jitter_abs    2.118719e+04
## Shimmer_apq11 4.185347e+01
## Jitter_rap    3.869878e+02
## Jitter_ddp    1.290131e+02
## Jitter_perc   2.029263e+02
## (Intercept)   2.256197e+01
## age           3.436060e-01
```

```
predict(multi1)
```

```
## $averages
```

```

##           1           2           3           4           5           6           7
## [1,] 30.80091 26.47582 25.05004 32.19909 32.3365 28.16318 31.37254
##           8           9          10          11          12          13          14          15
## [1,] 31.66181 30.8723 25.93123 24.51444 27.23311 31.26226 25.2689 27.98306
##          16          17          18          19          20          21          22          23
## [1,] 28.94633 28.3198 28.3759 26.13613 29.54709 32.12816 24.68134 25.92936
##          24          25          26          27          28          29          30          31
## [1,] 27.01281 32.76743 23.74941 25.30503 32.2478 33.23572 22.7198 33.31473
##          32          33          34          35          36          37          38
## [1,] 17.22386 29.00752 26.30683 31.12971 32.2823 24.96944 29.36874
##          39          40          41          42
## [1,] 29.36381 36.04468 30.352 26.99503
##
## $variability
## NULL
##
## $omittedNA
## [1] 0
##
## modelling the data without accounting for repeated sampling
## and or interpolation of response variable
m2 <- lm(total_UPDRS ~ age + sex +
        Jitter_perc + Jitter_abs + Jitter_rap + Jitter_ppq5 + Jitter_ddp +
        Shimmer + Shimmer_dB + Shimmer_apq3 + Shimmer_apq + Shimmer_apq11 + Shimmer_dda +
        NHR + HNR + RPDE + DFA + PPE,
        data=dd)
aictab(list(m2))

## Warning in aictab.AIClm(list(m2)):
## Model names have been supplied automatically in the table

##
## Model selection based on AICc:
##
##           K      AICc Delta_AICc AICcWt Cum.Wt      LL
## Mod1 20 43469.22          0          1          1 -21714.54
##
multi2 <- glmulti(total_UPDRS ~ age + sex +
                  Jitter_perc + Jitter_abs + Jitter_rap + Jitter_ppq5 + Jitter_ddp +
                  Shimmer + Shimmer_dB + Shimmer_apq3 + Shimmer_apq + Shimmer_apq11 + Shimmer_dda,
                  data=dd,
                  level = 1,
                  method = "h",
                  crit = "aicc",
                  confsetsize = 10,
                  plotty=F, report=F,
                  fitfunction = "lm")
summary(multi2)

## $name
## [1] "glmulti.analysis"
##
## $method
## [1] "h"
##
## $fitting

```

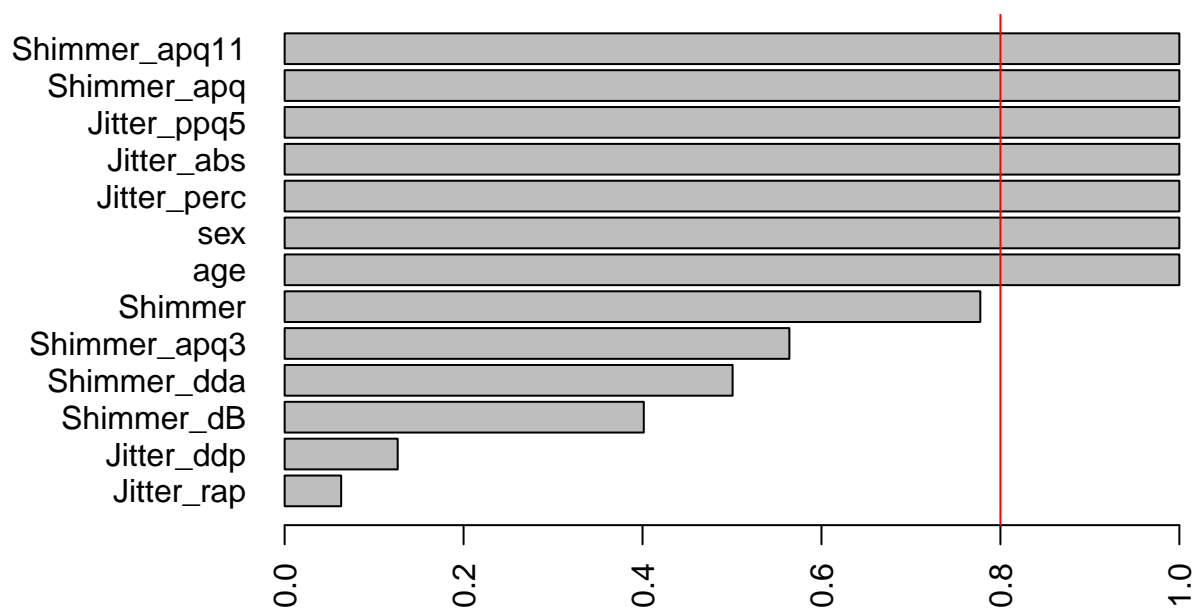
```

## [1] "lm"
##
## $crit
## [1] "aicc"
##
## $level
## [1] 1
##
## $marginality
## [1] FALSE
##
## $confsetsize
## [1] 10
##
## $bestic
## [1] 43809.95
##
## $icvalues
## [1] 43809.95 43809.95 43810.82 43810.82 43811.26 43811.26 43811.90
## [8] 43811.95 43811.95 43811.95
##
## $bestmodel
## [1] "total_UPDRS ~ 1 + age + sex + Jitter_perc + Jitter_abs + Jitter_ppq5 + "
## [2] "      Shimmer + Shimmer_apq3 + Shimmer_apq + Shimmer_apq11"
##
## $modelweights
## [1] 0.17217053 0.17204902 0.11124392 0.11120226 0.08950572 0.08944747
## [7] 0.06482657 0.06320577 0.06318817 0.06316056
##
## $includeobjects
## [1] TRUE
print(multi2)

## glmulti.analysis
## Method: h / Fitting: lm / IC used: aicc
## Level: 1 / Marginality: FALSE
## From 10 models:
## Best IC: 43809.9475975686
## Best model:
## [1] "total_UPDRS ~ 1 + age + sex + Jitter_perc + Jitter_abs + Jitter_ppq5 + "
## [2] "      Shimmer + Shimmer_apq3 + Shimmer_apq + Shimmer_apq11"
## Evidence weight: 0.172170530092854
## Worst IC: 43811.9532082892
## 7 models within 2 IC units.
## 9 models to reach 95% of evidence weight.
plot(multi2, type="s")

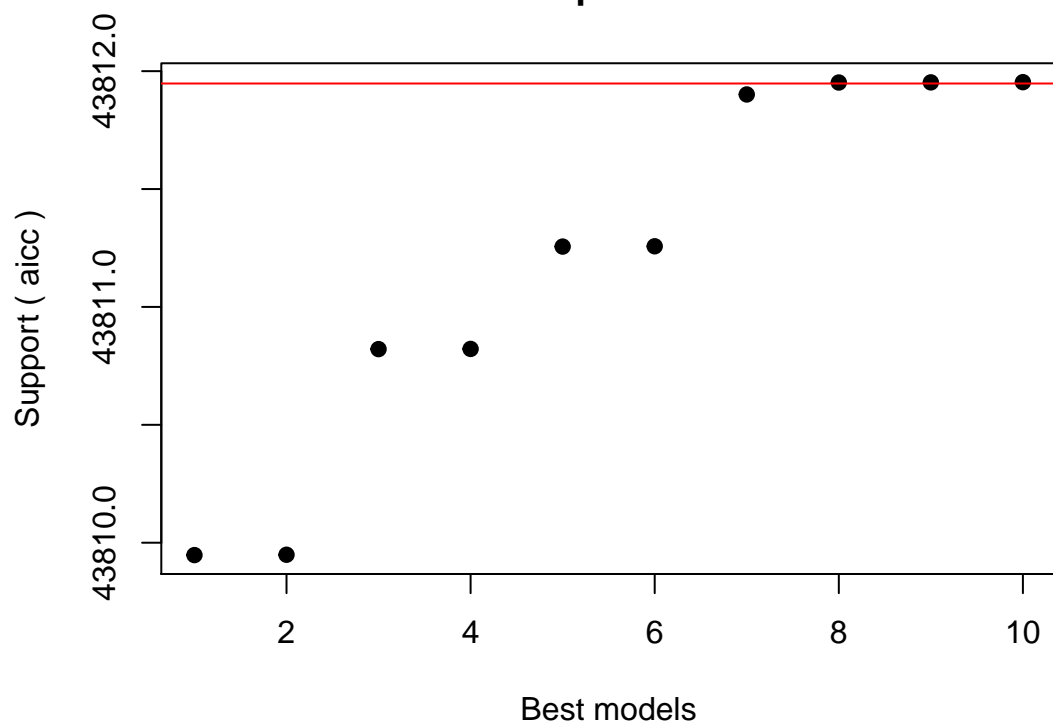
```

## Model-averaged importance of terms



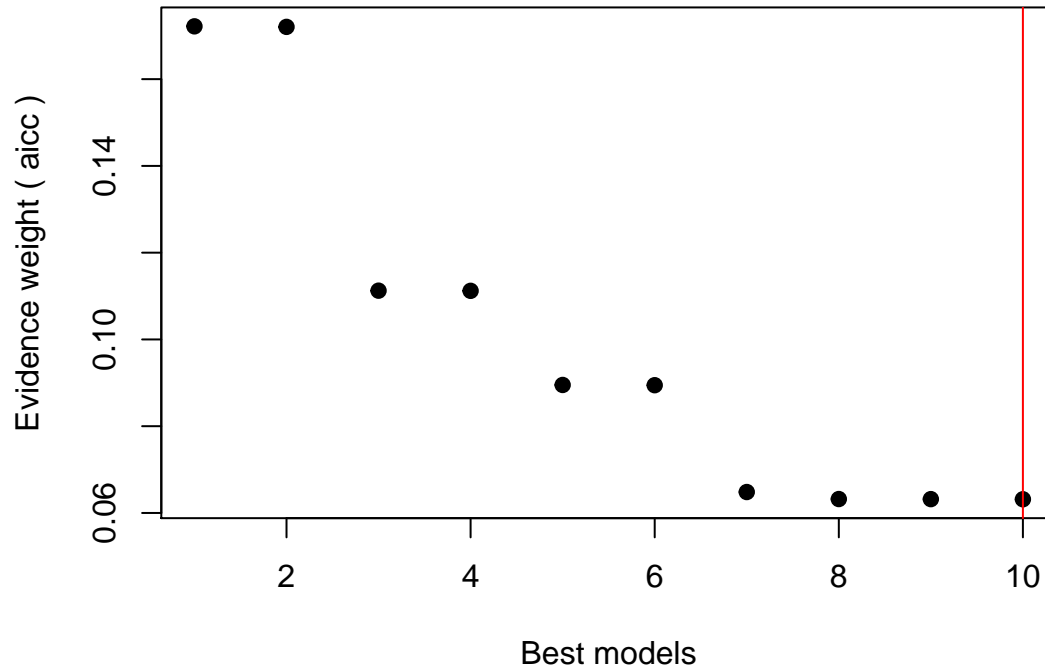
```
plot(multi2, type="p")
```

## IC profile



```
plot(multi2, type="w")
```

## Profile of model weights



```
coef(multi2)
```

##	Estimate	Uncond. variance	Nb models	Importance
## Jitter_rap	1.021892e+00	3.376056e+02	1	0.06318817
## Jitter_ddp	7.331831e-01	1.501066e+02	2	0.12636634
## Shimmer_dB	2.543292e+00	1.527357e+01	4	0.40139937
## Shimmer_dda	2.258584e+02	1.700713e+06	5	0.50068588
## Shimmer_apq3	-8.106228e+02	1.531766e+07	6	0.56414069
## Shimmer	8.575231e+01	4.289264e+03	8	0.77755382
## (Intercept)	5.393797e+00	9.944308e-01	10	1.00000000
## age	3.536807e-01	2.313893e-04	10	1.00000000
## sex	-2.418372e+00	9.750242e-02	10	1.00000000
## Jitter_perc	5.287322e+02	2.286417e+04	10	1.00000000
## Jitter_abs	-3.772502e+04	7.656992e+07	10	1.00000000
## Jitter_ppq5	-4.275348e+02	3.554207e+04	10	1.00000000
## Shimmer_apq	-1.110418e+02	2.983847e+03	10	1.00000000
## Shimmer_apq11	7.575984e+01	5.528641e+02	10	1.00000000
##	+/- (alpha=0.05)			
## Jitter_rap	3.601991e+01			
## Jitter_ddp	2.401805e+01			
## Shimmer_dB	7.661399e+00			
## Shimmer_dda	2.556544e+03			
## Shimmer_apq3	7.672447e+03			
## Shimmer	1.283894e+02			
## (Intercept)	1.954902e+00			
## age	2.982012e-02			
## sex	6.121325e-01			
## Jitter_perc	2.964254e+02			
## Jitter_abs	1.715406e+04			
## Jitter_ppq5	3.695806e+02			

```
## Shimmer_apq      1.070843e+02
## Shimmer_apq11    4.609427e+01
```

```
predict(multi2)
```

```
## $averages
```

```
##      1      2      3      4      5      6      7
## [1,] 32.41842 32.13176 32.67806 32.94602 32.66629 32.53296 32.67972
##      8      9     10     11     12     13     14     15
## [1,] 32.28316 33.7006 32.32833 32.18118 33.01528 32.4879 32.60521 33.04008
##     16     17     18     19     20     21     22
## [1,] 32.74551 32.87901 32.63764 32.28536 32.99997 32.40109 33.25256
##     23     24     25     26     27     28     29
## [1,] 32.65332 32.9696 32.52039 32.60304 32.08584 31.74451 31.79687
##     30     31     32     33     34     35     36     37
## [1,] 33.02191 32.9826 32.65432 32.5011 32.34104 32.16525 32.60253 33.82249
##     38     39     40     41     42     43     44     45
## [1,] 32.00413 31.74851 32.38895 32.8681 33.00678 32.64592 32.3223 32.31933
##     46     47     48     49     50     51     52
## [1,] 32.61661 31.80089 33.0261 32.55456 32.35443 32.01348 33.29495
##     53     54     55     56     57     58     59     60
## [1,] 31.56941 32.3827 33.20276 32.75229 32.3071 34.24317 33.05986 32.92756
##     61     62     63     64     65     66     67     68
## [1,] 32.1897 32.37575 31.85143 31.77044 32.59397 32.7103 31.82286 32.06105
##     69     70     71     72     73     74     75     76
## [1,] 31.85075 32.93478 32.061 32.85065 32.99493 32.64366 31.8573 33.19373
##     77     78     79     80     81     82     83
## [1,] 32.13912 31.76012 32.48667 32.12394 32.97676 32.68912 32.74542
##     84     85     86     87     88     89     90
## [1,] 33.14648 32.95212 31.81625 32.33354 32.17825 32.54207 32.22037
##     91     92     93     94     95     96     97
## [1,] 32.71848 31.81987 32.92779 31.71967 32.01538 32.19377 32.60878
##     98     99    100    101    102    103    104
## [1,] 31.68883 32.83003 32.00238 33.06217 32.71196 32.29237 32.44248
##    105    106    107    108    109    110    111
## [1,] 32.1833 32.66711 32.15561 32.54233 32.12585 33.71013 32.20044
##    112    113    114    115    116    117    118
## [1,] 32.20691 32.26316 32.10199 32.07566 32.00317 32.10796 32.11036
##    119    120    121    122    123    124    125
## [1,] 32.83408 32.25879 33.18002 32.69717 32.05436 32.69338 31.85931
##    126    127    128    129    130    131    132    133
## [1,] 31.81341 32.21696 31.45203 32.09295 31.88022 32.141 32.65284 32.32992
##    134    135    136    137    138    139    140    141
## [1,] 33.36064 31.79903 32.38091 31.69289 33.118 32.02955 32.27354 32.07557
##    142    143    144    145    146    147    148    149
## [1,] 32.05688 32.45946 32.31559 31.52134 31.9071 32.1994 31.66391 32.80991
##    150    151    152    153    154    155    156
## [1,] 26.80304 26.62078 26.76966 27.26198 26.69794 27.25046 27.00021
##    157    158    159    160    161    162    163
## [1,] 27.24909 27.58073 26.91705 27.36098 27.1665 27.10095 26.88843
##    164    165    166    167    168    169    170
## [1,] 26.93967 28.05082 27.23263 26.55292 26.52446 26.89406 26.80264
##    171    172    173    174    175    176    177
## [1,] 29.25547 28.10976 26.74593 27.13536 26.92046 26.64227 27.41689
##    178    179    180    181    182    183    184
```

```

## [1,] 27.37865 26.53534 27.17214 27.42043 26.50771 26.4198 26.86799
##      185      186      187      188      189      190      191
## [1,] 26.76403 26.95101 27.09652 26.71312 27.41886 26.71919 26.85558
##      192      193      194      195      196      197      198
## [1,] 27.75768 26.95829 26.82601 27.5423 28.40077 26.39135 26.82867
##      199      200      201      202      203      204      205
## [1,] 27.07928 27.76099 26.73844 26.83936 26.88598 27.4674 26.76033
##      206      207      208      209      210      211      212
## [1,] 26.82175 26.87058 27.30143 26.39546 27.33955 26.69643 26.59745
##      213      214      215      216      217      218      219      220
## [1,] 27.06308 26.39888 26.97584 27.10036 27.484 27.61658 27.17794 26.73251
##      221      222      223      224      225      226      227
## [1,] 27.09643 26.69365 26.52039 26.77241 26.86553 26.89322 26.55872
##      228      229      230      231      232      233      234
## [1,] 28.20491 26.66944 26.90355 27.63199 27.41881 27.03378 26.39069
##      235      236      237      238      239      240      241
## [1,] 27.42225 26.61868 26.87836 26.10742 29.63767 26.75248 26.54467
##      242      243      244      245      246      247      248      249
## [1,] 26.64391 27.3586 26.88674 27.9279 27.06921 26.90476 26.52241 26.5696
##      250      251      252      253      254      255      256
## [1,] 26.76428 26.65456 27.02234 26.7177 26.71417 26.81621 26.68983
##      257      258      259      260      261      262      263
## [1,] 27.22748 27.18973 26.74558 27.55996 27.08697 27.54432 26.79027
##      264      265      266      267      268      269      270
## [1,] 26.97359 26.88863 27.52254 27.79676 26.70879 27.70444 26.65026
##      271      272      273      274      275      276      277
## [1,] 27.11339 27.19665 27.11892 27.35925 26.99204 27.35578 27.47148
##      278      279      280      281      282      283      284
## [1,] 26.97577 27.69499 27.78505 27.81967 26.71355 26.93116 27.35399
##      285      286      287      288      289      290      291
## [1,] 27.0087 26.57124 27.73785 26.90621 26.49713 27.19006 27.40308
##      292      293      294      295      296      297      298      299
## [1,] 27.43912 26.8794 26.78356 26.48787 25.92457 26.1196 26.68096 26.16385
##      300      301      302      303      304      305      306
## [1,] 26.40241 27.20706 27.1561 26.34639 26.37299 26.09831 26.70935
##      307      308      309      310      311      312      313
## [1,] 26.06594 26.72672 25.97158 25.99263 26.14373 26.04347 26.51337
##      314      315      316      317      318      319      320
## [1,] 26.02673 25.86906 26.42392 26.59285 26.03604 26.73829 26.16018
##      321      322      323      324      325      326      327
## [1,] 26.22789 26.18971 26.23926 26.18974 26.81968 26.09809 26.27517
##      328      329      330      331      332      333      334      335
## [1,] 26.02744 25.66449 26.50477 26.57038 26.5892 26.17382 26.4027 26.1681
##      336      337      338      339      340      341      342
## [1,] 26.18881 26.35608 26.13593 26.70415 26.07002 26.39664 26.02727
##      343      344      345      346      347      348      349
## [1,] 26.40568 26.30267 27.02796 26.37132 26.49829 25.97793 26.50339
##      350      351      352      353      354      355      356
## [1,] 26.64156 26.45616 26.67889 26.01286 26.46323 26.02563 25.8613
##      357      358      359      360      361      362      363
## [1,] 26.61974 26.31643 26.16743 26.11969 26.65428 25.94352 25.97963
##      364      365      366      367      368      369      370      371
## [1,] 26.12411 26.2799 26.5828 26.5663 27.02359 26.86057 26.74588 26.11428
##      372      373      374      375      376      377      378

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## [1,] 26.06382 26.57773 26.78035 26.19516 26.57459 26.24504 26.02044
##      386      387      388      389      390      391      392      393
## [1,] 25.8757 26.59169 26.948 26.11569 26.49754 26.32733 26.36188 26.32206
##      394      395      396      397      398      399      400
## [1,] 26.24674 26.19359 26.05894 26.19819 27.19956 26.14965 26.39985
##      401      402      403      404      405      406      407
## [1,] 25.83913 26.95735 25.96691 26.63058 26.58149 25.9572 26.40437
##      408      409      410      411      412      413      414
## [1,] 25.95276 26.35303 26.06247 26.04923 26.09221 26.04339 26.40661
##      415      416      417      418      419      420      421      422
## [1,] 26.25791 26.46166 26.52341 27.16738 26.13095 26.5763 26.65 27.11027
##      423      424      425      426      427      428      429      430
## [1,] 26.4823 25.95868 25.81406 26.78027 26.22188 26.80987 26.06724 26.6643
##      431      432      433      434      435      436      437
## [1,] 26.03827 26.22808 26.68635 26.14834 26.36832 26.42415 26.18863
##      438      439      440      441      442      443      444
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##      445      446      447      448      449      450      451
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##      452      453      454      455      456      457      458
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##      459      460      461      462      463      464      465
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##      466      467      468      469      470      471      472
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##      480      481      482      483      484      485      486      487
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##      488      489      490      491      492      493      494
## [1,] 33.40404 32.40775 32.50132 32.28093 32.08714 33.16328 32.37416
##      495      496      497      498      499      500      501      502
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##      538      539      540      541      542      543      544
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##      545      546      547      548      549      550      551
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##      552      553      554      555      556      557      558
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##      559      560      561      562      563      564      565
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##      566      567      568      569      570      571      572

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##      573      574      575      576      577      578      579      580
## [1,] 32.8857 33.29226 33.45154 32.2759 33.98557 32.41829 32.20117 32.74148
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## [1,] 32.3322 32.72338 32.69753 32.35675 32.8764 33.43683 32.59552 32.38912
##      617      618      619      620      621      622      623
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## [1,] 33.3344 33.37413 33.18054 33.26557 32.64543 32.65342 33.07199 32.6103
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## [1,] 32.77405 32.35168 32.88049 31.91748 32.34763 32.91214 32.81391
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## [1,] 32.85114 33.44925 33.79024 32.48658 32.36718 32.93567 32.481 33.30286
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## [1,] 32.78459 32.5491 32.92286 32.93303 32.92377 32.45214 32.57013
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## [1,] 32.82034 32.94122 33.21198 33.48191 32.4305 32.76236 32.60748
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## [1,] 33.42294 32.56663 32.84737 33.19904 33.19912 33.31195 32.6 32.94642
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## [1,] 32.46085 33.02804 33.39238 32.49974 32.40567 33.39407 29.02684
##      733      734      735      736      737      738      739      740
## [1,] 29.01408 29.42104 29.73295 29.24538 29.616 28.00911 29.31225 29.11723
##      741      742      743      744      745      746      747      748
## [1,] 28.79544 29.807 28.9723 29.36555 29.50292 28.34143 28.38872 29.62699
##      749      750      751      752      753      754      755
## [1,] 29.92318 29.94628 28.95793 29.26843 28.49608 29.21135 29.93072
##      756      757      758      759      760      761      762
## [1,] 29.47829 29.63917 28.9839 29.11326 29.69819 29.38987 28.90159
##      763      764      765      766      767      768      769

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## [1,] 28.45422 28.67374 28.5251 28.95859 28.95286 29.09014 29.33789
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##      947      948      949      950      951      952      953
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##      954      955      956      957      958      959      960

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## [1,] 31.55085 31.54562 31.21197 31.09642 32.53899 31.45256 31.65045
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## [1,] 30.75772 32.3332 32.1483 31.61791 31.82859 31.58244 31.55579 31.34151
##          976          977          978          979          980          981          982          983
## [1,] 31.3678 31.90066 31.7878 32.00468 31.19638 31.74948 31.25176 31.84133
##          984          985          986          987          988          989          990
## [1,] 31.70236 32.09919 31.92809 31.49523 31.83041 31.8364 30.68181
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##          998          999          1000          1001          1002          1003          1004
## [1,] 31.70321 31.15223 32.87994 31.74265 31.58901 31.33099 32.47786
##          1005          1006          1007          1008          1009          1010          1011
## [1,] 32.28018 32.09914 31.89709 31.91407 32.06165 32.22556 32.92347
##          1012          1013          1014          1015          1016          1017          1018          1019
## [1,] 32.13359 31.76311 31.85831 31.1042 31.90834 31.10558 31.5876 31.23197
##          1020          1021          1022          1023          1024          1025          1026
## [1,] 31.76082 31.90143 32.35419 32.07711 31.98626 32.16591 31.89024
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## [1,] 30.00639 30.34613 29.90897 34.77865 29.78369 34.28658 32.75712
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## [1,] 29.40489 30.63793 30.3395 29.94963 30.45751 31.6509 30.5361 29.97807
##          1100          1101          1102          1103          1104          1105          1106
## [1,] 30.74311 29.80905 29.62665 31.15719 30.42249 29.54553 31.20593
##          1107          1108          1109          1110          1111          1112          1113
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## [1,] 30.38524 30.34028 30.04673 29.72324 29.97909 29.74301 29.85554
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## [1,] 30.25897 29.76195 30.29504 30.05 30.42453 30.11744 29.82121 30.28717
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## [1,] 29.85051 30.20651 30.59256 29.7171 29.89715 30.89921 32.55502
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## [1,] 30.70104 31.35424 30.16871 30.82394 30.77248 30.99447 30.03575
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## [1,] 30.30365 30.17437 30.57182 30.49763 30.92384 30.35447 30.3677
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## [1,] 30.77802 30.90271 30.56941 31.31741 30.51172 30.86479 30.14934
##      1344      1345      1346      1347      1348      1349      1350

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##      1365      1366      1367      1368      1369      1370      1371
## [1,] 26.45986 27.87527 27.65568 27.48332 27.46926 26.25768 26.59176
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##      1386      1387      1388      1389      1390      1391      1392
## [1,] 27.16454 26.47758 27.78787 26.3643 27.09837 26.52802 27.78098
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## [1,] 27.29858 27.0435 26.20123 26.45167 26.44952 26.55837 26.76677
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## [1,] 26.12994 27.06519 26.74032 26.72424 26.37294 27.71194 26.76409
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## [1,] 26.29022 26.28773 26.73353 26.80147 26.49606 27.43171 27.12856
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##      1598      1599      1600      1601      1602      1603      1604      1605
## [1,] 25.51066 25.53185 25.8544 25.77091 25.99086 25.8788 26.52017 26.66516
##      1606      1607      1608      1609      1610      1611      1612      1613
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## [1,] 27.06896 25.57543 25.46292 25.715 26.26014 25.77272 25.78827 25.38322
##      1636      1637      1638      1639      1640      1641      1642
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## [1,] 29.16037 30.2056 28.76796 29.41077 28.43463 28.54129 28.72934
##      1700      1701      1702      1703      1704      1705      1706      1707
## [1,] 28.72742 27.95217 28.78034 28.14245 28.7672 28.4487 28.472 28.46282
##      1708      1709      1710      1711      1712      1713      1714
## [1,] 29.03162 28.71066 28.19631 28.57159 29.28405 30.1119 28.48215
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##      1722      1723      1724      1725      1726      1727      1728
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##      1729      1730      1731      1732      1733      1734      1735

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##      1778      1779      1780      1781      1782      1783      1784      1785
## [1,] 30.76593 30.01272 31.60938 30.13567 29.5254 30.19391 31.2085 32.16133
##      1786      1787      1788      1789      1790      1791      1792
## [1,] 30.49675 30.36823 29.98749 29.82921 30.9395 30.24509 30.20336
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## [1,] 30.18337 30.50052 30.27535 30.09693 30.16419 29.83725 29.97057
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##      1821      1822      1823      1824      1825      1826      1827
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## [1,] 30.28218 30.69552 30.19203 30.84505 31.1811 30.02956 29.79918
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## [1,] 29.96957 29.73242 29.71496 29.56135 29.73689 30.55374 30.6123 24.2252
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##      1885      1886      1887      1888      1889      1890      1891
## [1,] 24.24975 24.00318 24.06144 24.06593 24.33013 23.96341 24.34919
##      1892      1893      1894      1895      1896      1897      1898      1899
## [1,] 24.02009 24.02463 24.02247 24.03917 24.42664 24.3041 24.2111 23.9776
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## [1,] 23.99376 24.29146 24.22794 24.25807 24.16381 24.34454 24.29901
##      1907      1908      1909      1910      1911      1912      1913
## [1,] 24.01272 24.52586 24.11542 24.09277 24.29561 24.25445 24.40003
##      1914      1915      1916      1917      1918      1919      1920
## [1,] 24.09889 24.58019 24.19004 23.96808 24.21226 24.04407 24.16447
##      1921      1922      1923      1924      1925      1926      1927

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##      2001      2002      2003      2004      2005      2006      2007
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##      2095      2096      2097      2098      2099      2100      2101
## [1,] 29.15496 29.45026 29.00288 29.24064 29.42628 29.53068 29.26523
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## [1,] 29.63965 28.85045 30.22334 29.82486 29.33942 29.17186 28.94439
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## [1,] 30.30399 28.96291 29.33651 29.54169 28.83034 29.38059 29.16156
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## [1,] 29.38054 28.49219 28.90259 29.24907 29.3469 29.22683 29.39575 28.8718
##      2159      2160      2161      2162      2163      2164      2165
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##      2252      2253      2254      2255      2256      2257      2258
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##      2282      2283      2284      2285      2286      2287      2288      2289
## [1,] 27.47164 27.09384 27.86323 27.12469 28.083 27.15345 26.72503 27.07767
##      2290      2291      2292      2293      2294      2295      2296
## [1,] 27.33222 26.92715 27.15818 27.37685 31.14591 27.30004 27.61703
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## [1,] 27.05697 27.06725 27.20507 27.4811 27.70416 27.9266 27.72854 26.89469
##      2305      2306      2307      2308      2309      2310      2311
## [1,] 27.33442 27.24688 27.19976 27.51106 27.50321 27.02435 26.82172
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##      2356      2357      2358      2359      2360      2361      2362
## [1,] 27.02709 27.00372 27.35309 27.75857 27.39259 27.63019 27.13569
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## [1,] 27.42414 27.03954 27.03885 26.82439 27.47523 27.45554 27.38992
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## [1,] 27.27482 27.17282 27.20468 27.9866 28.18942 27.61715 27.56294
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## [1,] 27.73519 26.9628 27.24792 27.8407 27.33042 26.78515 27.6753 27.38304
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## [1,] 27.59227 28.16019 26.9258 28.8346 27.73338 27.20173 27.15535 26.8854
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## [1,] 27.31308 29.00707 26.86711 27.43274 28.52272 28.40645 27.75834
##      3251      3252      3253      3254      3255      3256      3257
## [1,] 26.88184 28.26874 27.78572 27.28904 27.58762 27.19909 27.69615
##      3258      3259      3260      3261      3262      3263      3264
## [1,] 27.55569 27.4155 27.29191 28.54357 27.90804 27.39691 27.90671
##      3265      3266      3267      3268      3269      3270      3271
## [1,] 26.91876 26.86193 27.00952 27.81594 28.0222 28.33291 27.91429
##      3272      3273      3274      3275      3276      3277      3278
## [1,] 28.29883 27.92272 27.36525 27.33238 27.41378 27.37437 27.29879
##      3279      3280      3281      3282      3283      3284      3285

```

```

## [1,] 27.10891 27.18777 28.07519 27.37761 27.77774 27.73231 27.57694
##      3286      3287      3288      3289      3290      3291      3292
## [1,] 27.42248 27.56009 28.06182 27.82921 27.40375 27.41758 27.87469
##      3293      3294      3295      3296      3297      3298      3299
## [1,] 27.98853 27.34027 28.00808 27.45734 27.90429 27.25483 27.45029
##      3300      3301      3302      3303      3304      3305      3306      3307
## [1,] 28.67112 27.56754 28.05777 27.28873 27.65392 27.66835 26.856 27.97974
##      3308      3309      3310      3311      3312      3313      3314
## [1,] 27.36766 27.92935 28.76394 27.50256 27.85879 27.84125 27.58115
##      3315      3316      3317      3318      3319      3320      3321
## [1,] 28.00285 27.72215 27.22731 27.41267 29.39599 28.21172 31.42835
##      3322      3323      3324      3325      3326      3327      3328
## [1,] 27.78207 27.82756 27.57588 27.71874 28.50098 27.52293 27.88306
##      3329      3330      3331      3332      3333      3334      3335
## [1,] 28.45667 27.15132 27.31761 27.65626 29.23901 27.65926 32.67031
##      3336      3337      3338      3339      3340      3341      3342
## [1,] 33.24403 32.97195 33.91389 32.98601 32.84857 33.07949 32.88043
##      3343      3344      3345      3346      3347      3348      3349
## [1,] 33.16253 32.36981 32.34309 32.82911 33.2509 33.74982 33.76554
##      3350      3351      3352      3353      3354      3355      3356
## [1,] 32.62214 32.84882 33.13863 32.87253 33.11978 32.97029 33.03088
##      3357      3358      3359      3360      3361      3362      3363
## [1,] 32.18412 32.95742 32.74571 33.52892 33.55395 33.17027 33.00545
##      3364      3365      3366      3367      3368      3369      3370
## [1,] 33.17687 32.93658 33.15083 32.50433 32.89516 32.78989 32.35131
##      3371      3372      3373      3374      3375      3376      3377
## [1,] 33.14229 33.56137 32.65432 34.53249 32.89573 32.98424 32.63094
##      3378      3379      3380      3381      3382      3383      3384
## [1,] 33.69504 33.08657 33.91816 32.97956 34.81216 32.87521 33.53449
##      3385      3386      3387      3388      3389      3390      3391
## [1,] 33.43485 33.20465 32.72587 33.89434 33.45053 32.95767 33.41198
##      3392      3393      3394      3395      3396      3397      3398
## [1,] 33.20277 32.64294 32.82299 32.98377 33.36953 33.3245 34.86387
##      3399      3400      3401      3402      3403      3404      3405
## [1,] 33.01334 32.87782 33.02354 33.91584 33.01316 32.71705 34.80555
##      3406      3407      3408      3409      3410      3411      3412
## [1,] 35.54472 32.58889 32.68013 32.68373 33.16902 32.92871 33.10771
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## [1,] 32.82331 32.96076 32.77968 33.07745 32.79863 32.98218 33.36597
##      3420      3421      3422      3423      3424      3425      3426
## [1,] 32.94107 33.25066 33.42391 33.07408 33.09878 33.31231 32.9688
##      3427      3428      3429      3430      3431      3432      3433
## [1,] 33.10524 33.75827 33.27809 32.95226 32.31774 33.32815 33.24591
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## [1,] 32.1716 33.33783 33.6705 33.1384 32.48322 33.2449 34.06101 33.1502
##      3442      3443      3444      3445      3446      3447      3448
## [1,] 32.85524 32.79708 33.38847 33.6205 33.02304 32.91362 32.87257
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## [1,] 33.24017 34.34151 33.52032 33.45731 33.49004 32.90098 32.93095
##      3456      3457      3458      3459      3460      3461      3462
## [1,] 33.40134 32.68235 33.25399 33.02008 33.41002 32.86171 33.58667
##      3463      3464      3465      3466      3467      3468      3469
## [1,] 33.16774 33.27783 32.75374 32.98461 32.59466 32.90563 32.8267
##      3470      3471      3472      3473      3474      3475      3476      3477

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## [1,] 33.10984 33.497 33.38624 32.82901 33.51735 33.32247 32.91859 33.42578
##      3478      3479      3480      3481      3482      3483      3484      3485
## [1,] 32.7202 23.48899 23.57381 23.65427 23.23839 27.612 22.87948 23.2359
##      3486      3487      3488      3489      3490      3491      3492      3493
## [1,] 22.95304 24.43749 25.19351 25.14148 24.63721 24.88136 23.50802 22.902
##      3494      3495      3496      3497      3498      3499      3500
## [1,] 23.02815 23.61538 25.12019 23.33205 25.03459 24.80514 23.67418
##      3501      3502      3503      3504      3505      3506      3507
## [1,] 23.41091 23.59404 22.70356 23.52019 23.78025 23.28893 25.12725
##      3508      3509      3510      3511      3512      3513      3514      3515
## [1,] 23.4012 23.0604 23.95768 23.04355 23.22875 25.39968 23.9013 23.06077
##      3516      3517      3518      3519      3520      3521      3522
## [1,] 23.52834 23.92295 26.4291 23.18006 23.05483 23.07976 24.05471
##      3523      3524      3525      3526      3527      3528      3529
## [1,] 24.24637 23.85289 23.29538 25.13644 23.53739 24.39787 22.49596
##      3530      3531      3532      3533      3534      3535      3536
## [1,] 24.13599 23.72112 23.49511 23.92559 24.4844 24.09098 23.87123
##      3537      3538      3539      3540      3541      3542      3543
## [1,] 24.10013 23.34696 23.74497 24.09191 23.12826 24.05091 24.02898
##      3544      3545      3546      3547      3548      3549      3550      3551
## [1,] 24.7807 23.58465 22.85811 23.03938 24.88425 24.07924 23.7503 22.83586
##      3552      3553      3554      3555      3556      3557      3558
## [1,] 22.78988 23.72237 23.16802 23.42505 23.79237 23.43134 23.79442
##      3559      3560      3561      3562      3563      3564      3565
## [1,] 25.64336 23.19335 24.51465 25.11836 24.64962 24.03955 24.1438
##      3566      3567      3568      3569      3570      3571      3572      3573
## [1,] 23.48978 24.35452 23.17004 23.33179 25.295 23.35805 23.1708 24.20241
##      3574      3575      3576      3577      3578      3579      3580
## [1,] 23.56696 24.07463 23.17421 23.87769 25.35305 23.27336 23.6321
##      3581      3582      3583      3584      3585      3586      3587
## [1,] 24.83709 23.73139 24.52053 23.18444 23.71763 24.76052 22.84994
##      3588      3589      3590      3591      3592      3593      3594
## [1,] 23.99918 24.47241 22.38528 23.47347 25.28172 23.07815 23.61132
##      3595      3596      3597      3598      3599      3600      3601      3602
## [1,] 22.88276 23.15356 23.65273 23.02312 23.9545 23.66272 23.4706 24.25226
##      3603      3604      3605      3606      3607      3608      3609
## [1,] 24.52461 24.10393 24.57996 23.51284 23.58024 24.32032 24.6927
##      3610      3611      3612      3613      3614      3615      3616
## [1,] 25.59597 25.21755 24.80765 28.65702 26.34089 24.51526 25.10897
##      3617      3618      3619      3620      3621      3622      3623
## [1,] 24.82338 24.64092 24.88566 25.37283 25.44606 24.69931 25.60174
##      3624      3625      3626      3627      3628      3629      3630
## [1,] 24.66462 24.29389 25.05028 26.04274 24.57701 24.26537 25.33667
##      3631      3632      3633      3634      3635      3636      3637
## [1,] 24.1661 24.88161 25.35263 25.39953 24.20274 27.26337 25.73804
##      3638      3639      3640      3641      3642      3643      3644      3645
## [1,] 24.30201 26.21853 24.30464 24.57215 24.32816 24.44635 24.4136 23.862
##      3646      3647      3648      3649      3650      3651      3652
## [1,] 24.76416 24.37934 23.90458 24.44589 24.50887 24.61018 24.53646
##      3653      3654      3655      3656      3657      3658      3659
## [1,] 24.02017 25.86268 25.12332 24.71013 24.7185 25.90551 24.49377
##      3660      3661      3662      3663      3664      3665      3666
## [1,] 23.93749 23.94237 23.88527 24.59085 24.03714 24.83912 24.04702
##      3667      3668      3669      3670      3671      3672      3673      3674

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## [1,] 24.42717 23.89462 24.2394 24.33805 24.35043 24.36443 24.7486 24.57804
##      3675      3676      3677      3678      3679      3680      3681      3682
## [1,] 25.33944 25.735 24.92846 24.65109 24.68313 25.29993 24.15086 24.92685
##      3683      3684      3685      3686      3687      3688      3689
## [1,] 24.33198 24.54379 24.37148 24.5722 24.71015 24.37246 24.04223
##      3690      3691      3692      3693      3694      3695      3696
## [1,] 24.50745 24.74726 24.19928 24.37239 24.44288 24.60458 24.24413
##      3697      3698      3699      3700      3701      3702      3703      3704
## [1,] 24.38603 23.8634 24.064 24.78669 24.59359 24.25302 24.48829 24.46589
##      3705      3706      3707      3708      3709      3710      3711
## [1,] 24.48384 24.3882 24.30186 24.12854 24.30173 24.38851 23.85336
##      3712      3713      3714      3715      3716      3717      3718
## [1,] 24.45375 24.49359 24.18912 24.28586 23.81003 24.23777 24.57577
##      3719      3720      3721      3722      3723      3724      3725
## [1,] 24.04881 24.09656 24.71827 24.29491 24.21784 24.73012 24.46463
##      3726      3727      3728      3729      3730      3731      3732
## [1,] 24.49484 24.67776 24.04626 24.43566 24.24549 24.36676 23.91889
##      3733      3734      3735      3736      3737      3738      3739
## [1,] 24.42005 24.1541 24.57214 24.48709 25.21598 30.64115 30.62878
##      3740      3741      3742      3743      3744      3745      3746
## [1,] 32.19553 31.70521 31.5231 31.06637 31.07528 32.32416 31.32336
##      3747      3748      3749      3750      3751      3752      3753      3754
## [1,] 30.89873 32.0599 31.36455 31.4894 31.02234 30.54562 31.27993 32.62264
##      3755      3756      3757      3758      3759      3760      3761
## [1,] 32.10581 30.6613 31.04226 31.11475 30.16182 31.07675 30.78262
##      3762      3763      3764      3765      3766      3767      3768      3769
## [1,] 30.65006 31.1168 32.9498 31.06261 30.26787 31.8589 30.99765 31.23105
##      3770      3771      3772      3773      3774      3775      3776      3777
## [1,] 31.33226 32.27415 32.16864 30.67887 30.5012 30.055 30.85896 30.05687
##      3778      3779      3780      3781      3782      3783      3784
## [1,] 30.99253 31.0974 30.99173 30.92445 30.86911 31.21411 31.81439
##      3785      3786      3787      3788      3789      3790      3791      3792
## [1,] 30.46635 31.24851 30.6085 31.23755 30.54638 30.83393 31.29146 30.6631
##      3793      3794      3795      3796      3797      3798      3799
## [1,] 31.48724 31.45848 31.22863 30.73311 30.57411 30.74262 30.91323
##      3800      3801      3802      3803      3804      3805      3806
## [1,] 31.31083 31.77391 31.21925 30.90679 30.91541 30.75038 30.76056
##      3807      3808      3809      3810      3811      3812      3813
## [1,] 31.68555 31.68412 31.63104 30.93478 30.72358 30.86905 32.02264
##      3814      3815      3816      3817      3818      3819      3820
## [1,] 31.16787 31.03067 30.96925 30.60036 30.43036 30.96405 31.01593
##      3821      3822      3823      3824      3825      3826      3827
## [1,] 31.33782 30.7716 31.12493 30.72939 30.55819 30.53662 30.40201
##      3828      3829      3830      3831      3832      3833      3834
## [1,] 31.33708 32.37166 33.00247 31.61941 30.9694 31.40144 31.65556
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## [1,] 31.29389 31.42786 30.60109 31.10076 31.21161 30.76314 31.98743
##      3842      3843      3844      3845      3846      3847      3848
## [1,] 30.76112 31.23835 30.98977 31.06563 31.42387 31.48873 30.6676
##      3849      3850      3851      3852      3853      3854      3855
## [1,] 30.53687 34.23992 31.67231 32.87052 34.65433 31.24243 31.2551
##      3856      3857      3858      3859      3860      3861      3862
## [1,] 31.71239 31.67695 31.52445 31.55232 31.86403 31.04933 32.00698
##      3863      3864      3865      3866      3867      3868      3869      3870

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## [1,] 32.4456 30.91181 31.12574 30.65852 31.8083 31.47009 32.71168 30.90041
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## [1,] 31.74681 35.12896 36.29208 35.57358 35.48109 36.32934 35.82698
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## [1,] 35.36848 34.14516 34.64423 34.95912 35.44181 34.85433 34.83672
##      3885      3886      3887      3888      3889      3890      3891
## [1,] 35.1908 37.13901 34.79542 35.54977 34.05521 36.61171 34.12289
##      3892      3893      3894      3895      3896      3897      3898
## [1,] 35.08052 34.93307 36.77907 34.3588 35.66133 34.00611 36.67951
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## [1,] 35.15792 34.37009 34.67891 35.26631 35.60611 35.68596 36.4305
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## [1,] 34.13909 34.78738 34.65566 35.38849 35.79608 34.74705 35.74638
##      3913      3914      3915      3916      3917      3918      3919
## [1,] 34.58847 34.97076 35.2408 34.88305 37.48238 34.88506 34.74038
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##      3927      3928      3929      3930      3931      3932      3933
## [1,] 34.42771 34.44258 34.57157 37.22864 35.0375 36.07408 34.57833
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##      3948      3949      3950      3951      3952      3953      3954
## [1,] 35.86766 34.84222 34.10326 35.84188 35.55236 35.34123 35.45382
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##      3969      3970      3971      3972      3973      3974      3975      3976
## [1,] 35.52852 37.79608 35.18018 34.55083 34.75114 34.164 36.3335 34.358
##      3977      3978      3979      3980      3981      3982      3983
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##      3984      3985      3986      3987      3988      3989      3990
## [1,] 36.00042 35.6473 39.30995 35.28921 35.45645 35.53596 35.13567
##      3991      3992      3993      3994      3995      3996      3997
## [1,] 35.48029 35.71723 34.99191 34.51941 36.90274 36.12917 35.0862
##      3998      3999      4000      4001      4002      4003      4004
## [1,] 35.62324 35.36592 34.71002 35.57271 34.06109 34.35398 35.58539
##      4005      4006      4007      4008      4009      4010      4011
## [1,] 35.25119 35.85874 35.99972 35.82499 34.86607 35.39639 35.74515
##      4012      4013      4014      4015      4016      4017      4018
## [1,] 34.94194 34.56732 38.13087 34.64574 37.08106 34.61473 35.26389
##      4019      4020      4021      4022      4023      4024      4025
## [1,] 36.00705 35.19922 34.97121 36.24013 37.06878 34.85897 36.49154
##      4026      4027      4028      4029      4030      4031      4032
## [1,] 34.75454 34.26455 35.33468 34.38851 36.03897 35.13532 35.05755
##      4033      4034      4035      4036      4037      4038      4039
## [1,] 34.06865 38.24002 35.29315 36.35705 34.99944 35.63882 34.53488
##      4040      4041      4042      4043      4044      4045      4046
## [1,] 24.02391 23.06995 22.57984 24.38787 43.22056 23.45068 23.79491
##      4047      4048      4049      4050      4051      4052      4053      4054
## [1,] 23.7842 23.47179 23.51343 22.69527 23.34252 22.9389 24.83019 22.89161
##      4055      4056      4057      4058      4059      4060      4061

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## [1,] 23.3622 23.43383 24.03833 23.73057 24.61532 24.55069 24.14084
##      4062      4063      4064      4065      4066      4067      4068
## [1,] 23.29329 23.81199 53.16603 23.42645 23.2309 23.43758 23.10087
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## [1,] 23.24135 23.76111 23.509 23.18046 23.71658 23.5659 23.75232 23.32796
##      4077      4078      4079      4080      4081      4082      4083
## [1,] 23.25244 23.47996 23.42344 23.9408 23.48776 23.94639 23.16659
##      4084      4085      4086      4087      4088      4089      4090
## [1,] 23.59544 23.9648 23.22698 23.58833 22.98829 23.47107 23.79545
##      4091      4092      4093      4094      4095      4096      4097
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##      4098      4099      4100      4101      4102      4103      4104
## [1,] 22.8453 23.54522 23.45289 23.85106 23.37498 23.74161 23.52331
##      4105      4106      4107      4108      4109      4110      4111
## [1,] 23.15915 23.63418 53.83358 25.08842 23.35141 23.08963 23.84547
##      4112      4113      4114      4115      4116      4117      4118
## [1,] 22.9107 23.55624 22.97674 23.80068 23.08254 23.11431 23.34282
##      4119      4120      4121      4122      4123      4124      4125
## [1,] 23.48307 23.34326 23.64835 23.59791 23.95835 23.59929 24.21899
##      4126      4127      4128      4129      4130      4131      4132
## [1,] 23.72333 23.89282 23.73326 23.90824 23.16608 23.77318 23.14397
##      4133      4134      4135      4136      4137      4138      4139
## [1,] 24.81402 23.59686 23.77678 23.54987 23.79735 23.62277 23.38522
##      4140      4141      4142      4143      4144      4145      4146      4147
## [1,] 24.0864 23.61296 23.16633 23.23992 23.45604 23.83369 23.3341 23.69072
##      4148      4149      4150      4151      4152      4153      4154
## [1,] 23.62642 23.99193 23.88651 23.15891 23.68704 23.15628 25.06592
##      4155      4156      4157      4158      4159      4160      4161      4162
## [1,] 23.48279 23.85292 23.79692 23.52103 23.289 22.88924 23.4303 23.45002
##      4163      4164      4165      4166      4167      4168      4169      4170
## [1,] 23.69337 23.98299 23.26063 44.62258 35.4524 34.59579 35.99553 34.2614
##      4171      4172      4173      4174      4175      4176      4177
## [1,] 34.38577 34.66977 34.93944 36.41848 34.12399 33.25164 33.92692
##      4178      4179      4180      4181      4182      4183      4184      4185
## [1,] 33.83917 33.10209 34.22763 34.17062 34.12458 33.821 34.27211 35.11053
##      4186      4187      4188      4189      4190      4191      4192
## [1,] 35.2667 38.50232 41.71254 35.06818 40.34698 35.65211 36.14863
##      4193      4194      4195      4196      4197      4198      4199      4200
## [1,] 35.30956 33.1923 40.65787 35.25738 34.90689 34.59892 33.7623 34.35167
##      4201      4202      4203      4204      4205      4206      4207
## [1,] 33.61141 33.59381 36.7909 34.16523 34.63371 34.38519 34.17276
##      4208      4209      4210      4211      4212      4213      4214
## [1,] 34.99887 35.07327 38.52727 35.12897 34.47047 34.96985 34.77205
##      4215      4216      4217      4218      4219      4220      4221      4222
## [1,] 33.8656 35.6592 39.61007 34.68692 35.04843 33.89373 32.84609 34.08722
##      4223      4224      4225      4226      4227      4228      4229
## [1,] 33.78807 35.65559 35.98405 33.74427 34.18081 34.30881 41.37065
##      4230      4231      4232      4233      4234      4235      4236      4237
## [1,] 33.9389 34.22429 37.08484 33.67407 34.7039 33.97077 33.46691 35.83503
##      4238      4239      4240      4241      4242      4243      4244
## [1,] 33.76213 33.61735 33.85461 34.55048 33.65547 34.6948 34.58648
##      4245      4246      4247      4248      4249      4250      4251      4252
## [1,] 34.06224 34.38347 33.8318 33.16629 33.20913 34.35236 34.1938 38.97856
##      4253      4254      4255      4256      4257      4258      4259

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## [1,] 35.07799 37.26202 35.40882 34.86189 35.45804 34.50709 34.60214
##      4260      4261      4262      4263      4264      4265      4266
## [1,] 34.83028 34.19161 33.63707 34.28335 32.8471 33.43076 34.23937
##      4267      4268      4269      4270      4271      4272      4273
## [1,] 34.14596 33.17191 33.58813 33.65366 34.03877 35.55678 33.63234
##      4274      4275      4276      4277      4278      4279      4280
## [1,] 36.66915 35.11976 37.85597 35.27501 33.36084 36.78545 34.99873
##      4281      4282      4283      4284      4285      4286      4287
## [1,] 35.1287 33.80181 36.15878 34.23263 33.92301 33.67518 35.50047
##      4288      4289      4290      4291      4292      4293      4294      4295
## [1,] 35.28711 35.03985 36.06885 34.58645 33.85645 34.035 35.82723 34.13219
##      4296      4297      4298      4299      4300      4301      4302
## [1,] 17.08648 16.52148 16.48477 17.14534 17.36559 17.34646 16.74295
##      4303      4304      4305      4306      4307      4308      4309      4310
## [1,] 17.04104 16.91118 16.92555 17.36746 16.82614 17.47062 17.1452 16.6712
##      4311      4312      4313      4314      4315      4316      4317      4318
## [1,] 17.1336 16.68934 16.46387 17.03103 17.19142 16.90606 16.6197 17.23176
##      4319      4320      4321      4322      4323      4324      4325
## [1,] 16.50753 16.58897 16.7652 16.91185 16.88195 16.80109 16.98587
##      4326      4327      4328      4329      4330      4331      4332
## [1,] 16.48697 17.05653 16.76444 16.57347 16.98498 16.54101 17.17177
##      4333      4334      4335      4336      4337      4338      4339
## [1,] 17.08421 17.19048 17.39094 16.41642 16.59208 16.85236 16.78986
##      4340      4341      4342      4343      4344      4345      4346
## [1,] 17.12878 16.73535 16.83357 16.3757 17.00927 16.90343 16.18357
##      4347      4348      4349      4350      4351      4352      4353
## [1,] 16.54819 16.64806 16.67093 17.20518 16.71365 17.76156 16.48153
##      4354      4355      4356      4357      4358      4359      4360
## [1,] 16.71649 16.79261 16.86552 16.93944 16.59928 17.2044 16.71479
##      4361      4362      4363      4364      4365      4366      4367
## [1,] 16.62378 17.10755 16.51925 16.57341 16.40651 17.13537 16.68575
##      4368      4369      4370      4371      4372      4373      4374
## [1,] 16.73443 17.06665 17.27935 16.67115 16.68143 16.48215 16.88959
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## [1,] 16.83475 16.53211 16.79974 16.62028 16.57561 16.3559 16.86273
##      4382      4383      4384      4385      4386      4387      4388      4389
## [1,] 16.30012 16.7965 17.33157 16.87889 16.61815 16.98523 17.36541 16.6095
##      4390      4391      4392      4393      4394      4395      4396
## [1,] 16.83746 16.99259 16.46148 16.61395 16.71672 17.1216 17.20459
##      4397      4398      4399      4400      4401      4402      4403
## [1,] 28.23273 29.38688 28.39386 28.29252 27.98241 28.64884 28.29201
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## [1,] 28.87047 28.58407 28.03604 28.44293 28.84826 28.65967 29.23501
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## [1,] 28.21504 29.70449 28.41838 28.20113 28.92883 30.81415 29.22045
##      4418      4419      4420      4421      4422      4423      4424      4425
## [1,] 29.05048 27.56723 29.0922 28.8883 27.89026 28.25107 27.26675 27.81832
##      4426      4427      4428      4429      4430      4431      4432
## [1,] 28.00348 28.7383 27.84807 28.91363 27.63362 28.17564 28.15362
##      4433      4434      4435      4436      4437      4438      4439      4440
## [1,] 28.05815 28.9214 28.27605 28.89122 28.45194 30.41805 29.1759 28.89481
##      4441      4442      4443      4444      4445      4446      4447
## [1,] 28.03139 28.75067 28.00056 27.39226 28.16532 27.78174 28.25339
##      4448      4449      4450      4451      4452      4453      4454      4455

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## [1,] 28.81867 27.5895 27.6204 28.76023 28.22007 28.21962 28.13216 28.53676
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## [1,] 29.06953 29.69502 28.25574 28.05605 27.75291 28.41975 28.35888
##      4463      4464      4465      4466      4467      4468      4469
## [1,] 29.16553 28.02016 28.22051 28.48381 29.34707 27.95047 28.41916
##      4470      4471      4472      4473      4474      4475      4476
## [1,] 28.43481 28.9216 29.13776 28.30193 28.90166 28.82257 29.05337
##      4477      4478      4479      4480      4481      4482      4483
## [1,] 28.36884 28.28238 28.92223 28.37576 27.81986 28.1793 29.51111
##      4484      4485      4486      4487      4488      4489      4490
## [1,] 28.95457 30.39576 28.09204 27.93691 29.0136 27.70055 28.65125
##      4491      4492      4493      4494      4495      4496      4497
## [1,] 27.63258 29.36338 28.26538 29.88562 27.43756 29.09195 28.64564
##      4498      4499      4500      4501      4502      4503      4504
## [1,] 28.38019 27.8801 28.37107 28.83334 28.52426 28.62291 27.79434
##      4505      4506      4507      4508      4509      4510      4511      4512
## [1,] 28.22417 27.75842 29.1517 28.87481 27.9096 27.99995 28.41314 27.91388
##      4513      4514      4515      4516      4517      4518      4519
## [1,] 28.06502 27.97644 28.68425 28.14277 27.68777 28.83976 28.72825
##      4520      4521      4522      4523      4524      4525      4526
## [1,] 28.74747 29.13542 28.18041 27.91634 28.93491 28.94767 27.96981
##      4527      4528      4529      4530      4531      4532      4533      4534
## [1,] 28.73259 28.30315 27.52254 28.93617 28.13587 27.27239 27.0112 26.9757
##      4535      4536      4537      4538      4539      4540      4541      4542
## [1,] 26.50067 27.88884 26.89515 27.83236 27.46905 26.56228 26.49876 26.858
##      4543      4544      4545      4546      4547      4548      4549
## [1,] 25.38047 26.64048 26.80273 26.9087 26.50177 26.17025 26.81864
##      4550      4551      4552      4553      4554      4555      4556
## [1,] 27.71227 27.07842 26.54443 26.56355 27.18061 26.31086 26.71558
##      4557      4558      4559      4560      4561      4562      4563
## [1,] 27.07763 26.85001 27.31231 27.16776 27.07822 26.93798 26.97104
##      4564      4565      4566      4567      4568      4569      4570      4571
## [1,] 27.17718 27.77842 26.662 27.3837 27.17045 26.54567 26.97182 27.0043
##      4572      4573      4574      4575      4576      4577      4578
## [1,] 27.73644 26.93357 27.03689 26.58928 26.87921 26.62758 26.66718
##      4579      4580      4581      4582      4583      4584      4585      4586
## [1,] 26.87992 26.8997 27.5436 26.95193 26.64857 27.27239 27.1579 26.95323
##      4587      4588      4589      4590      4591      4592      4593
## [1,] 26.89552 26.71478 27.66859 27.18136 26.88425 26.85593 27.54509
##      4594      4595      4596      4597      4598      4599      4600      4601
## [1,] 26.99748 27.45564 26.8714 27.17162 26.74066 27.1805 26.94507 26.66381
##      4602      4603      4604      4605      4606      4607      4608
## [1,] 27.11496 26.74638 27.43702 26.79793 26.74831 27.1578 27.01258
##      4609      4610      4611      4612      4613      4614      4615
## [1,] 26.58972 26.87393 26.64458 27.29246 26.6869 26.88549 26.99071
##      4616      4617      4618      4619      4620      4621      4622
## [1,] 27.71693 27.98742 26.99057 27.07293 26.37762 27.90022 28.5509
##      4623      4624      4625      4626      4627      4628      4629
## [1,] 27.07444 27.56039 27.09382 26.90246 27.51909 26.69546 26.97002
##      4630      4631      4632      4633      4634      4635      4636
## [1,] 27.36239 26.85797 26.64214 27.0789 27.05205 27.18926 27.23205
##      4637      4638      4639      4640      4641      4642      4643
## [1,] 27.19725 27.19241 27.52983 27.07135 27.62955 26.66643 27.80488
##      4644      4645      4646      4647      4648      4649      4650

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## [1,] 26.89775 27.17592 26.63582 26.46716 27.22085 27.02536 26.2408
##      4651      4652      4653      4654      4655      4656      4657
## [1,] 27.09627 26.55385 26.57363 26.74666 27.00813 26.77515 26.86315
##      4658      4659      4660      4661      4662      4663      4664
## [1,] 27.06488 26.97921 27.15201 26.65655 26.97324 27.19797 27.13918
##      4665      4666      4667      4668      4669      4670      4671
## [1,] 27.00881 27.39888 27.03647 27.1319 27.52048 26.90491 27.14639
##      4672      4673      4674      4675      4676      4677      4678
## [1,] 26.97218 27.47204 26.94787 26.77882 27.07883 26.63087 26.65447
##      4679      4680      4681      4682      4683      4684      4685
## [1,] 27.07937 26.68252 26.60696 26.77054 26.84399 27.27667 26.97572
##      4686      4687      4688      4689      4690      4691      4692
## [1,] 26.73915 27.29392 26.89878 27.09731 26.95537 27.33506 26.73393
##      4693      4694      4695      4696      4697      4698      4699
## [1,] 32.10137 32.43923 36.19852 32.77581 32.39713 32.58272 32.39116
##      4700      4701      4702      4703      4704      4705      4706
## [1,] 32.60489 32.55592 32.47992 33.18763 32.32927 32.60325 31.77409
##      4707      4708      4709      4710      4711      4712      4713
## [1,] 34.08412 32.59113 34.68081 32.76394 33.18769 32.37669 32.17882
##      4714      4715      4716      4717      4718      4719      4720      4721
## [1,] 32.1544 31.72927 32.1754 32.41651 33.91325 34.19959 31.37735 32.25951
##      4722      4723      4724      4725      4726      4727      4728
## [1,] 34.59684 32.18804 32.56562 32.49976 32.03165 32.42983 31.38259
##      4729      4730      4731      4732      4733      4734      4735
## [1,] 32.12157 32.63165 32.07109 32.11221 32.05252 32.41791 31.82277
##      4736      4737      4738      4739      4740      4741      4742      4743
## [1,] 32.2986 32.76518 32.03081 31.9514 31.61176 31.7983 32.05326 31.85699
##      4744      4745      4746      4747      4748      4749      4750
## [1,] 33.18295 32.94749 31.66702 32.98171 32.41269 31.84751 33.21402
##      4751      4752      4753      4754      4755      4756      4757
## [1,] 31.56258 32.00937 31.31467 32.43044 31.6584 31.43685 31.39836
##      4758      4759      4760      4761      4762      4763      4764      4765
## [1,] 32.92591 31.57706 31.8378 32.8418 32.56818 32.41551 32.46564 32.26807
##      4766      4767      4768      4769      4770      4771      4772
## [1,] 32.60874 32.61553 31.91832 31.61273 32.10133 33.27302 32.43343
##      4773      4774      4775      4776      4777      4778      4779      4780
## [1,] 34.82597 32.6942 32.77172 31.6226 33.33382 33.59706 32.91658 31.91619
##      4781      4782      4783      4784      4785      4786      4787
## [1,] 31.16832 31.93081 32.11954 32.67774 33.19089 31.94945 32.85546
##      4788      4789      4790      4791      4792      4793      4794
## [1,] 32.64289 32.06068 32.30344 32.47616 33.19519 32.43266 31.8223
##      4795      4796      4797      4798      4799      4800      4801
## [1,] 31.64537 32.15234 33.03768 32.59701 33.52444 32.59889 33.23989
##      4802      4803      4804      4805      4806      4807      4808
## [1,] 32.50422 33.67214 33.72508 36.51703 33.51922 32.36189 34.55248
##      4809      4810      4811      4812      4813      4814      4815
## [1,] 32.04814 31.71229 32.32276 32.15697 31.74533 32.78996 32.72898
##      4816      4817      4818      4819      4820      4821      4822
## [1,] 31.93057 33.67837 32.44089 33.23926 33.11103 32.4055 32.60044
##      4823      4824      4825      4826      4827      4828      4829
## [1,] 31.94043 31.94971 32.44491 33.49855 32.25908 34.46857 32.84959
##      4830      4831      4832      4833      4834      4835      4836
## [1,] 32.99674 31.95109 33.51314 31.77485 32.05042 31.49183 32.29083
##      4837      4838      4839      4840      4841      4842      4843

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## [1,] 33.28074 31.72426 32.2039 32.51381 32.28234 32.88197 33.56106
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## [1,] 33.02026 32.27019 32.54735 32.85493 33.05595 32.91786 31.41424
##      4851      4852      4853      4854      4855      4856      4857
## [1,] 32.13717 33.40833 32.19743 35.31144 32.89345 33.31397 34.20593
##      4858      4859      4860      4861      4862      4863      4864
## [1,] 30.67591 28.3825 27.51145 28.24208 32.48878 27.77477 29.69291
##      4865      4866      4867      4868      4869      4870      4871
## [1,] 26.42771 31.22583 28.27687 28.85018 25.76813 28.68719 28.27181
##      4872      4873      4874      4875      4876      4877      4878      4879
## [1,] 31.28073 26.7969 40.7449 26.32479 37.97806 25.65165 30.68555 28.17978
##      4880      4881      4882      4883      4884      4885      4886
## [1,] 28.05208 27.45198 28.95118 30.64136 29.07569 34.26222 28.94087
##      4887      4888      4889      4890      4891      4892      4893
## [1,] 26.27988 26.95604 28.75936 27.46307 24.78133 27.25136 28.86126
##      4894      4895      4896      4897      4898      4899      4900
## [1,] 26.02758 28.73368 31.54154 32.32607 28.88208 33.54296 31.84617
##      4901      4902      4903      4904      4905      4906      4907      4908
## [1,] 31.7139 33.19815 22.00577 27.58277 25.2953 27.36231 30.93089 26.68519
##      4909      4910      4911      4912      4913      4914      4915
## [1,] 28.2235 26.26563 26.48029 26.32153 30.48354 30.30828 31.80043
##      4916      4917      4918      4919      4920      4921      4922
## [1,] 33.64325 34.01342 23.2093 34.88006 32.59293 31.43752 26.32424
##      4923      4924      4925      4926      4927      4928      4929
## [1,] 29.84036 30.61883 26.00841 24.31995 28.76069 27.19466 31.59881
##      4930      4931      4932      4933      4934      4935      4936      4937
## [1,] 27.71061 29.9912 24.93449 27.57927 28.6322 30.02695 29.72465 28.19849
##      4938      4939      4940      4941      4942      4943      4944
## [1,] 27.73671 31.39133 32.07204 27.79647 27.43481 33.45063 27.30198
##      4945      4946      4947      4948      4949      4950      4951      4952
## [1,] 30.27466 30.7985 27.52993 30.31009 31.70563 28.2137 38.27431 30.35081
##      4953      4954      4955      4956      4957      4958      4959
## [1,] 29.05489 28.07899 30.96677 28.54822 30.21937 27.41113 30.03025
##      4960      4961      4962      4963      4964      4965      4966
## [1,] 28.26407 32.97364 28.49099 34.39273 28.50393 26.69746 33.15278
##      4967      4968      4969      4970      4971      4972      4973
## [1,] 28.91703 29.19148 27.99946 31.12494 27.26938 29.27101 31.11319
##      4974      4975      4976      4977      4978      4979      4980
## [1,] 24.80212 26.88252 29.12686 29.38828 29.38575 29.90141 32.39162
##      4981      4982      4983      4984      4985      4986      4987
## [1,] 30.37793 26.32551 32.68818 27.24935 30.53499 28.15975 26.41669
##      4988      4989      4990      4991      4992      4993      4994
## [1,] 35.15633 32.7707 28.38163 24.13918 25.06571 24.08255 23.88262
##      4995      4996      4997      4998      4999      5000      5001      5002
## [1,] 24.40033 25.30076 24.0135 23.8778 24.14674 24.32934 23.90005 23.7776
##      5003      5004      5005      5006      5007      5008      5009
## [1,] 24.09331 23.80706 23.44267 23.78561 23.83136 23.80592 24.08374
##      5010      5011      5012      5013      5014      5015      5016
## [1,] 23.95201 32.30414 24.37008 28.07452 23.83095 26.43258 24.08494
##      5017      5018      5019      5020      5021      5022      5023      5024
## [1,] 23.63125 23.72114 24.97486 23.86551 23.73911 24.271 24.22107 23.58979
##      5025      5026      5027      5028      5029      5030      5031      5032
## [1,] 23.74776 23.44409 23.27466 23.61712 23.41607 24.02 24.16619 23.9251
##      5033      5034      5035      5036      5037      5038      5039

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## [1,] 25.1612 32.97799 29.55097 27.57861 23.93076 25.14118 23.94907
##      5040      5041      5042      5043      5044      5045      5046
## [1,] 23.60679 23.43099 28.46527 23.77515 24.49683 24.38302 24.23545
##      5047      5048      5049      5050      5051      5052      5053
## [1,] 23.31076 23.52226 23.95207 23.66693 23.35997 23.60876 23.59922
##      5054      5055      5056      5057      5058      5059      5060      5061
## [1,] 23.34693 23.73846 23.84719 32.01462 24.91425 25.056 23.55336 27.40016
##      5062      5063      5064      5065      5066      5067      5068
## [1,] 23.35175 23.49727 23.90224 30.50865 24.20744 23.78568 23.47823
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##      5083      5084      5085      5086      5087      5088      5089
## [1,] 23.55977 24.04868 23.42134 23.15896 23.56232 24.29681 23.67857
##      5090      5091      5092      5093      5094      5095      5096
## [1,] 23.49567 23.61232 23.68758 23.73476 23.49618 23.94645 23.79318
##      5097      5098      5099      5100      5101      5102      5103
## [1,] 23.59234 23.55871 23.79407 23.74268 23.74028 24.03824 24.78531
##      5104      5105      5106      5107      5108      5109      5110
## [1,] 27.42206 24.34216 29.08127 23.44718 24.98396 23.79446 23.3957
##      5111      5112      5113      5114      5115      5116      5117
## [1,] 23.62607 24.00754 23.5593 23.72575 23.82387 23.97175 23.57495
##      5118      5119      5120      5121      5122      5123      5124
## [1,] 23.69422 23.98994 23.39277 23.67696 23.76743 23.60575 23.86454
##      5125      5126      5127      5128      5129      5130      5131
## [1,] 23.78535 23.55406 30.99095 30.29702 30.98637 30.74196 31.29908
##      5132      5133      5134      5135      5136      5137      5138
## [1,] 30.69332 30.72239 31.10806 30.68441 30.55278 30.6591 30.59045
##      5139      5140      5141      5142      5143      5144      5145
## [1,] 30.90327 30.26208 30.07975 30.63993 30.3298 31.12675 30.02999
##      5146      5147      5148      5149      5150      5151      5152      5153
## [1,] 29.92259 30.29212 31.03647 30.6034 30.1595 30.96399 30.32278 30.43866
##      5154      5155      5156      5157      5158      5159      5160
## [1,] 30.33848 30.51422 30.28773 30.48014 29.96575 30.84687 30.10494
##      5161      5162      5163      5164      5165      5166      5167
## [1,] 30.14429 30.39952 30.8181 30.56839 31.39426 30.61102 30.51044
##      5168      5169      5170      5171      5172      5173      5174      5175
## [1,] 29.49517 30.02393 31.53353 29.99463 30.6325 30.5399 30.30078 30.60594
##      5176      5177      5178      5179      5180      5181      5182      5183
## [1,] 29.48392 29.8114 30.31675 30.44678 32.0063 30.35265 30.26736 30.79215
##      5184      5185      5186      5187      5188      5189      5190
## [1,] 30.89968 30.01535 30.41697 30.69666 30.21475 30.22291 30.22966
##      5191      5192      5193      5194      5195      5196      5197      5198
## [1,] 31.31547 30.62906 30.38985 30.2472 30.30427 30.26559 30.3896 30.20049
##      5199      5200      5201      5202      5203      5204      5205
## [1,] 29.73484 30.00512 30.58342 30.55605 30.68793 31.16946 30.70214
##      5206      5207      5208      5209      5210      5211      5212      5213
## [1,] 32.06623 30.97004 30.56615 31.32639 31.54682 32.2212 30.3257 30.83791
##      5214      5215      5216      5217      5218      5219      5220
## [1,] 30.02641 29.56523 30.61188 30.26987 31.10574 31.06978 31.05463
##      5221      5222      5223      5224      5225      5226      5227
## [1,] 31.34483 30.07868 30.27945 30.6256 30.61673 30.38575 30.54241
##      5228      5229      5230      5231      5232      5233      5234

```



```

## [1,] 31.01318 29.99531 30.57129 30.85995 30.59404 30.28337 30.10341
##      5235      5236      5237      5238      5239      5240      5241      5242
## [1,] 30.28414 30.10533 30.469 30.89794 32.05743 30.4114 31.8684 30.65695
##      5243      5244      5245      5246      5247      5248      5249
## [1,] 30.14121 30.5374 29.71029 31.66113 30.44617 30.59157 31.59296
##      5250      5251      5252      5253      5254      5255      5256
## [1,] 30.52153 31.04152 30.24887 30.35785 30.82458 30.47967 30.79664
##      5257      5258      5259      5260      5261      5262      5263
## [1,] 30.83374 30.37071 31.28545 30.13392 31.01252 30.8847 30.04793
##      5264      5265      5266      5267      5268      5269      5270
## [1,] 30.88965 30.65608 30.77895 30.60964 30.42928 30.13823 30.17909
##      5271      5272      5273      5274      5275      5276      5277
## [1,] 31.02457 30.98764 29.95855 30.87873 30.64724 30.36954 31.22117
##      5278      5279      5280      5281      5282      5283      5284
## [1,] 30.10905 31.54307 31.1837 30.79678 29.67507 29.75829 31.42616
##      5285      5286      5287      5288      5289      5290      5291
## [1,] 30.54644 32.42767 34.38166 30.57415 33.74301 30.1067 30.69801
##      5292      5293      5294      5295      5296      5297      5298
## [1,] 29.67473 31.94514 32.75835 29.55169 30.7529 30.97316 29.61155
##      5299      5300      5301      5302      5303      5304      5305      5306
## [1,] 30.40354 30.01904 30.593 29.42977 29.98989 29.65074 29.84737 29.50854
##      5307      5308      5309      5310      5311      5312      5313
## [1,] 29.46447 30.53552 30.10667 29.98915 30.12539 29.93766 31.39122
##      5314      5315      5316      5317      5318      5319      5320
## [1,] 31.29032 30.02608 31.45845 29.56844 30.42731 29.95703 31.20849
##      5321      5322      5323      5324      5325      5326      5327
## [1,] 29.87975 29.83919 29.87487 29.79704 29.94639 29.66364 30.45838
##      5328      5329      5330      5331      5332      5333      5334
## [1,] 29.37874 30.08638 29.7139 29.56558 29.70897 29.84254 29.15959
##      5335      5336      5337      5338      5339      5340      5341
## [1,] 30.22619 30.62122 29.88856 30.26428 29.94564 29.95602 29.68118
##      5342      5343      5344      5345      5346      5347      5348
## [1,] 30.67254 29.70694 29.76139 29.82501 30.85108 29.82678 34.11187
##      5349      5350      5351      5352      5353      5354      5355      5356
## [1,] 30.2725 30.1796 30.9573 30.19043 29.7224 31.36489 29.95031 30.40283
##      5357      5358      5359      5360      5361      5362      5363      5364
## [1,] 29.62564 30.6218 31.69098 29.35227 30.91713 30.1909 29.51555 31.89401
##      5365      5366      5367      5368      5369      5370      5371
## [1,] 29.42292 30.72558 30.40879 32.23438 30.3753 32.85162 30.51932
##      5372      5373      5374      5375      5376      5377      5378
## [1,] 30.76903 29.97807 31.48566 29.54969 30.36336 29.52366 29.94165
##      5379      5380      5381      5382      5383      5384      5385      5386
## [1,] 29.95543 30.30466 30.0219 30.10434 31.35534 29.58217 30.1309 29.69716
##      5387      5388      5389      5390      5391      5392      5393
## [1,] 29.65704 29.62805 29.70911 30.03469 30.29276 29.85696 29.65138
##      5394      5395      5396      5397      5398      5399      5400
## [1,] 29.95747 30.27907 29.88198 30.06757 29.46113 30.22359 29.85824
##      5401      5402      5403      5404      5405      5406      5407      5408
## [1,] 29.70225 29.9846 29.94104 29.53805 30.54555 29.552 30.52167 29.6054
##      5409      5410      5411      5412      5413      5414      5415
## [1,] 29.61643 29.85791 30.57834 30.11071 29.47102 29.78757 29.95304
##      5416      5417      5418      5419      5420      5421      5422
## [1,] 30.01985 30.7339 30.01576 34.56207 34.73994 34.60809 34.54301
##      5423      5424      5425      5426      5427      5428      5429

```

```

## [1,] 34.10182 34.01906 35.28615 34.26427 35.62015 34.57988 33.98784
##      5430      5431      5432      5433      5434      5435      5436
## [1,] 34.33586 35.35615 36.05852 34.47628 35.24606 34.14421 34.60532
##      5437      5438      5439      5440      5441      5442      5443
## [1,] 35.03073 34.64038 34.96935 34.79775 34.65132 36.5622 34.53197
##      5444      5445      5446      5447      5448      5449      5450
## [1,] 34.16591 34.43123 34.38872 33.93497 34.92051 35.02388 35.2988
##      5451      5452      5453      5454      5455      5456      5457
## [1,] 34.25999 34.19426 33.96494 34.52542 35.18838 33.58519 34.09699
##      5458      5459      5460      5461      5462      5463      5464      5465
## [1,] 35.2351 34.75824 34.5307 33.80981 34.45389 34.25046 33.57026 34.56368
##      5466      5467      5468      5469      5470      5471      5472
## [1,] 34.36965 34.07465 34.2087 35.07872 34.65072 34.32354 34.29992
##      5473      5474      5475      5476      5477      5478      5479      5480
## [1,] 34.60722 34.2381 34.52348 34.08119 34.38459 33.8525 34.03491 34.5228
##      5481      5482      5483      5484      5485      5486      5487      5488
## [1,] 34.62164 34.6769 34.43859 34.89562 33.55898 34.58551 33.9881 34.9803
##      5489      5490      5491      5492      5493      5494      5495
## [1,] 34.42947 34.7688 34.25054 34.22251 34.13951 33.91827 33.99709
##      5496      5497      5498      5499      5500      5501      5502      5503
## [1,] 35.32248 34.62646 35.3313 34.19452 34.7457 34.30885 34.32123 34.47123
##      5504      5505      5506      5507      5508      5509      5510
## [1,] 34.43822 34.61558 34.28123 34.59704 34.7841 34.25172 34.56351
##      5511      5512      5513      5514      5515      5516      5517
## [1,] 35.12052 34.75026 35.01797 34.11929 34.06301 34.64234 34.10146
##      5518      5519      5520      5521      5522      5523      5524
## [1,] 35.12087 35.61198 33.81094 34.64203 34.28976 34.54035 34.01804
##      5525      5526      5527      5528      5529      5530      5531      5532
## [1,] 34.43221 34.38498 34.44424 34.44614 34.59662 34.83087 34.176 34.50329
##      5533      5534      5535      5536      5537      5538      5539
## [1,] 33.96521 34.17201 34.68264 34.99269 34.96901 34.84985 34.4584
##      5540      5541      5542      5543      5544      5545      5546
## [1,] 34.25357 34.38381 34.58664 33.93038 34.75533 34.6214 34.04921
##      5547      5548      5549      5550      5551      5552      5553
## [1,] 34.29837 34.21479 34.91755 34.40007 34.18063 34.26855 34.35291
##      5554      5555      5556      5557      5558      5559      5560
## [1,] 33.71999 34.28717 34.24409 34.10399 33.99526 34.40461 34.76533
##      5561      5562      5563      5564      5565      5566      5567
## [1,] 29.47056 31.41191 29.62184 29.43955 33.17313 29.63241 30.03304
##      5568      5569      5570      5571      5572      5573      5574
## [1,] 30.71587 31.79142 29.42891 30.41715 29.3774 30.14516 29.98198
##      5575      5576      5577      5578      5579      5580      5581
## [1,] 31.58478 30.81846 29.28327 29.34649 30.31186 29.69869 28.41107
##      5582      5583      5584      5585      5586      5587      5588
## [1,] 30.78359 29.28722 29.60049 30.87209 29.90032 28.84934 31.44996
##      5589      5590      5591      5592      5593      5594      5595
## [1,] 29.59932 29.70749 30.05226 29.42913 29.82795 28.69577 30.12413
##      5596      5597      5598      5599      5600      5601      5602
## [1,] 29.39668 29.04982 31.90622 29.23878 29.17753 30.7121 29.84962
##      5603      5604      5605      5606      5607      5608      5609
## [1,] 29.54566 29.24745 29.08264 29.18528 30.3242 29.70386 28.94749
##      5610      5611      5612      5613      5614      5615      5616
## [1,] 29.20274 29.6662 29.18146 30.29544 29.31218 30.39392 31.46463
##      5617      5618      5619      5620      5621      5622      5623

```

```

## [1,] 30.36702 30.49376 28.60796 30.57456 32.17775 28.57083 31.02254
##      5624      5625      5626      5627      5628      5629      5630
## [1,] 29.54521 30.08616 29.55933 29.36529 29.70596 29.83562 28.61226
##      5631      5632      5633      5634      5635      5636      5637      5638
## [1,] 30.54277 29.49028 30.4604 29.10987 31.2646 31.03719 28.85902 31.12137
##      5639      5640      5641      5642      5643      5644      5645
## [1,] 29.31939 28.98341 28.71873 28.97292 30.89864 29.43322 28.81984
##      5646      5647      5648      5649      5650      5651      5652
## [1,] 29.37698 29.62751 30.53115 29.94627 29.32919 29.75489 32.64745
##      5653      5654      5655      5656      5657      5658      5659      5660
## [1,] 28.63794 30.0621 29.13235 29.30068 28.52456 30.2065 29.48946 30.43756
##      5661      5662      5663      5664      5665      5666      5667
## [1,] 29.02978 29.46182 29.68289 28.54541 30.66397 28.79112 29.07378
##      5668      5669      5670      5671      5672      5673      5674
## [1,] 29.14101 28.90501 29.31976 29.37241 29.27217 29.61948 28.86976
##      5675      5676      5677      5678      5679      5680      5681      5682
## [1,] 29.3168 29.9766 28.41379 28.97455 29.04569 28.63712 29.39977 29.27398
##      5683      5684      5685      5686      5687      5688      5689
## [1,] 29.89649 29.42549 30.2869 29.32053 29.08833 30.01046 29.13323
##      5690      5691      5692      5693      5694      5695      5696
## [1,] 29.28736 30.78032 29.25548 28.56468 28.98802 29.91977 28.82837
##      5697      5698      5699      5700      5701      5702      5703
## [1,] 29.24965 29.89715 28.8216 28.43566 28.78442 28.97856 28.75519
##      5704      5705      5706      5707      5708      5709      5710
## [1,] 28.93688 29.12438 28.88118 28.56574 29.03259 32.49314 29.32869
##      5711      5712      5713      5714      5715      5716      5717
## [1,] 29.66452 30.29826 29.21335 31.10677 28.51351 29.42559 29.00207
##      5718      5719      5720      5721      5722      5723      5724
## [1,] 29.43218 29.16982 29.93778 29.85283 29.67828 28.96292 30.45099
##      5725      5726      5727      5728      5729      5730      5731
## [1,] 29.43421 29.02681 28.07833 30.97831 30.23859 27.91505 28.39029
##      5732      5733      5734      5735      5736      5737      5738
## [1,] 28.27503 28.89963 28.09172 28.05875 30.86776 28.1938 28.60725
##      5739      5740      5741      5742      5743      5744      5745      5746
## [1,] 28.36085 28.5416 28.95766 28.95709 28.73627 29.1197 27.84491 28.1878
##      5747      5748      5749      5750      5751      5752      5753
## [1,] 30.56342 28.49296 28.74976 28.38486 28.38817 28.84459 27.97489
##      5754      5755      5756      5757      5758      5759      5760
## [1,] 28.33024 29.37902 27.34472 28.10282 28.31332 28.37277 28.21674
##      5761      5762      5763      5764      5765      5766      5767      5768
## [1,] 28.22973 28.19658 28.32924 28.61234 27.99816 27.80673 27.43798 28.1
##      5769      5770      5771      5772      5773      5774      5775
## [1,] 28.04394 27.64843 27.88072 28.5035 27.48163 28.42108 27.90831
##      5776      5777      5778      5779      5780      5781      5782
## [1,] 28.54943 28.64292 29.01625 27.81629 27.90455 27.58455 27.99935
##      5783      5784      5785      5786      5787      5788      5789
## [1,] 28.10198 28.61902 28.17301 27.97538 27.76647 28.91621 28.4149
##      5790      5791      5792      5793      5794      5795      5796
## [1,] 27.90425 28.49237 27.75073 27.43978 27.48572 28.45995 27.88815
##      5797      5798      5799      5800      5801      5802      5803
## [1,] 27.61404 28.20103 28.20801 27.86254 28.08266 28.12785 29.18937
##      5804      5805      5806      5807      5808      5809      5810
## [1,] 27.7064 28.72722 27.87935 28.19045 28.47449 28.27176 28.21196
##      5811      5812      5813      5814      5815      5816      5817      5818

```

```
## [1,] 27.85478 27.99933 28.2141 27.86506 27.69222 27.69534 27.6332 27.62025
##      5819      5820      5821      5822      5823      5824      5825
## [1,] 28.20937 27.83797 27.7566 27.87637 27.76638 28.07073 28.11868
##      5826      5827      5828      5829      5830      5831      5832
## [1,] 28.06463 27.59445 27.74907 27.8591 28.52789 27.73549 28.03662
##      5833      5834      5835      5836      5837      5838      5839
## [1,] 27.81617 27.77301 28.24242 28.05045 27.64839 27.6323 27.84687
##      5840      5841      5842      5843      5844      5845      5846
## [1,] 27.64639 27.51942 27.95902 28.20339 27.61914 27.9591 28.03167
##      5847      5848      5849      5850      5851      5852      5853      5854
## [1,] 27.59061 28.1611 27.83761 27.68715 28.0558 29.55693 27.62729 27.48075
##      5855      5856      5857      5858      5859      5860      5861
## [1,] 28.22042 27.81191 27.81361 28.55284 28.05756 28.33845 27.85956
##      5862      5863      5864      5865      5866      5867      5868      5869
## [1,] 27.63231 27.74988 27.95853 27.5049 28.01196 27.9775 27.95038 28.83485
##      5870      5871      5872      5873      5874      5875
## [1,] 27.74623 27.88362 28.14162 27.82961 27.75084 27.60407
##
## $variability
## NULL
##
## $omittedNA
## [1] 0
```

```
#corrplot(cor(features1), order = "hclust")
#trans <- preProcess(dd, method = c("BoxCox", "center", "scale")) features1 <- predict(trans, features0)
```