Lab 9

Amir ElTabakh

11:59PM May 10, 2021

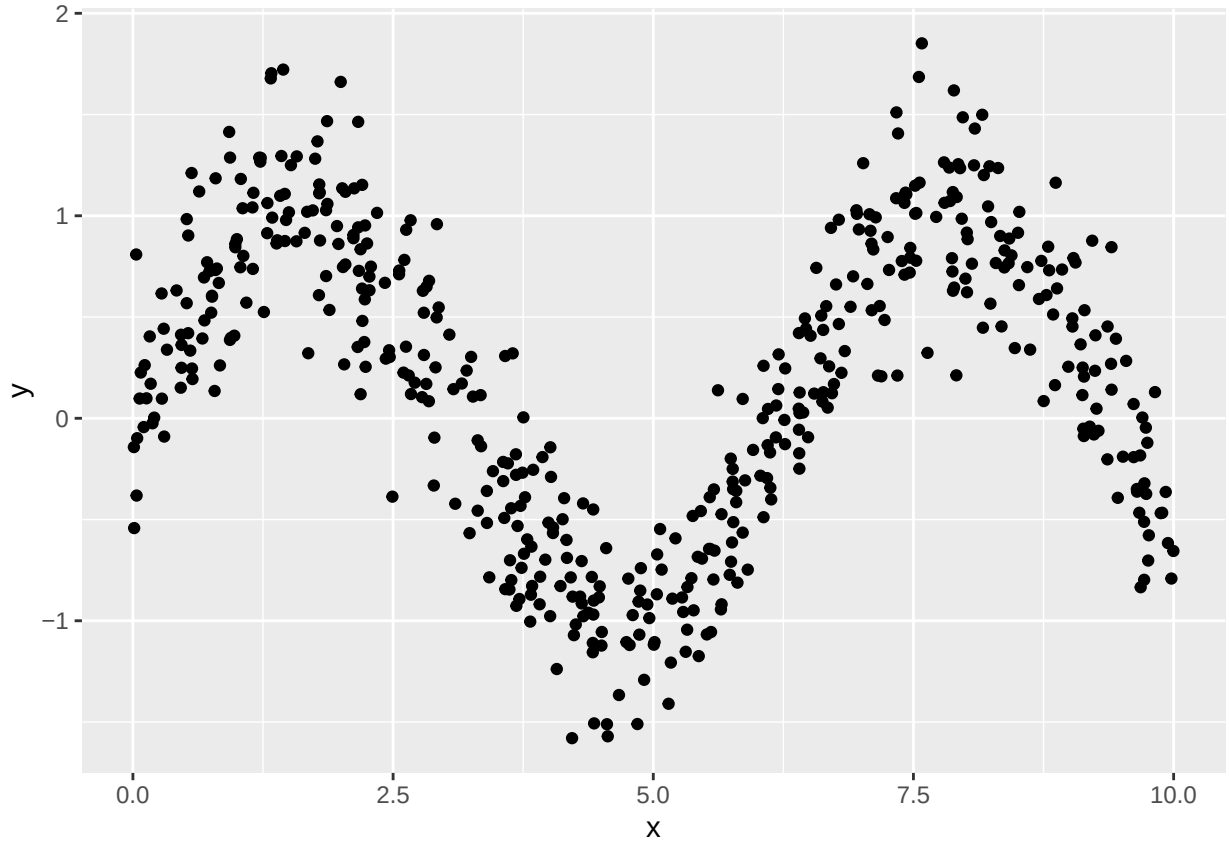
Here we will learn about trees, bagged trees and random forests. You can use the `YARF` package if it works, otherwise, use the `randomForest` package (the standard).

Let's take a look at the simulated sine curve data from practice lecture 12. Below is the code for the data generating process:

```
rm(list = ls())
n = 500
sigma = 0.3
x_min = 0
x_max = 10
f_x = function(x){sin(x)}
y_x = function(x, sigma){f_x(x) + rnorm(n, 0, sigma)}
x_train = runif(n, x_min, x_max)
y_train = y_x(x_train, sigma)
```

Plot the training dataset of size 500:

```
pacman::p_load(ggplot2)

ggplot(data.frame(x = x_train, y = y_train)) +
  geom_point(aes(x = x, y = y))
```

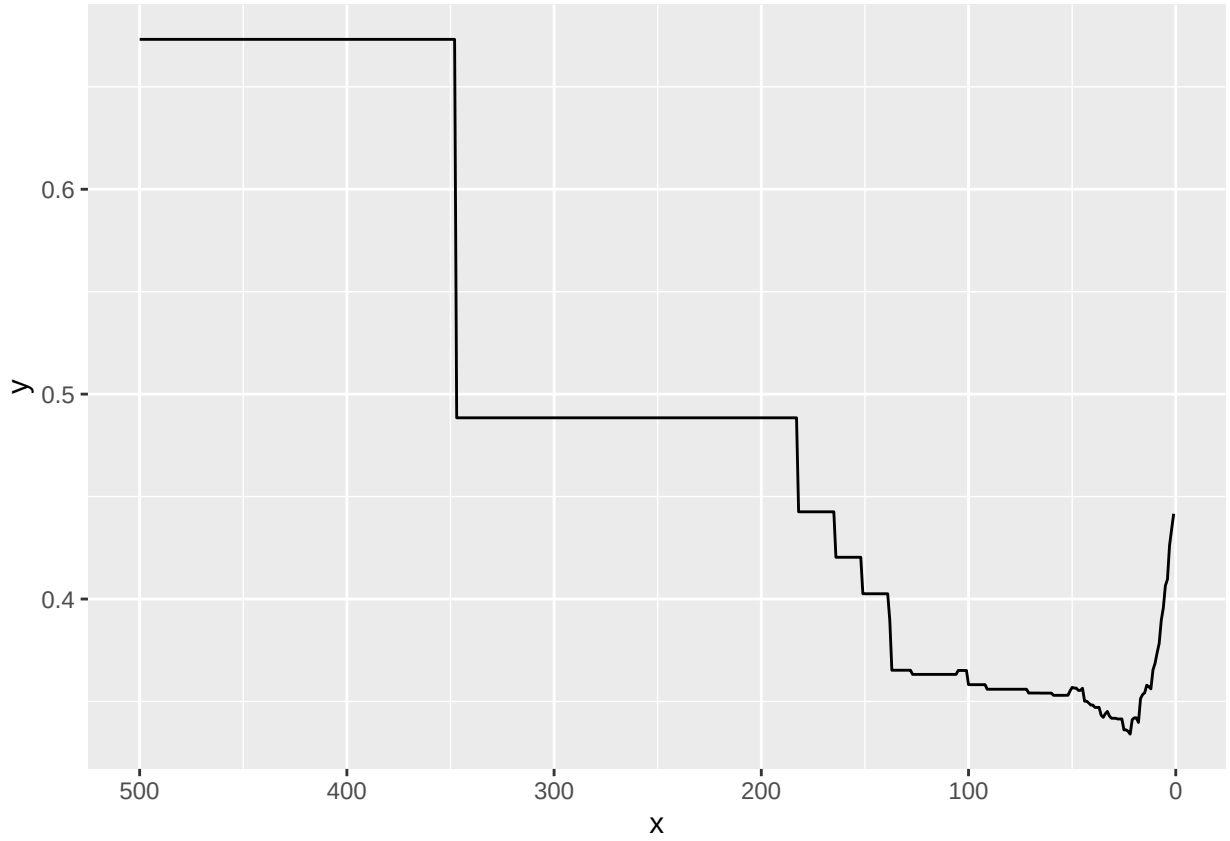


Create a test set of size 500 as well

```
x_test = runif(n, x_min, x_max)
y_test = y_x(x_test, sigma)
```

Locate the optimal node size hyperparameter for the regression tree model. I believe you can use `randomForest` here by setting `ntree = 1`, `replace = FALSE`, `sampsize = n` (`mtry` is already set to be 1 because there is only one feature) and then you can set `nodesize`. Plot nodesize by OOS standard error (SE).

```
pacman::p_load(randomForest)
node_sizes = 1:n
se_by_node_sizes = array(NA, length(node_sizes))
for (i in 1:length(node_sizes)) {
  rf_mod = randomForest(x = data.frame(x = x_train), y = y_train, ntree = 1, replace = FALSE, sampsize =
  y_hat_test = predict(rf_mod, data.frame(x = x_test))
  se_by_node_sizes[i] = sd(y_test - y_hat_test)
}
ggplot(data.frame(x=node_sizes, y= se_by_node_sizes)) +
  geom_line(aes(x = x, y = y)) +
  scale_x_reverse()
```

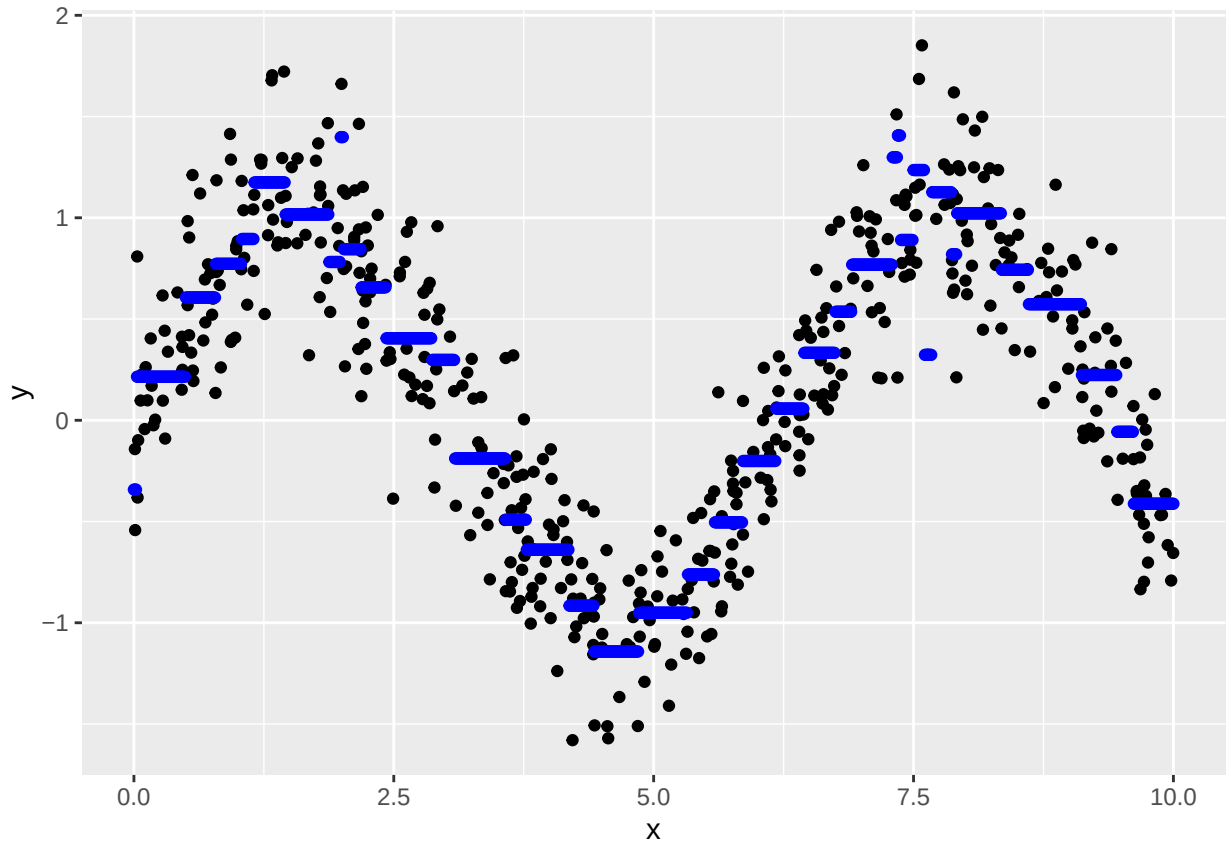



```
which.min(se_by_node_sizes)
```

```
## [1] 22
```

Plot the regression tree model with the optimal node size.

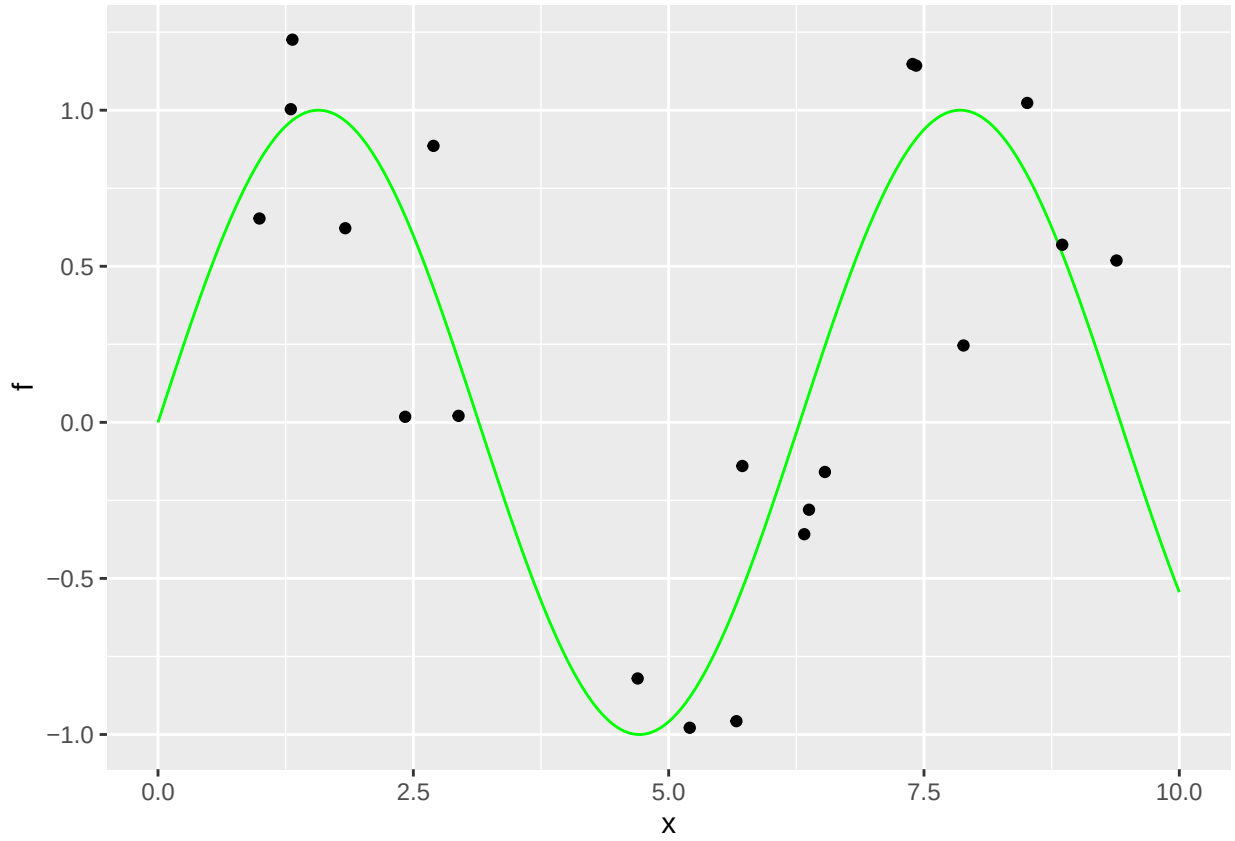
```
rf_mod = randomForest(x = data.frame(x = x_train), y = y_train, ntree = 1, replace = FALSE, sampsize = n
resolution = 0.01
x_grid = seq(from = x_min, to = x_max, by = resolution)
g_x = predict(rf_mod, data.frame(x = x_grid))
ggplot(data.frame(x = x_grid, y = g_x)) +
  aes(x = x, y = y) +
  geom_point(data = data.frame(x = x_train, y = y_train)) +
  geom_point(color = "blue")
```



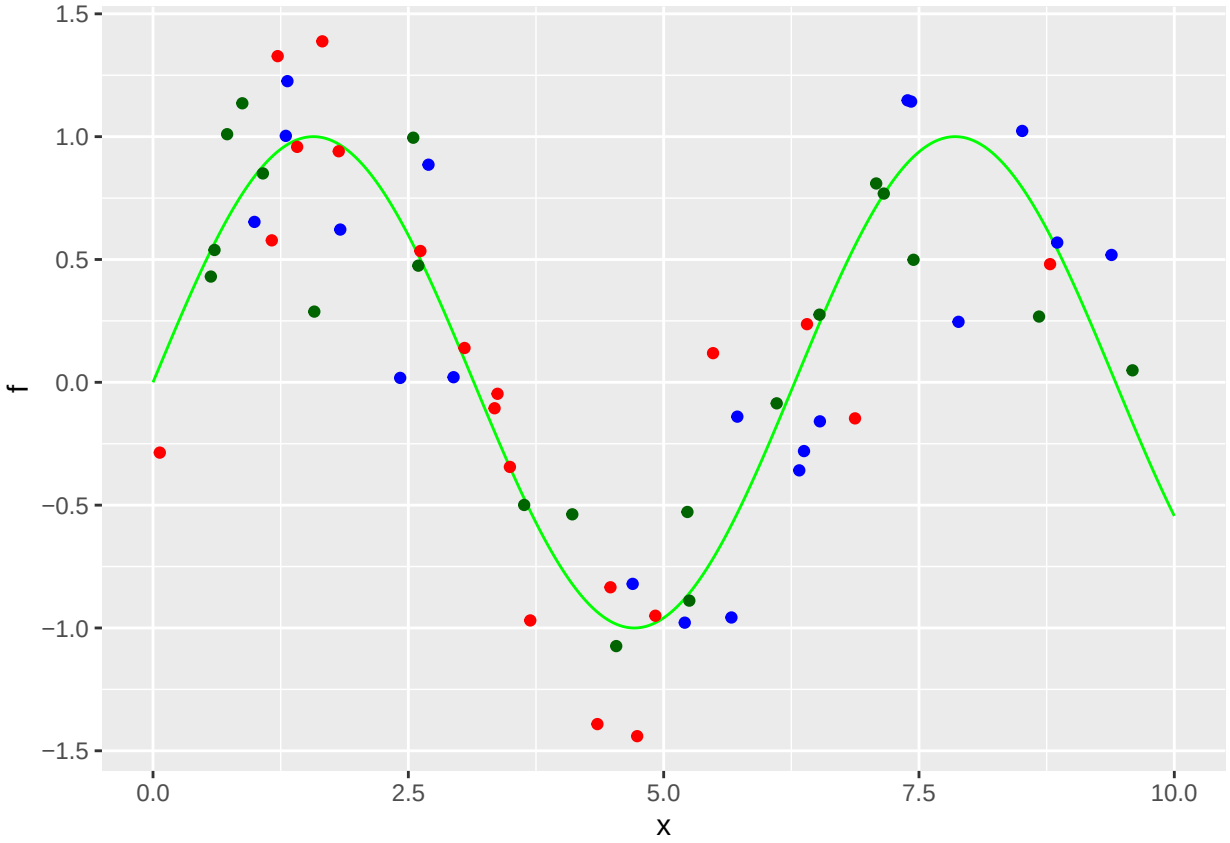
Provide the bias-variance decomposition of this DGP fit with this model. It is a lot of code, but it is in the practice lectures. If your three numbers don't add up within two significant digits, increase your resolution.

```
n_train = 20
n_test = 1000
Nsim = 1000

training_gs = matrix(NA, nrow = Nsim, ncol = 2)
x_trains = matrix(NA, nrow = Nsim, ncol = n_train)
y_trains = matrix(NA, nrow = Nsim, ncol = n_train)
all_oos_residuals = matrix(NA, nrow = Nsim, ncol = n_test)
for (nsim in 1 : Nsim){
  #simulate dataset $\mathbb{D}$
  x_train = runif(n_train, x_min, x_max)
  delta_train = rnorm(n_train, 0, sigma) #Assumption I: mean zero and Assumption II: homoskedastic
  y_train = f_x(x_train) + delta_train
  x_trains[nsim, ] = x_train
  y_trains[nsim, ] = y_train

  #fit a model g | x's, delta's and save it
  g_model = lm(y_train ~ ., data.frame(x = x_train))
  training_gs[nsim, ] = coef(g_model)

  #generate oos dataset according to the same data generating process (DGP)
  x_test = runif(n_test, x_min, x_max)
  delta_test = rnorm(n_test, 0, sigma)
```

```
  y_test = f_x(x_test) + delta_test
  #predict oos using the model and save the oos residuals
  y_hat_test = predict(g_model, data.frame(x = x_test))
  all_oos_residuals[nsim, ] = y_test - y_hat_test
}

pacman::p_load(ggplot2)
resolution = 10000
x = seq(x_min, x_max, length.out = resolution)
f_x_df = data.frame(x = x, f = f_x(x))
ggplot(f_x_df, aes(x, f)) +
  geom_line(col = "green") +
  geom_point(aes(x, y), data = data.frame(x = x_trains[1, ], y = y_trains[1, ]))
```



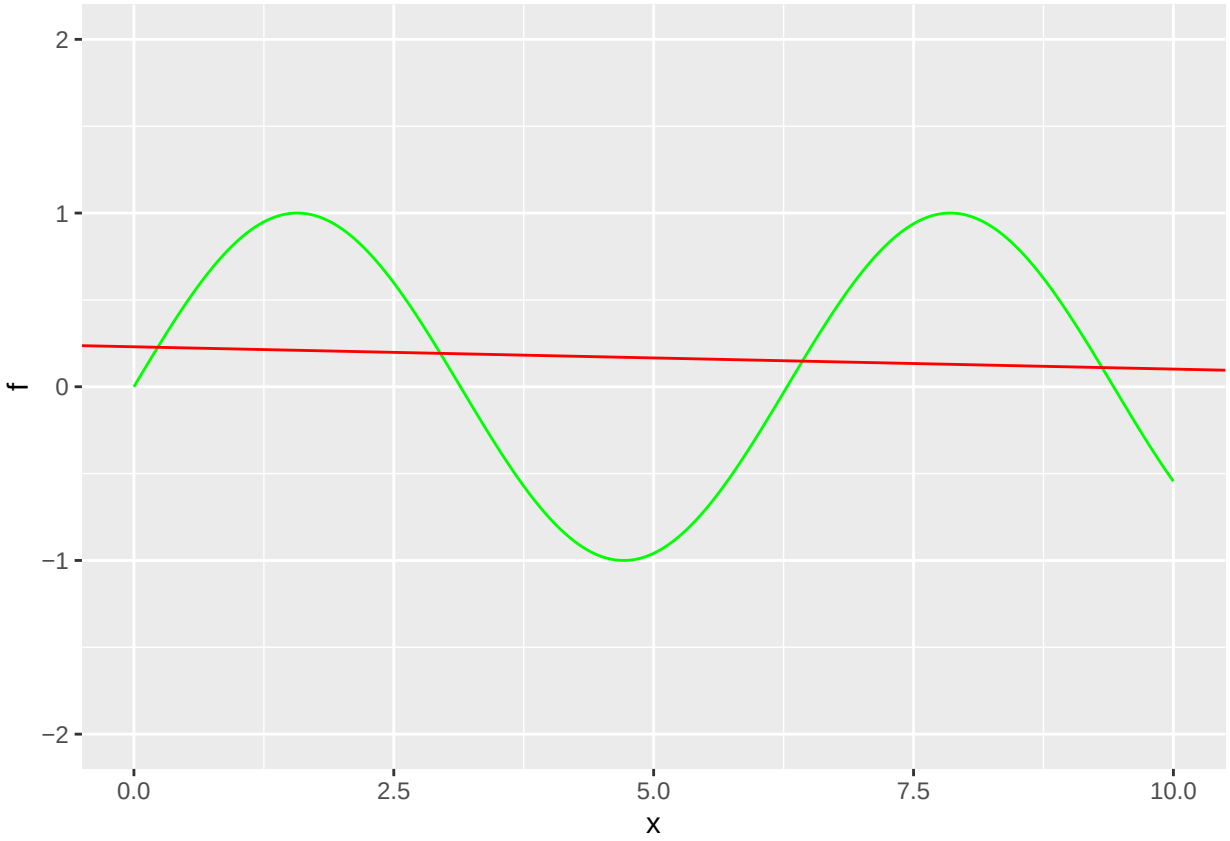

```
ggplot(f_x_df, aes(x, f)) +
  geom_line(col = "green") +
  geom_point(aes(x, y), data = data.frame(x = x_trains[1, ], y = y_trains[1, ]), col = "blue") +
  geom_point(aes(x, y), data = data.frame(x = x_trains[2, ], y = y_trains[2, ]), col = "darkgreen") +
  geom_point(aes(x, y), data = data.frame(x = x_trains[3, ], y = y_trains[3, ]), col = "red")
```




```
mse = mean(c(all_oos_residuals)^2)
mse
```

```
## [1] 0.5848235
```

```
g_average = colMeans(training_gs)
ggplot(f_x_df, aes(x, f)) +
  geom_line(col = "green") +
  geom_abline(intercept = g_average[1], slope = g_average[2], col = "red") +
  ylim(-2, 2)
```

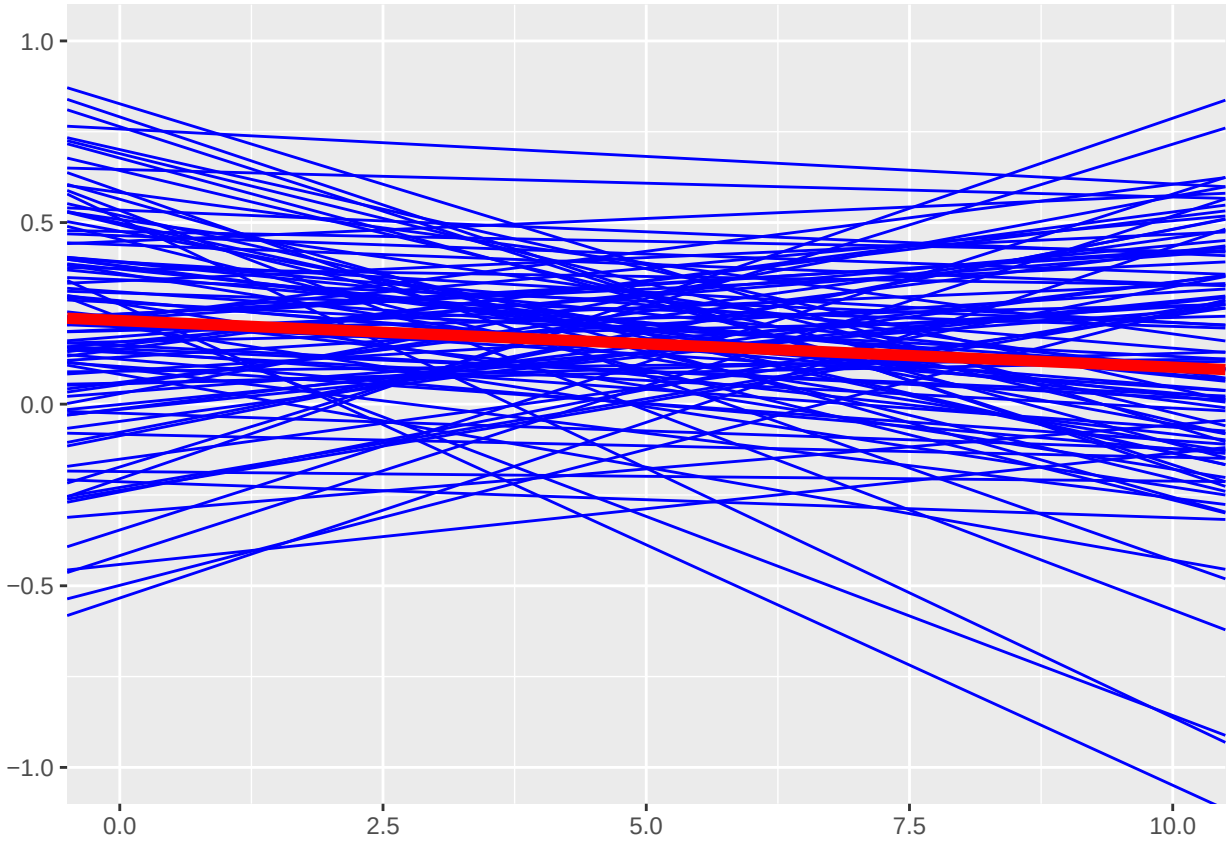



```
x = seq(x_min, x_max, length.out = resolution)
g_avg_x = g_average[1] + g_average[2] * x
f = sin(x)
biases = f - g_avg_x
expe_bias_g_sq = mean(biases^2)
expe_bias_g_sq
```

```
## [1] 0.4415672
```

```
plot_obj = ggplot() +
  xlim(x_min, x_max) + ylim(x_min^2, x_max^2)
for (nsim in 1 : min(Nsim, 100)){ #otherwise takes too long
  plot_obj = plot_obj + geom_abline(intercept = training_gs[nsim, 1], slope = training_gs[nsim, 2], col
}
plot_obj +
  geom_abline(intercept = g_average[1], slope = g_average[2], col = "red", lwd = 2) +
  ylim(-1, 1)
```

```
## Scale for 'y' is already present. Adding another scale for 'y', which will
## replace the existing scale.
```




```
  # geom_line(data = f_x_df, aes(x, f), col = "green", size = 1)

x = seq(x_min, x_max, length.out = resolution)
expe_g_x = g_average[1] + g_average[2] * x
var_x_s = array(NA, Nsim)
for (nsim in 1 : Nsim){
  g_x = training_gs[nsim, 1] + training_gs[nsim, 2] * x
  var_x_s[nsim] = mean((g_x - expe_g_x)^2)
}
expe_var_g = mean(var_x_s)
expe_var_g
```

```
## [1] 0.05297377
```

```
mse
```

```
## [1] 0.5848235
```

```
sigma^2
```

```
## [1] 0.09
```

```
expe_bias_g_sq
```

```
## [1] 0.4415672
```

```
expe_var_g
```

```
## [1] 0.05297377
```

```
sigma^2 + expe_bias_g_sq + expe_var_g
```

```
## [1] 0.5845409
```

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

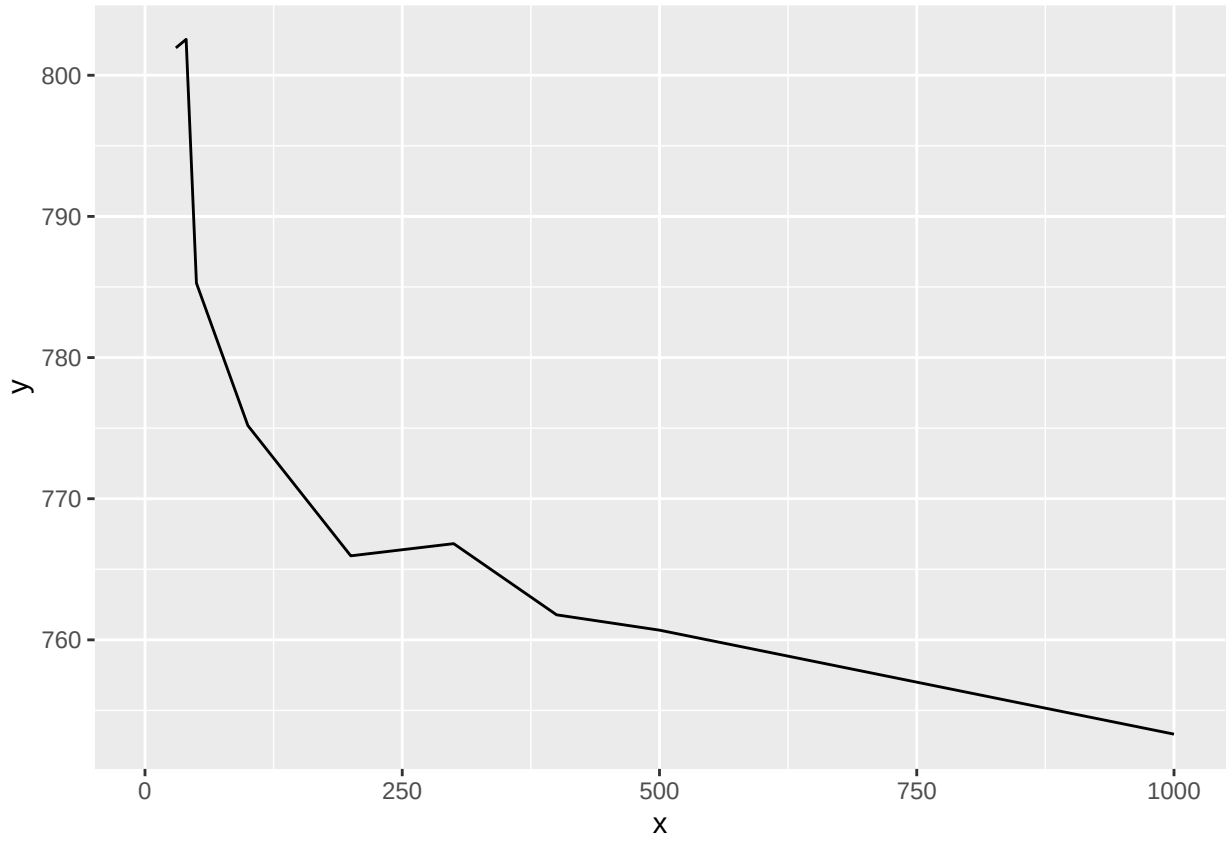
Take a sample of n = 2000 observations from the diamonds data.

```
pacman::p_load(dplyr)

diamond_sample = diamonds %>%
  sample_n(2000)
```

find the oob s_e for a RF model using 1, 2, 5, 10, 20, 30, 40, 50, 100, 200, 300, 400, 500, 1000 trees. If you are using the `randomForest` package, you can calculate oob residuals via `e_oob = y_train - rf_mod$predicted`. Plot it.

```
num_trees = c(1, 2, 5, 10, 20, 30, 40, 50, 100, 200, 300, 400, 500, 1000)
oob_se_by_num_trees = array(NA, length(num_trees))

for( i in 1:length(num_trees)){
  rf_mod = randomForest(price ~ ., data = diamond_sample, ntree = num_trees[i])
  oob_se_by_num_trees[i] = sd(diamond_sample$price - rf_mod$predicted)
}

ggplot(data.frame(x=num_trees, y= oob_se_by_num_trees)) +
  geom_line(aes(x = x, y = y))
```

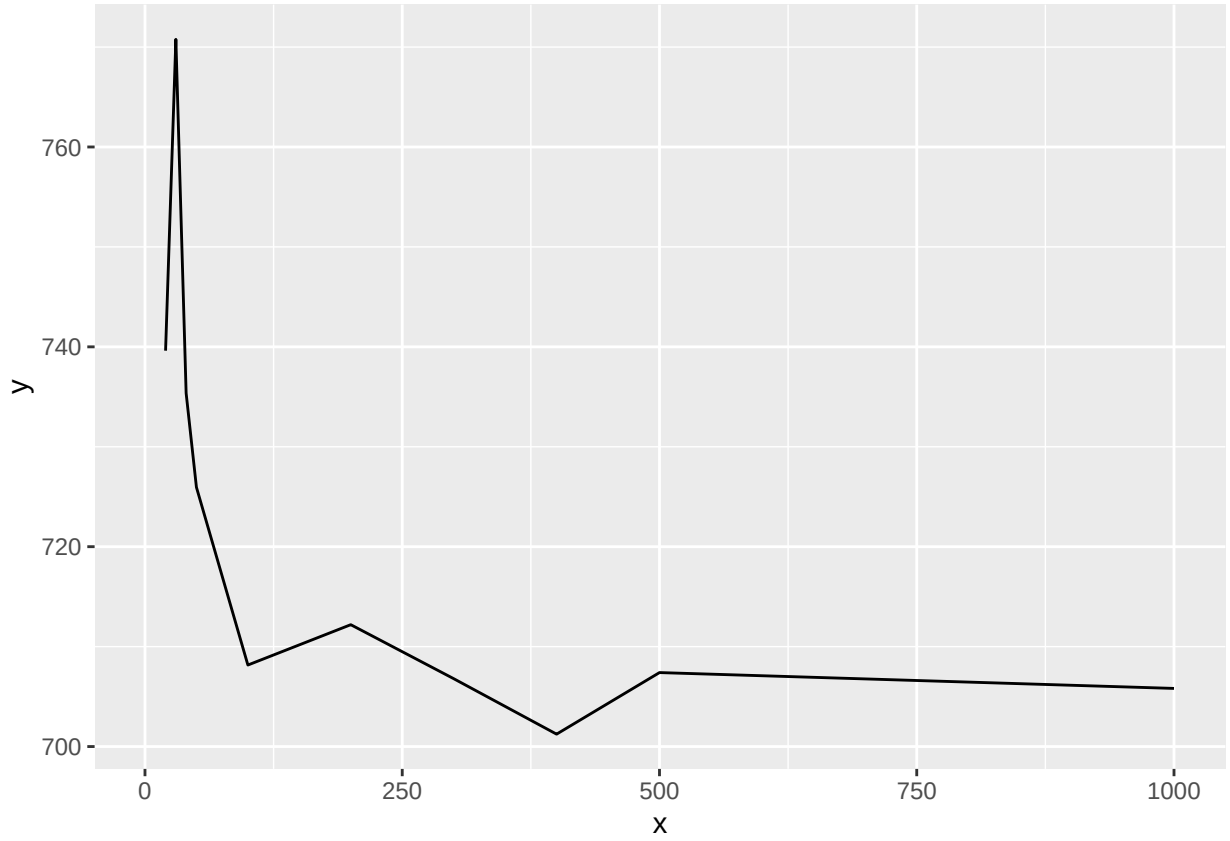
```
## Warning: Removed 5 row(s) containing missing values (geom_path).
```



Using the diamonds data, find the oob s_e for a bagged-tree model using 1, 2, 5, 10, 20, 30, 40, 50, 100, 200, 300, 400, 500, 1000 trees. If you are using the `randomForest` package, you can create the bagged tree model via setting an argument within the RF constructor function.

```
num_trees = c(1, 2, 5, 10, 20, 30, 40, 50, 100, 200, 300, 400, 500, 1000)
oob_se_by_num_trees_bag = array(NA, length(num_trees))

for( i in 1:length(num_trees)){
  rf_mod = randomForest(price ~ ., data = diamond_sample, ntree = num_trees[i], mtry = ncol(diamond_samp
  oob_se_by_num_trees_bag[i] = sd(diamond_sample$price - rf_mod$predicted)
}

ggplot(data.frame(x=num_trees, y= oob_se_by_num_trees_bag)) +
  geom_line(aes(x = x, y = y))
```

```
## Warning: Removed 4 row(s) containing missing values (geom_path).
```



What is the percentage gain / loss in performance of the RF model vs bagged trees model?

```
(oob_se_by_num_trees - oob_se_by_num_trees_bag) / oob_se_by_num_trees_bag * 100
```

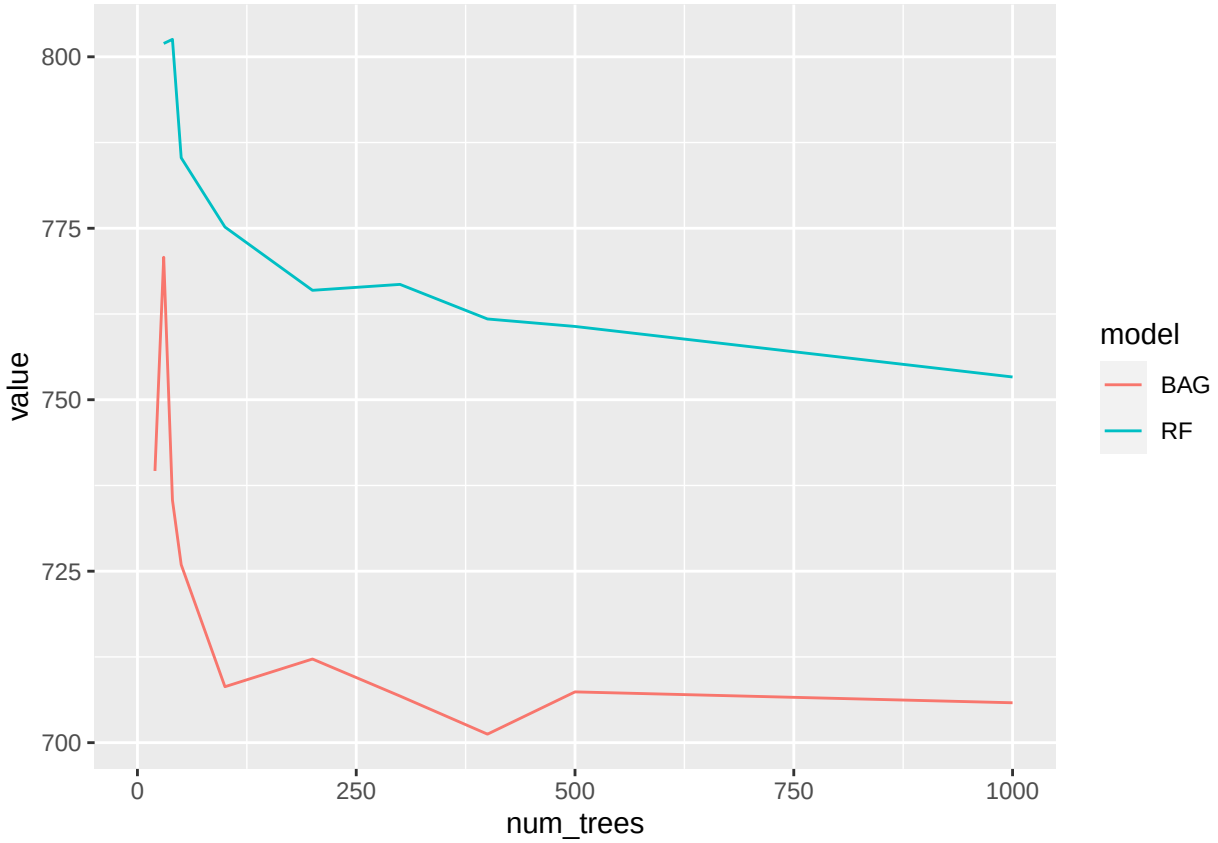
```
##  [1]       NA       NA       NA       NA       NA 4.043790 9.135690 8.171630
##  [9] 9.464355 7.548242 8.491990 8.632247 7.532176 6.730044
```

The SE for the bagged tree models was better than the random forest models.

Plot oob s_e by number of trees for both RF and bagged trees.

```
ggplot(rbind(data.frame(num_trees = num_trees, value = oob_se_by_num_trees, model = "RF"), data.frame(nu
  geom_line(aes(x = num_trees, y = value, color = model))
```

```
## Warning: Removed 9 row(s) containing missing values (geom_path).
```

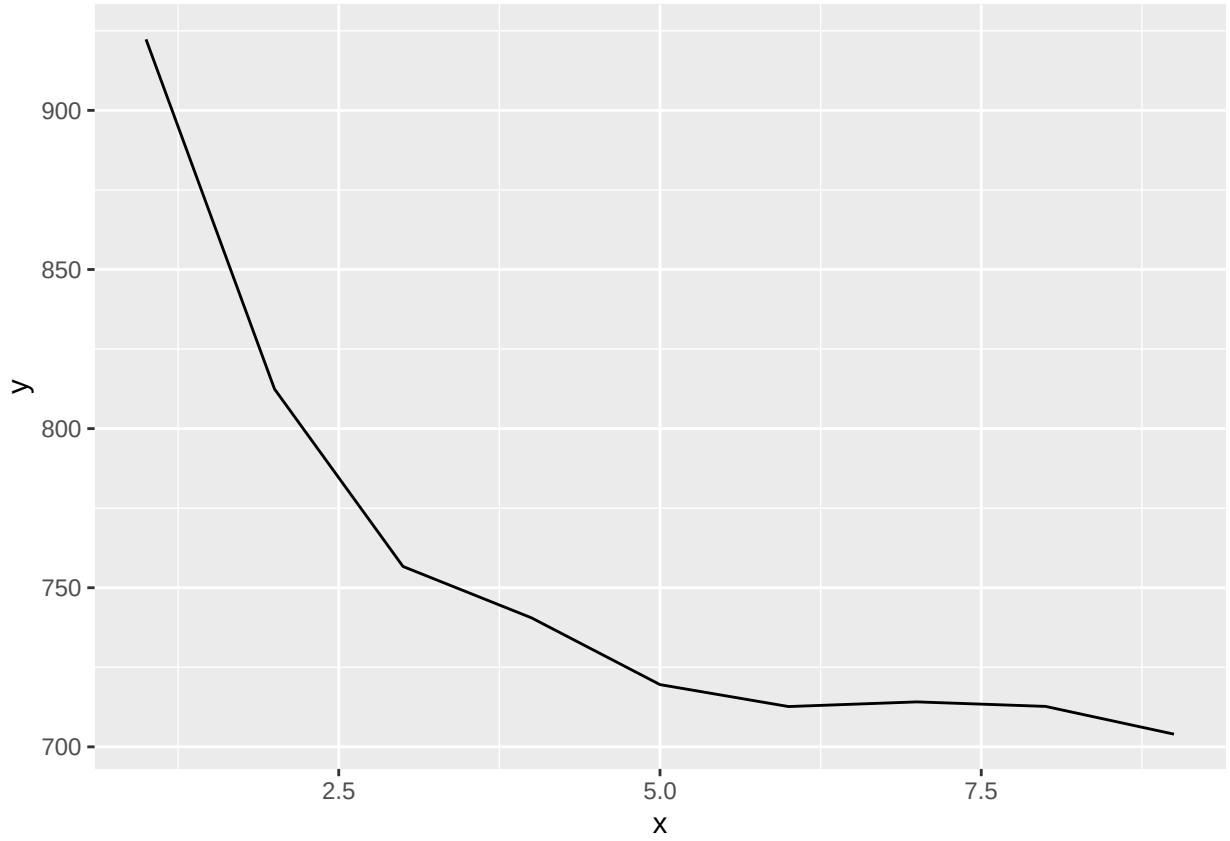


Build RF models for 500 trees using different `mtry` values: 1, 2, ... the maximum. That maximum will be the number of features assuming that we do not binarize categorical features if you are using `randomForest` or the number of features assuming binarization of the categorical features if you are using `YARF`. Calculate oob s_e for all mtry values.

```
mtries = 1:(ncol(diamond_sample) - 1)
oob_se_by_mtry = array(NA, length(mtries))

for( i in 1:length(mtries)){
  rf_mod = randomForest(price ~ ., data = diamond_sample, mtry = mtries[i])
  oob_se_by_mtry[i] = sd(diamond_sample$price - rf_mod$predicted)
}
```

Plot oob s_e by mtry.

```
ggplot(data.frame(x=mtries, y= oob_se_by_mtry)) +
  geom_line(aes(x = x, y = y))
```




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

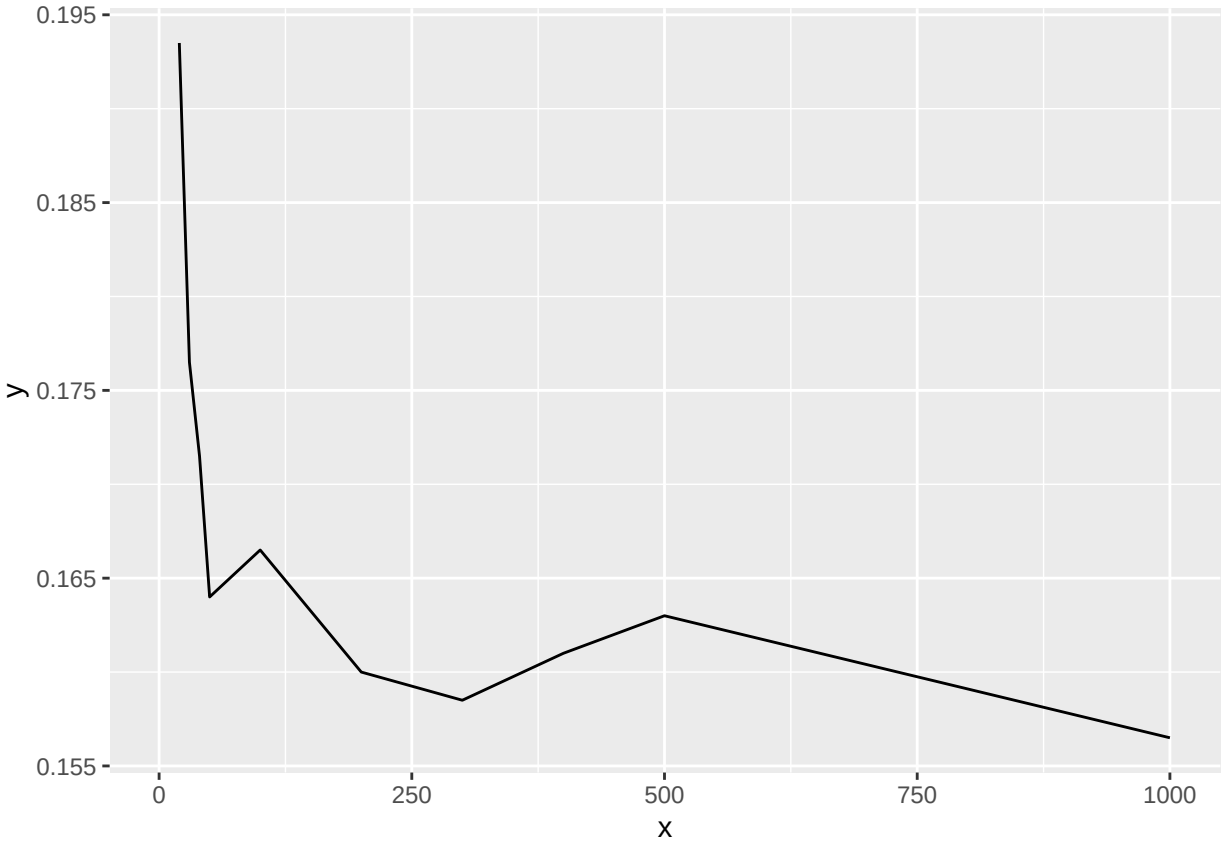
Take a sample of n = 2000 observations from the adult data.

```
pacman::p_load("ucidata")
pacman::p_load(randomForest)
data(adult)
adult = na.omit(adult) # kill any observations with missingness

adult_sample = adult %>%
  sample_n(2000)
```

Using the adult data, find the oob misclassification error for an RF model using 1, 2, 5, 10, 20, 30, 40, 50, 100, 200, 300, 400, 500, 1000 trees. Plot it.

```
num_trees = c(1, 2, 5, 10, 20, 30, 40, 50, 100, 200, 300, 400, 500, 1000)
oob_mc_by_num_trees = array(NA, length(num_trees))

for( i in 1:length(num_trees)){
  rf_mod = randomForest(income ~ ., data = adult_sample, ntree = num_trees[i])
  oob_mc_by_num_trees[i] = mean(adult_sample$income != rf_mod$predicted)
}

ggplot(data.frame(x=num_trees, y= oob_mc_by_num_trees)) +
  geom_line(aes(x = x, y = y))
```

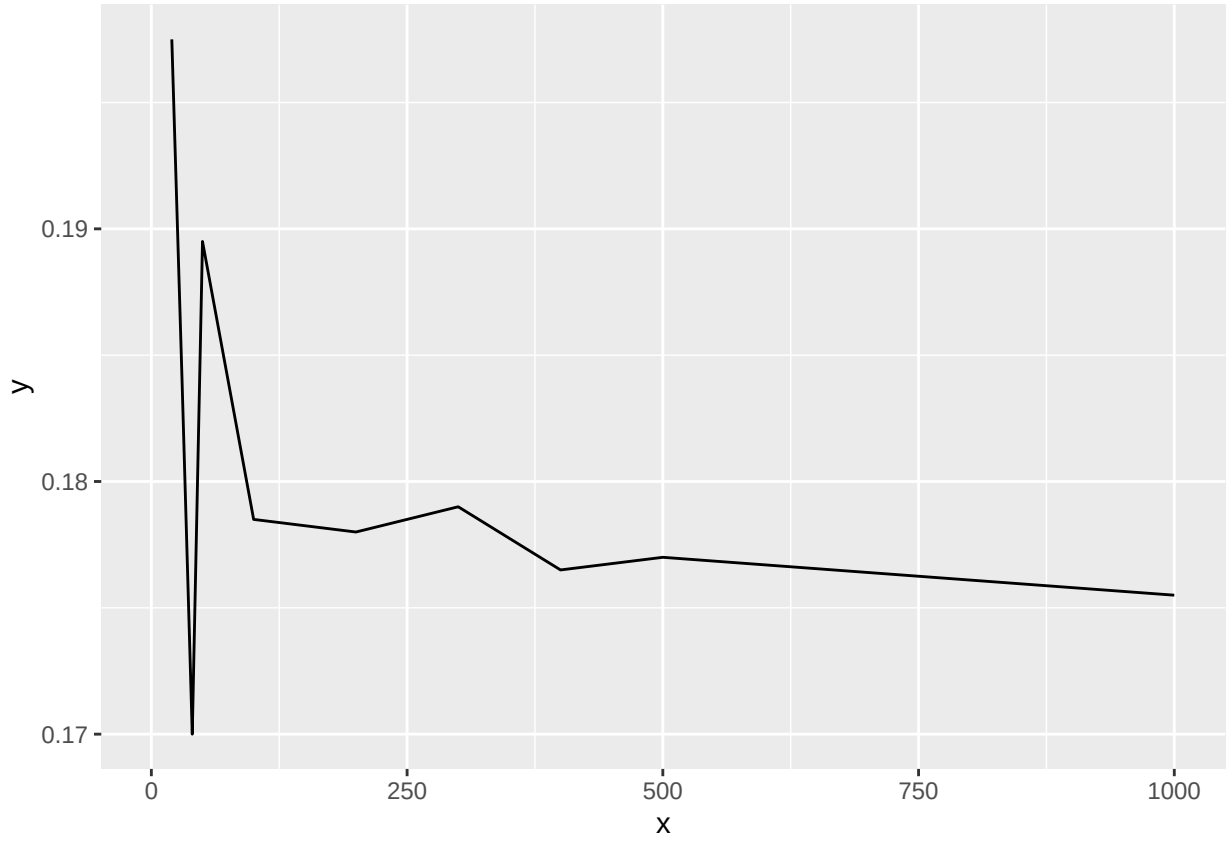
```
## Warning: Removed 4 row(s) containing missing values (geom_path).
```



Using the adult data, find the oob misclassification error for a bagged-tree model using 1, 2, 5, 10, 20, 30, 40, 50, 100, 200, 300, 400, 500, 1000 trees. Plot it.

```
num_trees = c(1, 2, 5, 10, 20, 30, 40, 50, 100, 200, 300, 400, 500, 1000)
oob_mc_by_num_trees_bagged = array(NA, length(num_trees))

for( i in 1:length(num_trees)){
  rf_mod = randomForest(income ~ ., data = adult_sample, ntree = num_trees[i], mtry = ncol(adult_sample)
  oob_mc_by_num_trees_bagged[i] = mean(adult_sample$income != rf_mod$predicted)
}

ggplot(data.frame(x=num_trees, y= oob_mc_by_num_trees_bagged)) +
  geom_line(aes(x = x, y = y))
```

```
## Warning: Removed 4 row(s) containing missing values (geom_path).
```



What is the percentage gain / loss in performance of the RF model vs bagged trees model?

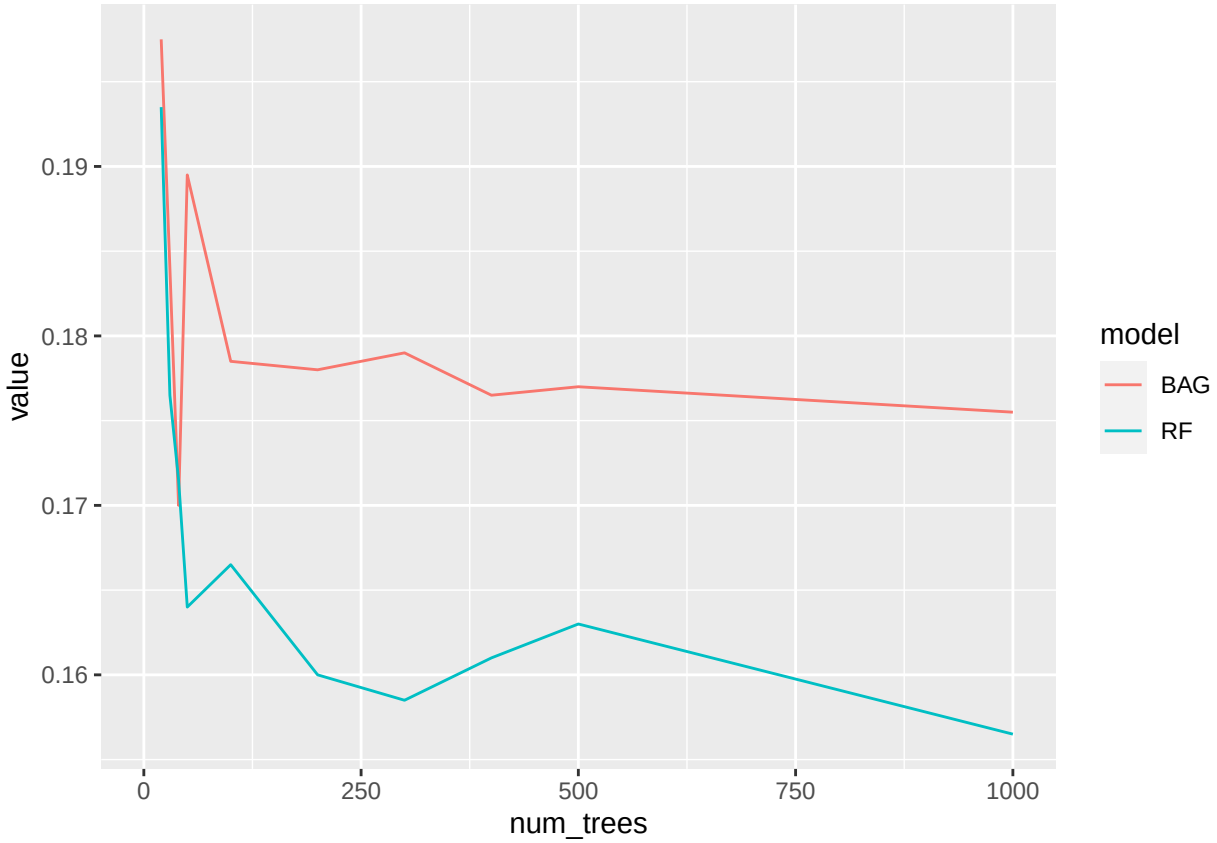
```
(oob_mc_by_num_trees - oob_mc_by_num_trees_bagged) / oob_mc_by_num_trees_bagged * 100
```

```
##  [1]          NA          NA          NA          NA  -2.0253165  -4.0760870
##  [7]   0.8823529 -13.4564644  -6.7226891 -10.1123596 -11.4525140  -8.7818697
## [13]  -7.9096045 -10.8262108
```

Plot oob misclassification error by number of trees for both RF and bagged trees.

```
ggplot(rbind(data.frame(num_trees = num_trees, value = oob_mc_by_num_trees, model = "RF"), data.frame(nu
  geom_line(aes(x = num_trees, y = value, color = model))
```

```
## Warning: Removed 8 row(s) containing missing values (geom_path).
```

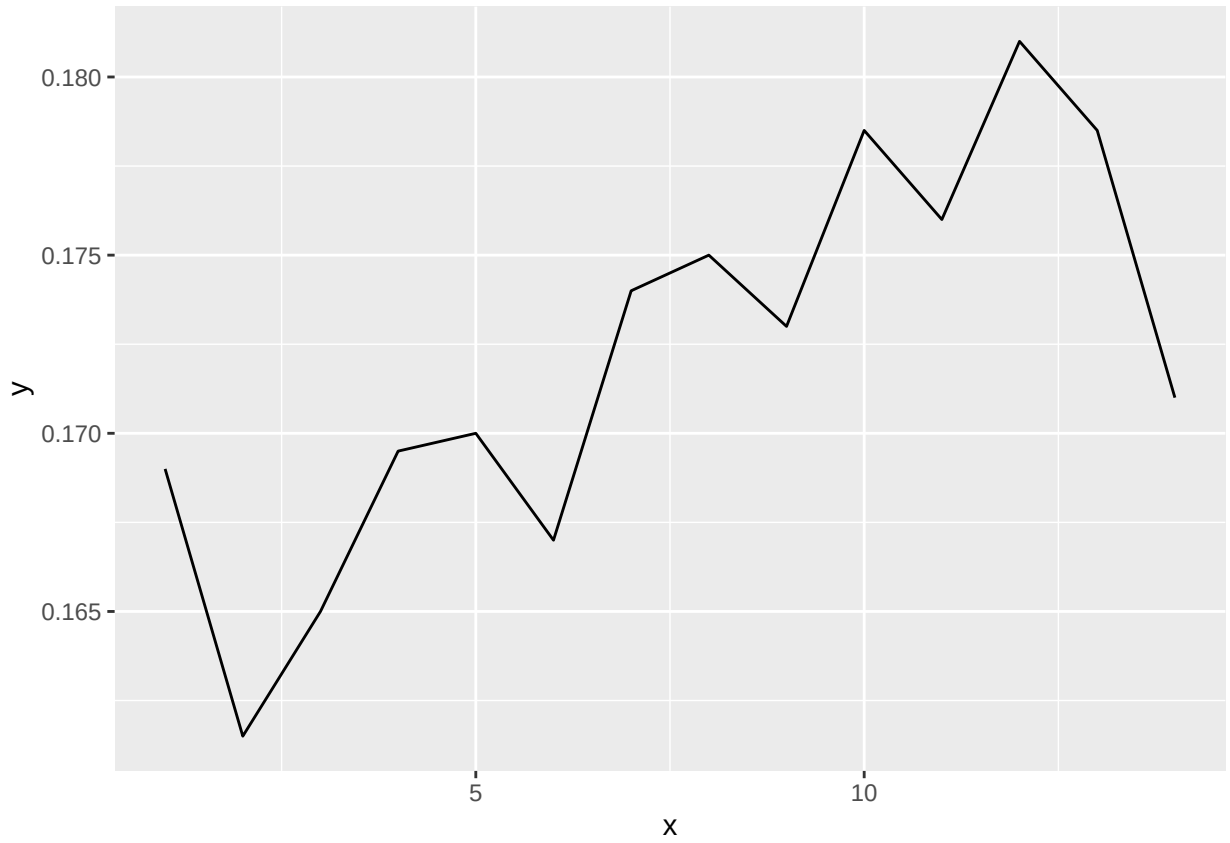


Build RF models for 500 trees using different `mtry` values: 1, 2, ... the maximum (see above as maximum is defined by the specific RF algorithm implementation).

```
mtries = 1:(ncol(adult_sample) - 1)
oob_mc_by_mtry = array(NA, length(mtries))

for( i in 1:length(mtries)){
  rf_mod = randomForest(income ~ ., data = adult_sample, mtry = mtries[i])
  oob_mc_by_mtry[i] = mean(adult_sample$income != rf_mod$predicted)
}
```

Plot oob misclassification error by `mtry`.

```
ggplot(data.frame(x=mtries, y= oob_mc_by_mtry)) +
  geom_line(aes(x = x, y = y))
```




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

Write a function `random_bagged_ols` which takes as its arguments `X` and `y` with further arguments `num_ols_models` defaulted to 100 and `mtry` defaulted to NULL which then gets set within the function to be 50% of available features. This argument builds an OLS on a oob sample of the data and uses only `mtry` < `p` of the available features. The function then returns all the `lm` models as a list with size `num_ols_models`.

```
pacman::p_load(dplyr)
random_bagged_ols <- function(X, y, num_ols_models = 100, mtry = NULL) {

  lm_models = array(NA, num_ols_models)

  # Bootstrapping with replacement
  for(i in 1:num_ols_models) {

    # Random number of columns to extract and random selection of columns
    number_of_columns = round(runif(1, min = 1, max = ncol(X)))
    columns = sample(ncol(X), number_of_columns)
    col_names = colnames(X_train)


    # Random number of rows to select with replacement
    n_0 = round(runif(1, min = 1, max = nrow(X))) # Determines random number of rows for bootstrapping
    n_1 = round(runif(n_0, min = 1, max = nrow(X))) # Determines the rows for bootstrapping
```

```
    # Initializing matrix with random selection of rows and number of rows
    X_train = X[, sample(ncol(X), number_of_columns)]
    X_matrix = X_train[0:n_0,]
    for(j in 1:n_0) {
      X_matrix[j,] = X_train[n_1[j],]
    }

    # Initializing matching y column vector
    y_vec = array(NA, n_0)
    for(k in 1:n_0) {
      y_vec[k] = y[n_1[k]]
    }
    X_matrix$y_vec = y_vec

    # Constructing model and appending to lm_models array
    mod = lm(y_vec ~ .+0, X_matrix)
    lm_models[i] = mod
  }

  lm_models
}
```

Load up the Boston Housing Data and separate into `X` and `y`.

```
pacman::p_load("MASS")
data(Boston)
y = Boston$medv
X = Boston
```

Similar to lab 1, write a function that takes a matrix and punches holes (i.e. sets entries equal to `NA`) randomly with an argument `prob_missing`.

```
punching <- function(prob_missing, X) {
  n = nrow(X)
  p = ncol(X)
  holes = matrix(nrow=n, ncol=p, sample(c(rep(0, n*p*(1 - prob_missing)), rep(1, n*p*prob_missing))))

  for(i in 1:n){
    for(j in 1:p){
      if(holes[i,j] == 1){
        X[i, j] = NA
      }
    }
  }
  X
}
```

Create a matrix `Xmiss` which is `X` but has missingness with probability of 10%.

```
X_miss = punching(0.1, X)
```

```
## Warning in matrix(nrow = n, ncol = p, sample(c(rep(0, n * p * (1 -
## prob_missing)), : data length [7083] is not a sub-multiple or multiple of the
## number of rows [506]
```

```
X_miss
```

```
##         crim    zn indus chas    nox    rm   age     dis rad tax ptratio  black
## 1    0.00632  18.0  2.31    0 0.5380 6.575  65.2  4.0900   1 296    15.3 396.90
## 2    0.02731   0.0  7.07    0 0.4690 6.421  78.9  4.9671   2 242    17.8 396.90
## 3    0.02729   0.0  7.07   NA 0.4690 7.185  61.1  4.9671   2 242    17.8 392.83
## 4    0.03237   0.0    NA    0 0.4580    NA  45.8  6.0622   3 222    18.7     NA
## 5    0.06905   0.0  2.18    0 0.4580 7.147  54.2  6.0622   3 222    18.7 396.90
## 6    0.02985   0.0  2.18   NA 0.4580 6.430  58.7  6.0622   3 222    18.7 394.12
## 7    0.08829    NA  7.87    0 0.5240 6.012  66.6  5.5605  NA 311    15.2 395.60
## 8    0.14455  12.5  7.87   NA     NA 6.172  96.1  5.9505  NA 311    15.2     NA
## 9         NA  12.5  7.87    0 0.5240 5.631 100.0  6.0821   5 311      NA 386.63
## 10   0.17004  12.5  7.87   NA 0.5240 6.004  85.9  6.5921   5 311    15.2 386.71
## 11   0.22489  12.5  7.87    0 0.5240 6.377    NA  6.3467   5 311    15.2 392.52
## 12   0.11747  12.5    NA    0 0.5240 6.009  82.9  6.2267   5 311    15.2 396.90
## 13   0.09378  12.5  7.87    0 0.5240 5.889  39.0  5.4509   5 311    15.2 390.50
## 14   0.62976   0.0  8.14    0 0.5380 5.949  61.8  4.7075   4  NA    21.0 396.90
## 15   0.63796   0.0  8.14    0 0.5380    NA  84.5  4.4619   4 307    21.0 380.02
## 16   0.62739   0.0  8.14    0 0.5380 5.834  56.5  4.4986  NA  NA    21.0 395.62
## 17   1.05393   0.0  8.14    0 0.5380 5.935  29.3  4.4986   4 307      NA 386.85
## 18   0.78420   0.0  8.14    0 0.5380 5.990  81.7  4.2579  NA 307    21.0 386.75
## 19   0.80271   0.0  8.14   NA 0.5380 5.456  36.6  3.7965   4 307    21.0 288.99
## 20   0.72580   0.0  8.14    0     NA 5.727  69.5  3.7965  NA 307    21.0 390.95
## 21   1.25179    NA    NA    0 0.5380 5.570    NA  3.7979   4 307    21.0 376.57
## 22   0.85204   0.0  8.14    0 0.5380 5.965  89.2  4.0123   4 307    21.0 392.53
## 23   1.23247   0.0  8.14    0 0.5380 6.142  91.7  3.9769   4 307    21.0 396.90
## 24   0.98843   0.0  8.14   NA 0.5380 5.813 100.0  4.0952   4 307    21.0 394.54
## 25   0.75026   0.0  8.14    0 0.5380 5.924  94.1  4.3996   4 307    21.0 394.33
## 26   0.84054   0.0  8.14    0 0.5380 5.599  85.7  4.4546   4 307    21.0 303.42
## 27   0.67191   0.0  8.14    0 0.5380 5.813  90.3  4.6820   4 307    21.0 376.88
## 28   0.95577   0.0  8.14    0 0.5380 6.047  88.8  4.4534   4 307    21.0 306.38
## 29   0.77299   0.0    NA   NA     NA 6.495  94.4      NA   4 307    21.0 387.94
## 30   1.00245   0.0  8.14    0 0.5380 6.674  87.3  4.2390   4 307    21.0 380.23
## 31        NA   0.0  8.14   NA 0.5380 5.713    NA  4.2330   4 307    21.0 360.17
## 32   1.35472   0.0  8.14   NA 0.5380 6.072 100.0  4.1750   4 307    21.0 376.73
## 33   1.38799   0.0  8.14    0 0.5380 5.950  82.0  3.9900   4 307    21.0     NA
## 34   1.15172   0.0  8.14   NA     NA 5.701  95.0  3.7872   4 307      NA 358.77
## 35        NA   0.0  8.14    0 0.5380 6.096  96.9  3.7598   4 307    21.0 248.31
## 36   0.06417   0.0  5.96    0 0.4990 5.933  68.2  3.3603   5 279    19.2 396.90
## 37   0.09744    NA  5.96   NA     NA 5.841  61.4  3.3779   5 279    19.2 377.56
## 38   0.08014   0.0  5.96   NA 0.4990 5.850  41.5  3.9342   5  NA    19.2 396.90
## 39   0.17505   0.0  5.96    0 0.4990 5.966  30.2      NA   5 279    19.2 393.43
## 40   0.02763  75.0  2.95    0 0.4280    NA    NA  5.4011   3  NA      NA 395.63
## 41   0.03359  75.0  2.95    0 0.4280 7.024  15.8  5.4011  NA  NA    18.3 395.62
## 42   0.12744   0.0  6.91    0     NA 6.770   2.9  5.7209   3 233    17.9 385.41
## 43   0.14150   0.0  6.91   NA 0.4480 6.169   6.6  5.7209   3 233    17.9 383.37
## 44   0.15936   0.0  6.91    0 0.4480 6.211   6.5  5.7209   3 233    17.9 394.46
## 45   0.12269    NA  6.91    0 0.4480 6.069  40.0  5.7209   3 233    17.9 389.39
## 46   0.17142    NA  6.91    0 0.4480 5.682  33.8  5.1004   3 233    17.9 396.90
## 47   0.18836   0.0  6.91    0 0.4480 5.786    NA  5.1004  NA 233    17.9 396.90
## 48        NA   0.0  6.91    0 0.4480 6.030  85.5  5.6894   3 233    17.9 392.74
## 49   0.25387   0.0  6.91    0 0.4480 5.399  95.3      NA   3 233    17.9 396.90
## 50   0.21977   0.0  6.91    0 0.4480 5.602  62.0  6.0877   3 233    17.9 396.90
```

```
## 51   0.08873  21.0  5.64    0 0.4390 5.963  45.7  6.8147   4 243    16.8 395.56
## 52   0.04337  21.0  5.64   NA 0.4390 6.115  63.0  6.8147   4 243    16.8 393.97
## 53   0.05360  21.0  5.64   NA 0.4390 6.511  21.1  6.8147  NA 243    16.8 396.90
## 54   0.04981  21.0  5.64    0 0.4390    NA  21.4      NA  NA 243    16.8 396.90
## 55   0.01360  75.0  4.00    0 0.4100 5.888    NA      NA  NA 469    21.1 396.90
## 56   0.01311  90.0  1.22    0 0.4030    NA  21.9  8.6966   5 226    17.9 395.93
## 57   0.02055  85.0  0.74    0 0.4100 6.383    NA  9.1876   2 313    17.3 396.90
## 58   0.01432 100.0  1.32    0 0.4110 6.816  40.5  8.3248   5 256    15.1 392.90
## 59   0.15445  25.0  5.13    0 0.4530 6.145  29.2  7.8148   8 284    19.7 390.68
## 60   0.10328  25.0  5.13    0     NA    NA  47.2  6.9320   8 284      NA 396.90
## 61   0.14932  25.0  5.13    0 0.4530 5.741  66.2  7.2254  NA 284    19.7 395.11
## 62   0.17171  25.0  5.13    0 0.4530 5.966  93.4  6.8185   8  NA    19.7 378.08
## 63   0.11027  25.0    NA    0 0.4530 6.456  67.8  7.2255   8  NA    19.7 396.90
## 64       NA  25.0  5.13    0 0.4530 6.762  43.4      NA   8 284      NA 395.58
## 65   0.01951  17.5  1.38    0     NA 7.104  59.5  9.2229   3 216    18.6     NA
## 66   0.03584  80.0  3.37    0 0.3980 6.290  17.8  6.6115   4 337    16.1 396.90
## 67   0.04379  80.0  3.37   NA 0.3980 5.787    NA  6.6115   4 337    16.1 396.90
## 68   0.05789  12.5  6.07    0 0.4090 5.878  21.4  6.4980   4 345    18.9 396.21
## 69   0.13554  12.5  6.07   NA 0.4090 5.594  36.8  6.4980  NA 345    18.9 396.90
## 70   0.12816  12.5  6.07   NA 0.4090 5.885  33.0  6.4980   4 345    18.9 396.90
## 71   0.08826   0.0 10.81    0 0.4130 6.417    NA  5.2873   4 305    19.2     NA
## 72   0.15876   0.0 10.81    0 0.4130 5.961    NA      NA   4 305    19.2 376.94
## 73   0.09164    NA 10.81    0 0.4130 6.065   7.8  5.2873   4 305    19.2 390.91
## 74   0.19539   0.0 10.81    0 0.4130 6.245   6.2      NA   4 305    19.2     NA
## 75   0.07896   0.0 12.83    0 0.4370 6.273   6.0  4.2515   5  NA    18.7 394.92
## 76   0.09512    NA 12.83    0 0.4370 6.286  45.0  4.5026   5 398    18.7 383.23
## 77   0.10153   0.0 12.83    0 0.4370 6.279  74.5      NA   5 398    18.7 373.66
## 78   0.08707   0.0 12.83    0 0.4370 6.140  45.8  4.0905   5 398    18.7 386.96
## 79   0.05646   0.0 12.83    0     NA 6.232  53.7      NA   5  NA    18.7 386.40
## 80   0.08387   0.0 12.83    0 0.4370 5.874  36.6  4.5026   5 398    18.7 396.06
## 81   0.04113  25.0  4.86    0     NA 6.727  33.5  5.4007   4  NA    19.0 396.90
## 82       NA  25.0  4.86    0 0.4260 6.619  70.4  5.4007   4 281    19.0 395.63
## 83   0.03659  25.0  4.86    0 0.4260 6.302  32.2  5.4007   4 281    19.0 396.90
## 84   0.03551  25.0    NA    0 0.4260 6.167  46.7  5.4007   4 281    19.0 390.64
## 85   0.05059   0.0  4.49    0 0.4490 6.389  48.0  4.7794   3 247    18.5 396.90
## 86   0.05735   0.0  4.49    0 0.4490 6.630  56.1  4.4377   3 247    18.5 392.30
## 87   0.05188   0.0  4.49    0 0.4490 6.015  45.1  4.4272   3  NA    18.5 395.99
## 88   0.07151   0.0  4.49    0 0.4490    NA  56.8  3.7476   3 247    18.5 395.15
## 89   0.05660   0.0  3.41    0 0.4890 7.007    NA  3.4217   2 270    17.8 396.90
## 90   0.05302   0.0    NA    0     NA 7.079  63.1  3.4145  NA 270    17.8 396.06
## 91   0.04684   0.0    NA   NA     NA 6.417  66.1  3.0923   2 270    17.8 392.18
## 92   0.03932   0.0    NA    0 0.4890 6.405  73.9  3.0921   2 270    17.8 393.55
## 93   0.04203    NA 15.04   NA     NA 6.442  53.6  3.6659   4 270      NA 395.01
## 94   0.02875  28.0 15.04    0     NA 6.211  28.9  3.6659   4 270      NA 396.33
## 95   0.04294  28.0 15.04    0 0.4640 6.249  77.3  3.6150   4 270    18.2 396.90
## 96   0.12204   0.0  2.89    0     NA 6.625  57.8      NA   2 276    18.0 357.98
## 97   0.11504   0.0  2.89    0 0.4450 6.163  69.6  3.4952   2 276    18.0 391.83
## 98       NA    NA  2.89    0 0.4450 8.069  76.0  3.4952   2 276    18.0 396.90
## 99   0.08187   0.0  2.89    0 0.4450 7.820    NA      NA   2 276    18.0 393.53
## 100  0.06860   0.0  2.89    0     NA 7.416    NA  3.4952   2 276    18.0 396.90
## 101  0.14866   0.0  8.56    0 0.5200 6.727  79.9      NA   5 384    20.9 394.76
## 102  0.11432   0.0  8.56    0     NA 6.781  71.3  2.8561   5 384    20.9 395.58
## 103  0.22876   0.0  8.56    0 0.5200 6.405  85.4  2.7147   5 384    20.9  70.80
## 104  0.21161   0.0  8.56    0 0.5200 6.137  87.4  2.7147   5 384    20.9 394.47
```

```
## 105  0.13960   0.0  8.56    0     NA 6.167    NA  2.4210   5 384    20.9 392.69
## 106  0.13262    NA  8.56    0 0.5200 5.851  96.7  2.1069   5 384    20.9 394.05
## 107  0.17120   0.0  8.56    0 0.5200 5.836  91.9  2.2110   5 384    20.9 395.67
## 108       NA    NA  8.56    0 0.5200 6.127  85.2  2.1224   5 384    20.9 387.69
## 109  0.12802   0.0    NA    0 0.5200 6.474  97.1  2.4329   5  NA    20.9 395.24
## 110  0.26363   0.0    NA    0 0.5200 6.229  91.2  2.5451   5 384    20.9 391.23
## 111  0.10793    NA    NA    0 0.5200 6.195  54.4      NA   5 384    20.9 393.49
## 112  0.10084   0.0 10.01    0 0.5470 6.715  81.6  2.6775   6 432    17.8 395.59
## 113  0.12329   0.0    NA    0 0.5470 5.913  92.9  2.3534   6 432      NA 394.95
## 114  0.22212   0.0 10.01    0 0.5470 6.092  95.4  2.5480   6 432    17.8 396.90
## 115  0.14231   0.0 10.01    0 0.5470 6.254  84.2  2.2565   6 432    17.8 388.74
## 116  0.17134   0.0 10.01    0 0.5470 5.928  88.2  2.4631   6 432    17.8 344.91
## 117  0.13158   0.0    NA    0 0.5470 6.176  72.5  2.7301  NA 432    17.8 393.30
## 118  0.15098   0.0 10.01    0 0.5470 6.021  82.6  2.7474   6 432    17.8 394.51
## 119  0.13058   0.0 10.01    0 0.5470 5.872  73.1  2.4775   6 432    17.8 338.63
## 120  0.14476   0.0 10.01    0 0.5470 5.731  65.2  2.7592   6 432    17.8 391.50
## 121  0.06899   0.0 25.65    0 0.5810    NA  69.7  2.2577   2 188    19.1 389.15
## 122  0.07165   0.0    NA    0 0.5810 6.004  84.1  2.1974   2 188    19.1 377.67
## 123  0.09299   0.0 25.65    0 0.5810 5.961    NA  2.0869   2 188    19.1 378.09
## 124  0.15038   0.0 25.65    0 0.5810 5.856  97.0  1.9444   2 188    19.1 370.31
## 125  0.09849   0.0 25.65    0 0.5810 5.879  95.8  2.0063   2 188    19.1 379.38
## 126  0.16902   0.0 25.65    0     NA 5.986  88.4  1.9929   2  NA    19.1 385.02
## 127       NA   0.0 25.65   NA 0.5810 5.613  95.6  1.7572   2 188    19.1 359.29
## 128       NA   0.0 21.89    0 0.6240 5.693  96.0  1.7883   4 437    21.2 392.11
## 129  0.32543   0.0 21.89    0 0.6240 6.431  98.8  1.8125   4 437    21.2 396.90
## 130  0.88125   0.0 21.89    0     NA 5.637  94.7  1.9799   4 437      NA 396.90
## 131  0.34006   0.0 21.89    0 0.6240 6.458  98.9  2.1185   4 437      NA 395.04
## 132       NA   0.0 21.89    0 0.6240 6.326  97.7  2.2710   4  NA    21.2 396.90
## 133       NA   0.0    NA   NA 0.6240 6.372  97.9      NA   4 437    21.2 385.76
## 134  0.32982   0.0 21.89    0 0.6240 5.822  95.4  2.4699   4 437    21.2 388.69
## 135  0.97617   0.0 21.89    0     NA 5.757  98.4  2.3460   4 437    21.2 262.76
## 136  0.55778   0.0 21.89    0 0.6240 6.335  98.2  2.1107   4  NA      NA 394.67
## 137  0.32264   0.0 21.89    0     NA 5.942  93.5  1.9669   4 437    21.2 378.25
## 138  0.35233   0.0 21.89    0 0.6240 6.454  98.4  1.8498  NA 437    21.2 394.08
## 139  0.24980   0.0 21.89    0 0.6240    NA  98.2  1.6686   4 437    21.2 392.04
## 140  0.54452   0.0 21.89    0 0.6240 6.151  97.9  1.6687   4 437    21.2 396.90
## 141  0.29090   0.0 21.89    0 0.6240 6.174  93.6  1.6119   4 437    21.2 388.08
## 142  1.62864   0.0 21.89    0 0.6240 5.019 100.0  1.4394   4 437    21.2 396.90
## 143  3.32105   0.0 19.58    1     NA 5.403 100.0  1.3216   5 403    14.7     NA
## 144  4.09740   0.0 19.58    0 0.8710    NA 100.0      NA   5  NA    14.7 396.90
## 145  2.77974   0.0 19.58    0 0.8710 4.903  97.8  1.3459   5 403    14.7 396.90
## 146  2.37934   0.0 19.58    0 0.8710 6.130 100.0  1.4191   5 403    14.7 172.91
## 147  2.15505   0.0 19.58   NA 0.8710 5.628 100.0  1.5166  NA 403    14.7 169.27
## 148  2.36862   0.0 19.58    0 0.8710 4.926  95.7  1.4608   5 403    14.7     NA
## 149  2.33099   0.0    NA    0 0.8710 5.186  93.8  1.5296  NA 403    14.7 356.99
## 150       NA   0.0 19.58    0 0.8710 5.597  94.9  1.5257   5 403    14.7 351.85
## 151  1.65660   0.0    NA    0     NA 6.122  97.3  1.6180   5 403    14.7 372.80
## 152  1.49632   0.0 19.58    0     NA 5.404    NA  1.5916   5 403    14.7 341.60
## 153  1.12658   0.0 19.58    1 0.8710 5.012  88.0  1.6102   5 403      NA 343.28
## 154  2.14918   0.0    NA    0 0.8710 5.709  98.5  1.6232   5 403    14.7 261.95
## 155  1.41385   0.0 19.58    1 0.8710 6.129  96.0  1.7494   5 403    14.7 321.02
## 156  3.53501   0.0 19.58    1 0.8710 6.152  82.6  1.7455   5 403    14.7  88.01
## 157  2.44668   0.0 19.58   NA 0.8710 5.272    NA  1.7364   5 403    14.7  88.63
## 158  1.22358   0.0 19.58    0 0.6050 6.943  97.4  1.8773   5 403    14.7 363.43
```

```
## 159  1.34284   0.0 19.58    0 0.6050 6.066 100.0  1.7573   5 403    14.7 353.89
## 160  1.42502   0.0 19.58    0 0.8710 6.510    NA      NA  NA 403    14.7 364.31
## 161  1.27346   0.0 19.58    1 0.6050 6.250  92.6  1.7984   5  NA    14.7 338.92
## 162  1.46336   0.0 19.58    0 0.6050 7.489  90.8  1.9709   5 403    14.7 374.43
## 163  1.83377   0.0 19.58    1     NA 7.802  98.2  2.0407   5 403    14.7 389.61
## 164       NA   0.0 19.58    1 0.6050 8.375    NA  2.1620   5 403    14.7 388.45
## 165  2.24236   0.0 19.58   NA 0.6050 5.854  91.8  2.4220   5 403    14.7 395.11
## 166  2.92400    NA 19.58    0 0.6050 6.101  93.0  2.2834   5 403    14.7 240.16
## 167  2.01019   0.0 19.58    0 0.6050 7.929  96.2  2.0459   5 403    14.7 369.30
## 168  1.80028   0.0 19.58    0     NA 5.877  79.2  2.4259   5 403    14.7 227.61
## 169  2.30040   0.0 19.58   NA 0.6050 6.319  96.1  2.1000   5 403    14.7 297.09
## 170  2.44953   0.0 19.58    0 0.6050    NA  95.2  2.2625   5 403    14.7 330.04
## 171  1.20742   0.0 19.58    0 0.6050 5.875  94.6      NA   5  NA    14.7 292.29
## 172  2.31390   0.0 19.58    0 0.6050 5.880  97.3  2.3887   5 403    14.7 348.13
## 173  0.13914   0.0  4.05    0 0.5100 5.572  88.5  2.5961   5 296    16.6 396.90
## 174  0.09178   0.0  4.05    0 0.5100 6.416  84.1  2.6463   5 296    16.6 395.50
## 175  0.08447   0.0    NA    0 0.5100 5.859  68.7  2.7019  NA 296    16.6 393.23
## 176  0.06664   0.0  4.05    0 0.5100 6.546  33.1      NA   5 296    16.6 390.96
## 177  0.07022   0.0  4.05    0     NA 6.020  47.2      NA  NA 296    16.6 393.23
## 178  0.05425   0.0  4.05    0 0.5100 6.315  73.4  3.3175   5 296    16.6 395.60
## 179  0.06642    NA  4.05    0 0.5100 6.860    NA  2.9153   5 296    16.6     NA
## 180       NA   0.0  2.46    0 0.4880 6.980  58.4  2.8290   3 193    17.8 396.90
## 181  0.06588   0.0    NA    0 0.4880 7.765  83.3      NA   3 193    17.8 395.56
## 182  0.06888   0.0  2.46    0 0.4880 6.144  62.2  2.5979   3 193    17.8 396.90
## 183  0.09103    NA  2.46    0 0.4880 7.155  92.2  2.7006   3 193    17.8 394.12
## 184  0.10008   0.0  2.46   NA     NA 6.563  95.6      NA   3 193      NA 396.90
## 185       NA   0.0  2.46    0     NA 5.604  89.8  2.9879   3 193    17.8 391.00
## 186  0.06047   0.0  2.46    0 0.4880 6.153  68.8  3.2797   3  NA    17.8 387.11
## 187  0.05602   0.0  2.46    0 0.4880 7.831  53.6  3.1992   3 193      NA 392.63
## 188  0.07875  45.0  3.44    0 0.4370 6.782  41.1  3.7886   5 398    15.2 393.87
## 189  0.12579  45.0  3.44    0 0.4370 6.556  29.1  4.5667   5 398    15.2 382.84
## 190  0.08370  45.0  3.44    0 0.4370 7.185  38.9  4.5667   5 398    15.2 396.90
## 191  0.09068  45.0  3.44    0 0.4370 6.951  21.5  6.4798   5 398    15.2 377.68
## 192  0.06911  45.0  3.44    0 0.4370 6.739  30.8  6.4798   5 398    15.2 389.71
## 193  0.08664  45.0    NA    0 0.4370 7.178  26.3  6.4798   5 398      NA 390.49
## 194  0.02187  60.0  2.93    0 0.4010 6.800   9.9  6.2196   1 265    15.6 393.37
## 195  0.01439  60.0  2.93    0 0.4010 6.604  18.8  6.2196   1 265    15.6 376.70
## 196  0.01381  80.0  0.46    0 0.4220 7.875  32.0  5.6484   4 255    14.4 394.23
## 197  0.04011    NA  1.52    0 0.4040 7.287  34.1  7.3090  NA 329    12.6 396.90
## 198  0.04666  80.0  1.52    0 0.4040 7.107  36.6  7.3090   2 329    12.6 354.31
## 199  0.03768  80.0  1.52    0 0.4040 7.274  38.3  7.3090  NA 329    12.6 392.20
## 200  0.03150  95.0  1.47    0 0.4030 6.975  15.3  7.6534   3  NA    17.0 396.90
## 201  0.01778    NA    NA    0 0.4030 7.135  13.9  7.6534   3 402    17.0 384.30
## 202  0.03445  82.5  2.03    0 0.4150    NA    NA  6.2700   2 348    14.7 393.77
## 203  0.02177  82.5  2.03   NA 0.4150 7.610  15.7  6.2700   2 348    14.7 395.38
## 204  0.03510    NA  2.68    0 0.4161 7.853  33.2  5.1180   4 224      NA 392.78
## 205  0.02009  95.0  2.68    0 0.4161 8.034  31.9  5.1180  NA 224    14.7 390.55
## 206  0.13642   0.0 10.59    0 0.4890 5.891  22.3  3.9454   4 277    18.6 396.90
## 207  0.22969   0.0 10.59    0 0.4890 6.326  52.5  4.3549   4 277    18.6 394.87
## 208  0.25199   0.0 10.59    0 0.4890 5.783  72.7  4.3549   4 277    18.6 389.43
## 209  0.13587    NA 10.59    1 0.4890 6.064  59.1  4.2392   4 277    18.6 381.32
## 210  0.43571   0.0 10.59    1 0.4890 5.344 100.0  3.8750   4 277    18.6 396.90
## 211  0.17446   0.0 10.59   NA 0.4890 5.960  92.1  3.8771   4 277    18.6 393.25
## 212  0.37578    NA 10.59    1 0.4890 5.404  88.6  3.6650  NA 277    18.6 395.24
```

```
## 213       NA    NA    NA    1     NA 5.807  53.8  3.6526   4  NA    18.6 390.94
## 214  0.14052    NA 10.59   NA 0.4890 6.375  32.3  3.9454   4 277    18.6 385.81
## 215  0.28955   0.0 10.59    0 0.4890 5.412   9.8  3.5875   4 277    18.6 348.93
## 216  0.19802   0.0 10.59    0 0.4890 6.182  42.4  3.9454   4 277    18.6 393.63
## 217  0.04560   0.0 13.89    1 0.5500 5.888  56.0      NA   5 276    16.4 392.80
## 218  0.07013   0.0 13.89   NA 0.5500 6.642  85.1  3.4211   5 276    16.4 392.78
## 219  0.11069   0.0 13.89    1     NA 5.951  93.8  2.8893   5 276    16.4 396.90
## 220  0.11425   0.0 13.89    1 0.5500 6.373  92.4  3.3633   5 276    16.4 393.74
## 221  0.35809   0.0  6.20    1 0.5070 6.951  88.5  2.8617   8 307    17.4 391.70
## 222  0.40771   0.0  6.20    1 0.5070 6.164  91.3  3.0480   8 307    17.4 395.24
## 223  0.62356   0.0  6.20    1     NA 6.879  77.7  3.2721   8 307    17.4 390.39
## 224  0.61470   0.0  6.20    0 0.5070 6.618  80.8  3.2721   8  NA    17.4 396.90
## 225  0.31533   0.0  6.20    0 0.5040 8.266  78.3  2.8944   8 307    17.4     NA
## 226  0.52693   0.0  6.20   NA     NA 8.725  83.0  2.8944   8 307    17.4 382.00
## 227  0.38214   0.0  6.20    0 0.5040 8.040  86.5  3.2157   8  NA    17.4 387.38
## 228  0.41238   0.0  6.20    0 0.5040 7.163  79.9  3.2157   8 307    17.4 372.08
## 229  0.29819   0.0  6.20    0 0.5040 7.686  17.0  3.3751   8  NA    17.4     NA
## 230  0.44178   0.0  6.20    0 0.5040 6.552  21.4  3.3751   8 307    17.4 380.34
## 231  0.53700   0.0  6.20    0 0.5040 5.981  68.1  3.6715  NA 307    17.4 378.35
## 232  0.46296   0.0  6.20    0 0.5040 7.412  76.9  3.6715   8 307    17.4 376.14
## 233  0.57529   0.0  6.20    0 0.5070 8.337  73.3  3.8384   8 307    17.4 385.91
## 234  0.33147   0.0  6.20    0 0.5070 8.247  70.4  3.6519   8 307    17.4     NA
## 235  0.44791   0.0  6.20    1 0.5070 6.726  66.5  3.6519   8 307    17.4 360.20
## 236  0.33045    NA  6.20    0 0.5070 6.086  61.5  3.6519   8 307    17.4 376.75
## 237  0.52058   0.0  6.20    1 0.5070 6.631  76.5  4.1480   8 307    17.4 388.45
## 238  0.51183   0.0  6.20    0 0.5070 7.358  71.6  4.1480   8 307      NA     NA
## 239  0.08244  30.0  4.93    0 0.4280 6.481  18.5      NA   6 300      NA 379.41
## 240  0.09252  30.0  4.93    0 0.4280 6.606  42.2  6.1899   6 300    16.6 383.78
## 241  0.11329  30.0  4.93    0 0.4280 6.897  54.3  6.3361   6 300    16.6 391.25
## 242       NA  30.0  4.93    0 0.4280 6.095  65.1      NA   6 300    16.6 394.62
## 243  0.10290  30.0  4.93    0 0.4280 6.358  52.9  7.0355  NA 300    16.6 372.75
## 244  0.12757  30.0  4.93   NA 0.4280 6.393   7.8      NA   6 300    16.6 374.71
## 245       NA  22.0  5.86    0 0.4310 5.593  76.5  7.9549   7 330    19.1 372.49
## 246  0.19133  22.0  5.86    0 0.4310 5.605  70.2  7.9549  NA 330    19.1     NA
## 247  0.33983  22.0  5.86    0 0.4310 6.108  34.9  8.0555   7 330    19.1 390.18
## 248  0.19657  22.0  5.86    0     NA 6.226  79.2  8.0555   7 330    19.1 376.14
## 249       NA  22.0  5.86    0 0.4310 6.433  49.1  7.8265   7 330    19.1 374.71
## 250  0.19073  22.0    NA    0 0.4310 6.718  17.5  7.8265   7 330      NA 393.74
## 251  0.14030  22.0  5.86    0 0.4310    NA  13.0  7.3967  NA 330    19.1 396.28
## 252  0.21409  22.0  5.86    0 0.4310 6.438   8.9  7.3967   7 330    19.1 377.07
## 253  0.08221  22.0  5.86    0 0.4310 6.957   6.8  8.9067   7 330      NA 386.09
## 254  0.36894  22.0    NA    0 0.4310 8.259    NA      NA   7 330      NA 396.90
## 255  0.04819  80.0    NA    0 0.3920 6.108  32.0  9.2203   1 315    16.4 392.89
## 256  0.03548  80.0  3.64   NA 0.3920 5.876  19.1  9.2203   1 315    16.4     NA
## 257  0.01538  90.0  3.75    0 0.3940 7.454    NA  6.3361   3 244    15.9 386.34
## 258  0.61154    NA  3.97    0 0.6470 8.704  86.9      NA  NA 264    13.0 389.70
## 259  0.66351  20.0  3.97    0 0.6470 7.333 100.0  1.8946   5 264    13.0 383.29
## 260  0.65665  20.0  3.97    0 0.6470 6.842 100.0  2.0107   5 264    13.0 391.93
## 261  0.54011  20.0  3.97    0 0.6470    NA  81.8  2.1121   5 264    13.0     NA
## 262       NA  20.0  3.97    0 0.6470 7.520  89.4      NA  NA 264    13.0 388.37
## 263  0.52014  20.0  3.97    0 0.6470 8.398  91.5  2.2885   5 264    13.0 386.86
## 264  0.82526    NA  3.97    0 0.6470 7.327  94.5  2.0788   5 264      NA 393.42
## 265       NA    NA  3.97   NA 0.6470 7.206  91.6  1.9301   5 264      NA 387.89
## 266  0.76162  20.0  3.97    0     NA 5.560  62.8  1.9865   5 264    13.0 392.40
```

```
## 267  0.78570  20.0  3.97    0 0.6470 7.014  84.6  2.1329  NA 264    13.0 384.07
## 268  0.57834  20.0  3.97    0 0.5750 8.297  67.0  2.4216   5  NA    13.0 384.54
## 269  0.54050  20.0  3.97   NA     NA 7.470  52.6  2.8720   5 264      NA 390.30
## 270  0.09065  20.0  6.96    1 0.4640 5.920  61.5  3.9175   3 223    18.6 391.34
## 271       NA    NA  6.96    0 0.4640 5.856  42.1  4.4290   3 223      NA 388.65
## 272       NA  20.0  6.96   NA 0.4640    NA  16.3  4.4290   3 223    18.6 396.90
## 273  0.11460  20.0  6.96    0 0.4640 6.538  58.7  3.9175   3 223      NA 394.96
## 274  0.22188  20.0  6.96    1 0.4640 7.691  51.8  4.3665   3 223    18.6 390.77
## 275  0.05644  40.0  6.41    1 0.4470 6.758  32.9  4.0776   4 254    17.6 396.90
## 276  0.09604    NA  6.41    0 0.4470 6.854  42.8  4.2673   4 254    17.6 396.90
## 277  0.10469  40.0  6.41    1 0.4470 7.267  49.0      NA   4 254    17.6 389.25
## 278  0.06127  40.0  6.41    1     NA 6.826  27.6  4.8628   4 254    17.6     NA
## 279  0.07978  40.0  6.41   NA 0.4470 6.482    NA  4.1403   4 254    17.6 396.90
## 280  0.21038  20.0  3.33    0 0.4429 6.812  32.2  4.1007   5 216    14.9 396.90
## 281  0.03578  20.0  3.33    0 0.4429 7.820  64.5  4.6947   5  NA    14.9 387.31
## 282  0.03705    NA  3.33    0 0.4429 6.968  37.2      NA   5 216    14.9 392.23
## 283  0.06129  20.0  3.33    1 0.4429 7.645  49.7  5.2119   5 216    14.9 377.07
## 284  0.01501  90.0  1.21    1 0.4010 7.923    NA  5.8850   1 198    13.6 395.52
## 285  0.00906  90.0  2.97    0 0.4000 7.088  20.8  7.3073   1 285    15.3 394.72
## 286  0.01096  55.0  2.25    0 0.3890 6.453  31.9  7.3073   1 300    15.3 394.72
## 287  0.01965  80.0  1.76    0 0.3850 6.230  31.5  9.0892   1 241    18.2 341.60
## 288  0.03871  52.5  5.32    0 0.4050 6.209  31.3  7.3172   6 293    16.6 396.90
## 289  0.04590  52.5  5.32    0 0.4050 6.315  45.6  7.3172   6 293    16.6     NA
## 290  0.04297  52.5  5.32    0 0.4050 6.565  22.9  7.3172   6  NA    16.6 371.72
## 291  0.03502  80.0  4.95    0     NA 6.861    NA  5.1167   4 245    19.2 396.90
## 292  0.07886  80.0  4.95    0 0.4110    NA  27.7  5.1167   4 245    19.2 396.90
## 293  0.03615    NA  4.95    0 0.4110 6.630  23.4  5.1167   4 245    19.2 396.90
## 294  0.08265   0.0 13.92    0 0.4370 6.127  18.4      NA   4 289    16.0 396.90
## 295  0.08199   0.0 13.92    0 0.4370 6.009  42.3  5.5027   4 289    16.0 396.90
## 296  0.12932   0.0 13.92    0 0.4370 6.678  31.1  5.9604   4 289      NA 396.90
## 297  0.05372   0.0 13.92    0 0.4370 6.549  51.0  5.9604   4 289    16.0 392.85
## 298  0.14103   0.0 13.92    0     NA 5.790  58.0  6.3200   4 289    16.0 396.90
## 299  0.06466  70.0  2.24    0 0.4000 6.345  20.1  7.8278   5  NA    14.8 368.24
## 300  0.05561  70.0  2.24   NA 0.4000 7.041  10.0  7.8278   5  NA      NA 371.58
## 301       NA  70.0    NA    0 0.4000 6.871  47.4  7.8278   5 358    14.8 390.86
## 302  0.03537  34.0    NA    0 0.4330 6.590    NA  5.4917   7 329    16.1 395.75
## 303  0.09266  34.0  6.09   NA 0.4330    NA  18.4  5.4917   7  NA    16.1 383.61
## 304  0.10000  34.0  6.09    0 0.4330 6.982  17.7  5.4917   7 329    16.1 390.43
## 305  0.05515  33.0  2.18    0 0.4720 7.236  41.1  4.0220   7 222    18.4     NA
## 306       NA  33.0  2.18    0 0.4720 6.616  58.1      NA   7 222    18.4 393.36
## 307  0.07503  33.0  2.18    0 0.4720 7.420  71.9  3.0992   7 222    18.4 396.90
## 308  0.04932  33.0  2.18    0 0.4720 6.849  70.3  3.1827   7 222    18.4 396.90
## 309  0.49298   0.0    NA    0 0.5440 6.635  82.5  3.3175   4 304      NA 396.90
## 310       NA   0.0  9.90    0 0.5440 5.972  76.7  3.1025   4 304    18.4 396.24
## 311  2.63548   0.0  9.90    0     NA 4.973  37.8  2.5194   4 304    18.4 350.45
## 312  0.79041   0.0  9.90    0 0.5440 6.122  52.8  2.6403   4 304    18.4 396.90
## 313  0.26169   0.0    NA    0 0.5440 6.023  90.4      NA   4 304    18.4     NA
## 314  0.26938   0.0    NA    0 0.5440 6.266  82.8  3.2628   4 304    18.4 393.39
## 315  0.36920   0.0    NA    0 0.5440 6.567  87.3  3.6023   4 304    18.4 395.69
## 316  0.25356   0.0  9.90   NA 0.5440 5.705  77.7  3.9450   4 304    18.4 396.42
## 317  0.31827   0.0  9.90    0 0.5440 5.914  83.2  3.9986   4 304    18.4 390.70
## 318  0.24522    NA  9.90    0 0.5440 5.782  71.7  4.0317   4 304    18.4 396.90
## 319  0.40202   0.0  9.90   NA 0.5440 6.382  67.2  3.5325   4  NA    18.4 395.21
## 320  0.47547   0.0  9.90    0     NA 6.113  58.8      NA   4 304    18.4 396.23
```

```
## 321  0.16760   0.0  7.38   NA 0.4930 6.426  52.3  4.5404   5 287    19.6 396.90
## 322  0.18159   0.0  7.38    0 0.4930 6.376  54.3  4.5404   5 287    19.6 396.90
## 323  0.35114   0.0  7.38    0 0.4930 6.041  49.9  4.7211   5 287      NA 396.90
## 324  0.28392   0.0  7.38    0 0.4930 5.708    NA  4.7211  NA 287    19.6 391.13
## 325  0.34109   0.0  7.38    0     NA 6.415  40.1  4.7211   5 287    19.6 396.90
## 326  0.19186    NA  7.38    0 0.4930 6.431  14.7  5.4159   5 287    19.6 393.68
## 327  0.30347   0.0  7.38    0 0.4930    NA  28.9  5.4159   5 287    19.6 396.90
## 328  0.24103   0.0  7.38    0 0.4930 6.083  43.7  5.4159   5 287    19.6 396.90
## 329  0.06617   0.0  3.24    0 0.4600 5.868  25.8  5.2146   4 430    16.9 382.44
## 330  0.06724   0.0  3.24   NA 0.4600 6.333  17.2      NA   4 430    16.9 375.21
## 331  0.04544   0.0  3.24    0 0.4600    NA  32.2  5.8736   4 430    16.9 368.57
## 332  0.05023  35.0  6.06    0 0.4379 5.706  28.4  6.6407  NA 304    16.9 394.02
## 333  0.03466  35.0  6.06    0     NA 6.031  23.3  6.6407  NA 304    16.9 362.25
## 334  0.05083   0.0  5.19    0 0.5150 6.316  38.1  6.4584   5 224    20.2 389.71
## 335       NA   0.0  5.19    0 0.5150 6.310  38.5  6.4584   5 224    20.2 389.40
## 336       NA   0.0  5.19    0     NA 6.037  34.5      NA   5 224      NA 396.90
## 337  0.03427   0.0  5.19    0 0.5150 5.869  46.3  5.2311   5 224    20.2 396.90
## 338  0.03041   0.0  5.19    0 0.5150 5.895  59.6  5.6150   5 224    20.2 394.81
## 339  0.03306   0.0  5.19    0 0.5150 6.059  37.3  4.8122   5 224    20.2 396.14
## 340  0.05497   0.0  5.19    0 0.5150 5.985  45.4  4.8122   5 224    20.2 396.90
## 341  0.06151    NA  5.19    0 0.5150 5.968  58.5  4.8122   5  NA    20.2 396.90
## 342  0.01301  35.0  1.52    0     NA 7.241  49.3  7.0379   1 284    15.5     NA
## 343  0.02498   0.0  1.89    0 0.5180 6.540  59.7  6.2669   1 422    15.9 389.96
## 344  0.02543  55.0  3.78    0 0.4840    NA  56.4  5.7321   5 370    17.6 396.90
## 345  0.03049  55.0  3.78    0 0.4840 6.874  28.1  6.4654   5 370    17.6 387.97
## 346  0.03113   0.0  4.39   NA 0.4420 6.014  48.5  8.0136   3  NA    18.8 385.64
## 347  0.06162   0.0  4.39    0 0.4420 5.898  52.3  8.0136   3 352    18.8 364.61
## 348  0.01870  85.0  4.15    0     NA 6.516  27.7  8.5353   4 351    17.9 392.43
## 349  0.01501  80.0  2.01    0 0.4350 6.635  29.7      NA   4 280    17.0 390.94
## 350  0.02899  40.0  1.25    0 0.4290 6.939  34.5  8.7921   1  NA    19.7 389.85
## 351  0.06211  40.0  1.25    0 0.4290 6.490  44.4      NA   1 335    19.7 396.90
## 352  0.07950  60.0  1.69    0 0.4110 6.579    NA 10.7103   4 411    18.3 370.78
## 353  0.07244  60.0  1.69    0 0.4110    NA  18.5 10.7103   4 411      NA 392.33
## 354  0.01709  90.0  2.02    0 0.4100 6.728  36.1 12.1265   5 187    17.0 384.46
## 355  0.04301  80.0  1.91    0 0.4130 5.663  21.9 10.5857   4  NA    22.0 382.80
## 356  0.10659  80.0  1.91    0 0.4130 5.936  19.5 10.5857   4 334      NA 376.04
## 357  8.98296    NA 18.10    1 0.7700 6.212  97.4  2.1222  24 666    20.2 377.73
## 358  3.84970   0.0 18.10    1 0.7700 6.395  91.0  2.5052  24 666      NA 391.34
## 359  5.20177   0.0 18.10    1 0.7700 6.127    NA  2.7227  24 666    20.2     NA
## 360  4.26131   0.0 18.10    0 0.7700 6.112  81.3  2.5091  24 666    20.2 390.74
## 361  4.54192    NA 18.10    0 0.7700 6.398  88.0  2.5182  24 666    20.2 374.56
## 362  3.83684   0.0 18.10    0 0.7700 6.251    NA  2.2955  24 666      NA 350.65
## 363  3.67822   0.0 18.10    0 0.7700 5.362  96.2  2.1036  24 666    20.2 380.79
## 364  4.22239   0.0 18.10    1 0.7700 5.803  89.0  1.9047  NA 666    20.2 353.04
## 365  3.47428   0.0 18.10    1 0.7180 8.780  82.9  1.9047  24 666    20.2 354.55
## 366  4.55587    NA 18.10    0 0.7180 3.561  87.9  1.6132  24 666    20.2 354.70
## 367  3.69695   0.0 18.10    0 0.7180 4.963  91.4  1.7523  24 666    20.2 316.03
## 368 13.52220    NA 18.10    0 0.6310 3.863 100.0  1.5106  24  NA    20.2     NA
## 369  4.89822   0.0    NA    0 0.6310 4.970 100.0  1.3325  24 666    20.2 375.52
## 370  5.66998   0.0    NA    1 0.6310 6.683  96.8  1.3567  NA 666    20.2     NA
## 371  6.53876   0.0    NA    1 0.6310 7.016  97.5  1.2024  24 666    20.2     NA
## 372  9.23230    NA 18.10    0 0.6310 6.216 100.0  1.1691  24 666    20.2 366.15
## 373  8.26725   0.0 18.10    1 0.6680 5.875  89.6  1.1296  24 666    20.2 347.88
## 374 11.10810   0.0 18.10    0 0.6680 4.906 100.0  1.1742  24 666    20.2 396.90
```

```
## 375 18.49820   0.0 18.10    0 0.6680 4.138 100.0  1.1370  24 666    20.2     NA
## 376       NA   0.0    NA    0 0.6710 7.313  97.9  1.3163  24 666    20.2     NA
## 377 15.28800   0.0 18.10    0 0.6710 6.649  93.3  1.3449  24 666    20.2     NA
## 378  9.82349   0.0 18.10    0 0.6710 6.794    NA  1.3580  NA 666    20.2 396.90
## 379 23.64820   0.0 18.10    0     NA 6.380  96.2  1.3861  24 666      NA 396.90
## 380 17.86670   0.0 18.10    0 0.6710 6.223 100.0  1.3861  24 666    20.2 393.74
## 381 88.97620   0.0 18.10    0 0.6710 6.968    NA  1.4165  24 666    20.2 396.90
## 382 15.87440   0.0 18.10    0     NA 6.545  99.1      NA  24 666    20.2 396.90
## 383  9.18702   0.0 18.10    0 0.7000 5.536 100.0  1.5804  24 666    20.2 396.90
## 384  7.99248   0.0 18.10    0 0.7000 5.520 100.0  1.5331  24 666    20.2 396.90
## 385 20.08490   0.0 18.10    0 0.7000 4.368  91.2  1.4395  24 666    20.2 285.83
## 386 16.81180   0.0 18.10    0 0.7000 5.277  98.1  1.4261  24 666    20.2 396.90
## 387 24.39380   0.0 18.10   NA 0.7000    NA 100.0      NA  24 666    20.2 396.90
## 388 22.59710   0.0 18.10    0 0.7000 5.000  89.5  1.5184  24 666    20.2 396.90
## 389 14.33370   0.0 18.10    0 0.7000 4.880 100.0  1.5895  24 666    20.2 372.92
## 390  8.15174   0.0    NA   NA 0.7000 5.390  98.9  1.7281  24 666      NA 396.90
## 391       NA    NA    NA   NA 0.7000 5.713    NA  1.9265  24  NA    20.2 394.43
## 392  5.29305   0.0    NA    0 0.7000 6.051  82.5  2.1678  24 666    20.2 378.38
## 393       NA   0.0    NA   NA     NA 5.036  97.0  1.7700  NA 666    20.2 396.90
## 394  8.64476   0.0 18.10    0 0.6930 6.193  92.6  1.7912  NA 666    20.2 396.90
## 395 13.35980   0.0 18.10    0     NA 5.887  94.7  1.7821  24 666    20.2 396.90
## 396  8.71675   0.0 18.10    0 0.6930 6.471  98.8  1.7257  24 666    20.2 391.98
## 397  5.87205   0.0 18.10    0 0.6930 6.405    NA  1.6768  24 666    20.2 396.90
## 398  7.67202   0.0 18.10    0 0.6930 5.747  98.9  1.6334  24 666      NA 393.10
## 399 38.35180   0.0 18.10    0 0.6930 5.453 100.0  1.4896  24 666    20.2 396.90
## 400  9.91655   0.0 18.10    0     NA 5.852  77.8      NA  24 666    20.2 338.16
## 401 25.04610   0.0    NA    0 0.6930    NA    NA  1.5888  24 666    20.2 396.90
## 402 14.23620    NA 18.10    0     NA 6.343 100.0  1.5741  24 666    20.2 396.90
## 403  9.59571   0.0 18.10    0 0.6930 6.404 100.0  1.6390  24 666    20.2 376.11
## 404 24.80170   0.0 18.10    0 0.6930 5.349  96.0  1.7028  24 666    20.2 396.90
## 405 41.52920   0.0 18.10    0 0.6930    NA  85.4  1.6074  NA 666    20.2 329.46
## 406 67.92080   0.0 18.10   NA     NA 5.683 100.0  1.4254  24 666    20.2 384.97
## 407 20.71620    NA 18.10    0 0.6590 4.138 100.0  1.1781  24 666    20.2 370.22
## 408 11.95110   0.0 18.10    0 0.6590 5.608 100.0  1.2852  24 666    20.2 332.09
## 409  7.40389    NA 18.10    0 0.5970 5.617  97.9  1.4547  24 666    20.2 314.64
## 410 14.43830   0.0 18.10   NA 0.5970 6.852 100.0  1.4655  24 666    20.2 179.36
## 411 51.13580   0.0 18.10    0 0.5970 5.757 100.0  1.4130  24 666    20.2   2.60
## 412       NA   0.0 18.10    0 0.5970 6.657 100.0  1.5275  24 666    20.2  35.05
## 413 18.81100   0.0 18.10    0 0.5970 4.628 100.0  1.5539  24 666    20.2  28.79
## 414 28.65580   0.0 18.10    0 0.5970 5.155 100.0  1.5894  24 666      NA 210.97
## 415 45.74610   0.0    NA    0     NA 4.519 100.0  1.6582  24 666    20.2  88.27
## 416 18.08460   0.0 18.10    0 0.6790 6.434    NA  1.8347  24 666      NA  27.25
## 417 10.83420   0.0 18.10    0 0.6790 6.782  90.8      NA  24 666      NA  21.57
## 418 25.94060   0.0 18.10    0 0.6790 5.304  89.1  1.6475  24 666    20.2 127.36
## 419 73.53410   0.0 18.10   NA 0.6790 5.957    NA  1.8026  24 666    20.2     NA
## 420 11.81230   0.0 18.10    0 0.7180 6.824  76.5  1.7940  24 666      NA  48.45
## 421       NA   0.0 18.10    0     NA 6.411 100.0  1.8589  24 666    20.2     NA
## 422  7.02259   0.0 18.10    0 0.7180 6.006    NA  1.8746  24 666    20.2 319.98
## 423 12.04820    NA 18.10    0 0.6140 5.648  87.6  1.9512  24 666    20.2 291.55
## 424  7.05042   0.0 18.10    0 0.6140 6.103  85.1  2.0218  NA 666    20.2   2.52
## 425  8.79212   0.0    NA    0 0.5840    NA  70.6  2.0635  24 666    20.2   3.65
## 426 15.86030   0.0 18.10    0 0.6790    NA    NA  1.9096  24 666    20.2   7.68
## 427 12.24720   0.0 18.10    0 0.5840 5.837  59.7  1.9976  24 666    20.2  24.65
## 428 37.66190   0.0 18.10    0 0.6790 6.202  78.7  1.8629  NA 666      NA  18.82
```

```
## 429  7.36711   0.0 18.10    0 0.6790 6.193  78.1  1.9356  24 666    20.2  96.73
## 430  9.33889   0.0 18.10    0     NA 6.380  95.6  1.9682  24 666    20.2  60.72
## 431       NA   0.0 18.10    0 0.5840 6.348  86.1  2.0527  24 666    20.2  83.45
## 432 10.06230   0.0 18.10    0 0.5840 6.833  94.3  2.0882  NA 666    20.2  81.33
## 433       NA   0.0 18.10    0 0.5840    NA  74.8  2.2004  24 666    20.2  97.95
## 434  5.58107    NA 18.10    0 0.7130 6.436  87.9  2.3158  24 666    20.2 100.19
## 435 13.91340   0.0 18.10    0 0.7130 6.208  95.0  2.2222  24 666    20.2 100.63
## 436 11.16040    NA    NA    0 0.7400 6.629  94.6  2.1247  24 666    20.2 109.85
## 437 14.42080   0.0    NA   NA 0.7400 6.461  93.3  2.0026  24 666    20.2  27.49
## 438 15.17720   0.0 18.10    0 0.7400 6.152 100.0  1.9142  24 666    20.2   9.32
## 439 13.67810   0.0 18.10    0     NA 5.935  87.9  1.8206  24 666      NA  68.95
## 440  9.39063   0.0 18.10    0 0.7400 5.627    NA  1.8172  24 666    20.2 396.90
## 441 22.05110    NA    NA    0 0.7400 5.818  92.4  1.8662  24 666    20.2 391.45
## 442  9.72418   0.0 18.10    0 0.7400 6.406  97.2  2.0651  24 666    20.2 385.96
## 443  5.66637    NA 18.10    0 0.7400 6.219 100.0      NA  24 666    20.2 395.69
## 444  9.96654   0.0 18.10    0 0.7400 6.485 100.0  1.9784  24 666    20.2 386.73
## 445 12.80230   0.0 18.10   NA 0.7400 5.854  96.6  1.8956  24 666    20.2 240.52
## 446 10.67180   0.0 18.10    0     NA 6.459  94.8  1.9879  24 666    20.2  43.06
## 447  6.28807   0.0 18.10    0     NA 6.341  96.4  2.0720  24 666    20.2 318.01
## 448       NA   0.0    NA    0     NA 6.251  96.6  2.1980  24 666    20.2 388.52
## 449  9.32909    NA 18.10    0     NA 6.185  98.7  2.2616  24 666    20.2 396.90
## 450  7.52601   0.0 18.10    0 0.7130 6.417  98.3      NA  24 666    20.2 304.21
## 451  6.71772    NA 18.10    0     NA 6.749    NA  2.3236  24 666    20.2   0.32
## 452  5.44114   0.0 18.10    0 0.7130 6.655    NA  2.3552  24 666    20.2 355.29
## 453       NA    NA 18.10   NA 0.7130 6.297  91.8  2.3682  NA 666    20.2 385.09
## 454       NA   0.0    NA    0 0.7130    NA  99.3  2.4527  24 666    20.2 375.87
## 455  9.51363   0.0 18.10    0 0.7130 6.728  94.1  2.4961  24 666      NA   6.68
## 456  4.75237   0.0 18.10    0     NA 6.525  86.5  2.4358  24 666    20.2  50.92
## 457  4.66883   0.0 18.10   NA 0.7130 5.976  87.9  2.5806  24 666    20.2  10.48
## 458  8.20058   0.0 18.10    0 0.7130 5.936  80.3  2.7792  24  NA      NA   3.50
## 459       NA   0.0    NA    0 0.7130 6.301  83.7  2.7831  NA 666    20.2 272.21
## 460  6.80117   0.0 18.10    0 0.7130 6.081  84.4  2.7175  NA 666    20.2 396.90
## 461  4.81213   0.0 18.10    0     NA 6.701  90.0  2.5975  24 666    20.2 255.23
## 462  3.69311    NA 18.10    0 0.7130 6.376  88.4  2.5671  24 666    20.2 391.43
## 463  6.65492   0.0 18.10    0 0.7130 6.317  83.0      NA  NA 666      NA 396.90
## 464  5.82115    NA 18.10    0     NA 6.513  89.9  2.8016  NA 666      NA 393.82
## 465  7.83932   0.0 18.10   NA 0.6550 6.209  65.4  2.9634  24 666      NA 396.90
## 466  3.16360   0.0 18.10    0 0.6550 5.759  48.2  3.0665  24 666    20.2 334.40
## 467  3.77498   0.0 18.10    0 0.6550 5.952  84.7      NA  24 666    20.2  22.01
## 468  4.42228   0.0 18.10    0 0.5840    NA  94.5  2.5403  24 666    20.2 331.29
## 469 15.57570   0.0 18.10    0 0.5800 5.926  71.0  2.9084  NA  NA    20.2     NA
## 470 13.07510   0.0    NA   NA 0.5800 5.713  56.7  2.8237  24 666    20.2 396.90
## 471  4.34879   0.0    NA    0 0.5800    NA  84.0  3.0334  24 666    20.2 396.90
## 472  4.03841   0.0    NA    0 0.5320 6.229  90.7  3.0993  24 666    20.2 395.33
## 473       NA   0.0 18.10    0     NA    NA  75.0  2.8965  24 666    20.2 393.37
## 474  4.64689   0.0 18.10    0 0.6140 6.980  67.6  2.5329  24 666    20.2 374.68
## 475       NA   0.0 18.10    0 0.5840 5.427  95.4  2.4298  NA 666    20.2 352.58
## 476  6.39312   0.0    NA    0 0.5840 6.162  97.4      NA  24 666    20.2 302.76
## 477  4.87141   0.0 18.10    0 0.6140 6.484  93.6      NA  NA 666    20.2 396.21
## 478 15.02340   0.0 18.10    0 0.6140 5.304  97.3  2.1007  24 666    20.2 349.48
## 479 10.23300    NA 18.10    0 0.6140    NA  96.7      NA  24 666    20.2 379.70
## 480 14.33370   0.0 18.10    0 0.6140 6.229    NA      NA  24  NA    20.2 383.32
## 481  5.82401   0.0 18.10    0 0.5320 6.242  64.7  3.4242  24 666    20.2 396.90
## 482  5.70818   0.0 18.10    0 0.5320 6.750    NA  3.3317  NA 666    20.2 393.07
```

```
## 483  5.73116   0.0 18.10    0     NA 7.061  77.0  3.4106  24 666    20.2     NA
## 484  2.81838   0.0 18.10    0 0.5320 5.762  40.3  4.0983  24 666    20.2 392.92
## 485  2.37857   0.0 18.10    0 0.5830 5.871  41.9  3.7240  24 666    20.2 370.73
## 486  3.67367    NA 18.10    0     NA 6.312  51.9  3.9917  24 666    20.2 388.62
## 487       NA   0.0 18.10    0 0.5830 6.114  79.8  3.5459  24  NA      NA 392.68
## 488  4.83567   0.0    NA    0 0.5830    NA  53.2  3.1523  24 666      NA 388.22
## 489  0.15086   0.0 27.74    0 0.6090 5.454  92.7  1.8209   4 711    20.1 395.09
## 490  0.18337   0.0 27.74    0 0.6090 5.414    NA  1.7554   4 711    20.1 344.05
## 491  0.20746   0.0 27.74    0 0.6090 5.093  98.0  1.8226   4 711      NA 318.43
## 492  0.10574   0.0 27.74    0 0.6090 5.983  98.8  1.8681   4 711    20.1 390.11
## 493       NA   0.0    NA   NA 0.6090 5.983  83.5  2.1099   4 711    20.1     NA
## 494  0.17331   0.0  9.69    0 0.5850 5.707  54.0  2.3817  NA 391    19.2 396.90
## 495  0.27957   0.0  9.69    0 0.5850 5.926  42.6  2.3817   6 391    19.2 396.90
## 496  0.17899   0.0    NA    0 0.5850 5.670  28.8  2.7986   6 391    19.2 393.29
## 497       NA   0.0  9.69    0 0.5850 5.390  72.9  2.7986  NA 391      NA 396.90
## 498  0.26838   0.0  9.69    0 0.5850 5.794  70.6  2.8927   6 391    19.2 396.90
## 499  0.23912   0.0  9.69    0 0.5850 6.019  65.3  2.4091   6 391    19.2 396.90
## 500  0.17783   0.0  9.69    0 0.5850 5.569  73.5  2.3999   6 391    19.2 395.77
## 501  0.22438   0.0  9.69    0     NA 6.027  79.7  2.4982  NA 391    19.2     NA
## 502  0.06263    NA 11.93    0 0.5730 6.593    NA  2.4786   1 273    21.0 391.99
## 503  0.04527    NA 11.93    0 0.5730 6.120  76.7  2.2875   1 273      NA 396.90
## 504  0.06076   0.0 11.93    0     NA 6.976  91.0  2.1675   1 273    21.0 396.90
## 505  0.10959   0.0 11.93    0 0.5730 6.794  89.3  2.3889   1 273    21.0 393.45
## 506  0.04741   0.0 11.93    0 0.5730    NA  80.8  2.5050   1 273    21.0 396.90
##     lstat medv
## 1    4.98 24.0
## 2    9.14 21.6
## 3    4.03 34.7
## 4    2.94   NA
## 5    5.33 36.2
## 6    5.21 28.7
## 7   12.43 22.9
## 8   19.15   NA
## 9   29.93   NA
## 10  17.10 18.9
## 11  20.45 15.0
## 12  13.27   NA
## 13  15.71 21.7
## 14   8.26 20.4
## 15  10.26 18.2
## 16   8.47 19.9
## 17   6.58 23.1
## 18  14.67 17.5
## 19  11.69   NA
## 20  11.28 18.2
## 21  21.02 13.6
## 22  13.83 19.6
## 23  18.72 15.2
## 24  19.88 14.5
## 25  16.30 15.6
## 26  16.51 13.9
## 27  14.81 16.6
## 28  17.28 14.8
## 29  12.80 18.4
```

```
## 30  11.98 21.0
## 31  22.60 12.7
## 32  13.04 14.5
## 33  27.71 13.2
## 34  18.35 13.1
## 35  20.34 13.5
## 36   9.68 18.9
## 37  11.41   NA
## 38     NA 21.0
## 39  10.13 24.7
## 40   4.32 30.8
## 41   1.98 34.9
## 42   4.84 26.6
## 43   5.81 25.3
## 44   7.44   NA
## 45   9.55 21.2
## 46  10.21 19.3
## 47  14.15 20.0
## 48     NA 16.6
## 49  30.81 14.4
## 50  16.20 19.4
## 51  13.45 19.7
## 52   9.43 20.5
## 53   5.28 25.0
## 54   8.43 23.4
## 55  14.80 18.9
## 56   4.81 35.4
## 57   5.77 24.7
## 58   3.95 31.6
## 59   6.86 23.3
## 60   9.22 19.6
## 61     NA 18.7
## 62  14.44 16.0
## 63   6.73 22.2
## 64   9.50 25.0
## 65   8.05 33.0
## 66   4.67 23.5
## 67  10.24 19.4
## 68   8.10 22.0
## 69  13.09   NA
## 70   8.79 20.9
## 71   6.72   NA
## 72   9.88   NA
## 73   5.52 22.8
## 74     NA 23.4
## 75   6.78 24.1
## 76   8.94 21.4
## 77  11.97 20.0
## 78  10.27 20.8
## 79  12.34 21.2
## 80   9.10 20.3
## 81   5.29 28.0
## 82     NA 23.9
## 83   6.72 24.8
```

```
## 84   7.51 22.9
## 85   9.62 23.9
## 86   6.53 26.6
## 87     NA 22.5
## 88     NA 22.2
## 89     NA 23.6
## 90   5.70 28.7
## 91   8.81 22.6
## 92   8.20 22.0
## 93   8.16 22.9
## 94   6.21 25.0
## 95  10.59 20.6
## 96   6.65 28.4
## 97  11.34 21.4
## 98   4.21 38.7
## 99   3.57 43.8
## 100  6.19 33.2
## 101  9.42 27.5
## 102  7.67 26.5
## 103 10.63 18.6
## 104 13.44 19.3
## 105 12.33 20.1
## 106 16.47 19.5
## 107 18.66   NA
## 108 14.09 20.4
## 109 12.27 19.8
## 110 15.55 19.4
## 111 13.00 21.7
## 112 10.16 22.8
## 113 16.21 18.8
## 114    NA 18.7
## 115 10.45 18.5
## 116 15.76 18.3
## 117    NA 21.2
## 118 10.30 19.2
## 119 15.37 20.4
## 120 13.61 19.3
## 121 14.37 22.0
## 122 14.27 20.3
## 123 17.93 20.5
## 124 25.41 17.3
## 125 17.58 18.8
## 126 14.81 21.4
## 127 27.26 15.7
## 128 17.19 16.2
## 129 15.39 18.0
## 130 18.34 14.3
## 131 12.60 19.2
## 132 12.26   NA
## 133 11.12   NA
## 134 15.03   NA
## 135 17.31 15.6
## 136 16.96 18.1
## 137 16.90   NA
```

```
## 138 14.59 17.1
## 139 21.32 13.3
## 140 18.46 17.8
## 141 24.16 14.0
## 142 34.41   NA
## 143 26.82 13.4
## 144 26.42 15.6
## 145 29.29 11.8
## 146 27.80 13.8
## 147 16.65 15.6
## 148    NA 14.6
## 149 28.32 17.8
## 150 21.45 15.4
## 151 14.10 21.5
## 152 13.28   NA
## 153 12.12 15.3
## 154 15.79 19.4
## 155 15.12 17.0
## 156    NA 15.6
## 157 16.14 13.1
## 158  4.59 41.3
## 159  6.43 24.3
## 160  7.39 23.3
## 161  5.50 27.0
## 162  1.73 50.0
## 163    NA 50.0
## 164  3.32 50.0
## 165 11.64 22.7
## 166  9.81 25.0
## 167  3.70 50.0
## 168    NA 23.8
## 169 11.10 23.8
## 170 11.32 22.3
## 171 14.43 17.4
## 172 12.03 19.1
## 173 14.69 23.1
## 174  9.04 23.6
## 175  9.64 22.6
## 176    NA 29.4
## 177 10.11 23.2
## 178  6.29 24.6
## 179  6.92 29.9
## 180  5.04 37.2
## 181  7.56 39.8
## 182    NA 36.2
## 183  4.82 37.9
## 184  5.68 32.5
## 185 13.98 26.4
## 186    NA 29.6
## 187  4.45 50.0
## 188    NA 32.0
## 189  4.56 29.8
## 190  5.39 34.9
## 191  5.10 37.0
```

```
## 192  4.69 30.5
## 193    NA   NA
## 194  5.03 31.1
## 195    NA 29.1
## 196  2.97 50.0
## 197    NA 33.3
## 198  8.61 30.3
## 199  6.62 34.6
## 200  4.56 34.9
## 201  4.45 32.9
## 202  7.43 24.1
## 203  3.11 42.3
## 204  3.81 48.5
## 205  2.88 50.0
## 206 10.87 22.6
## 207 10.97 24.4
## 208 18.06 22.5
## 209 14.66 24.4
## 210 23.09 20.0
## 211 17.27 21.7
## 212 23.98 19.3
## 213 16.03 22.4
## 214  9.38 28.1
## 215 29.55 23.7
## 216  9.47 25.0
## 217 13.51 23.3
## 218  9.69   NA
## 219    NA 21.5
## 220 10.50 23.0
## 221    NA 26.7
## 222 21.46 21.7
## 223  9.93 27.5
## 224  7.60 30.1
## 225  4.14   NA
## 226  4.63 50.0
## 227    NA 37.6
## 228  6.36 31.6
## 229  3.92 46.7
## 230  3.76 31.5
## 231    NA 24.3
## 232  5.25 31.7
## 233  2.47 41.7
## 234  3.95 48.3
## 235  8.05 29.0
## 236 10.88 24.0
## 237  9.54 25.1
## 238  4.73   NA
## 239  6.36 23.7
## 240  7.37 23.3
## 241 11.38 22.0
## 242    NA 20.1
## 243 11.22 22.2
## 244  5.19 23.7
## 245    NA 17.6
```

```
## 246 18.46 18.5
## 247    NA 24.3
## 248 10.15 20.5
## 249  9.52 24.5
## 250  6.56 26.2
## 251  5.90 24.4
## 252    NA 24.8
## 253  3.53 29.6
## 254  3.54 42.8
## 255  6.57 21.9
## 256  9.25 20.9
## 257  3.11 44.0
## 258  5.12 50.0
## 259  7.79 36.0
## 260  6.90   NA
## 261  9.59 33.8
## 262  7.26 43.1
## 263  5.91 48.8
## 264 11.25 31.0
## 265  8.10 36.5
## 266 10.45 22.8
## 267 14.79 30.7
## 268  7.44 50.0
## 269    NA 43.5
## 270 13.65   NA
## 271 13.00   NA
## 272  6.59 25.2
## 273  7.73 24.4
## 274  6.58 35.2
## 275  3.53 32.4
## 276  2.98 32.0
## 277  6.05 33.2
## 278  4.16 33.1
## 279  7.19 29.1
## 280  4.85 35.1
## 281  3.76 45.4
## 282  4.59 35.4
## 283  3.01 46.0
## 284  3.16 50.0
## 285  7.85 32.2
## 286    NA 22.0
## 287 12.93 20.1
## 288  7.14   NA
## 289  7.60 22.3
## 290  9.51 24.8
## 291  3.33   NA
## 292  3.56 37.3
## 293  4.70 27.9
## 294  8.58 23.9
## 295 10.40 21.7
## 296  6.27 28.6
## 297  7.39 27.1
## 298 15.84 20.3
## 299  4.97 22.5
```

```
## 300    NA 29.0
## 301  6.07 24.8
## 302  9.50 22.0
## 303  8.67 26.4
## 304  4.86 33.1
## 305  6.93 36.1
## 306    NA 28.4
## 307  6.47 33.4
## 308  7.53 28.2
## 309  4.54 22.8
## 310  9.97 20.3
## 311 12.64 16.1
## 312  5.98 22.1
## 313 11.72 19.4
## 314  7.90   NA
## 315    NA 23.8
## 316 11.50   NA
## 317 18.33 17.8
## 318 15.94 19.8
## 319 10.36 23.1
## 320 12.73 21.0
## 321  7.20 23.8
## 322  6.87 23.1
## 323  7.70 20.4
## 324 11.74 18.5
## 325  6.12 25.0
## 326  5.08   NA
## 327  6.15 23.0
## 328 12.79 22.2
## 329  9.97   NA
## 330  7.34 22.6
## 331  9.09 19.8
## 332 12.43   NA
## 333  7.83 19.4
## 334  5.68 22.2
## 335  6.75   NA
## 336  8.01 21.1
## 337  9.80 19.5
## 338 10.56 18.5
## 339  8.51 20.6
## 340  9.74 19.0
## 341  9.29 18.7
## 342  5.49 32.7
## 343  8.65   NA
## 344  7.18 23.9
## 345  4.61 31.2
## 346 10.53 17.5
## 347    NA 17.2
## 348  6.36 23.1
## 349  5.99 24.5
## 350  5.89 26.6
## 351  5.98 22.9
## 352  5.49 24.1
## 353  7.79 18.6
```

```
## 354  4.50 30.1
## 355    NA 18.2
## 356    NA 20.6
## 357 17.60 17.8
## 358 13.27 21.7
## 359 11.48 22.7
## 360    NA 22.6
## 361  7.79 25.0
## 362 14.19 19.9
## 363 10.19 20.8
## 364 14.64 16.8
## 365  5.29 21.9
## 366  7.12 27.5
## 367 14.00 21.9
## 368 13.33   NA
## 369  3.26 50.0
## 370  3.73 50.0
## 371  2.96 50.0
## 372  9.53 50.0
## 373    NA   NA
## 374 34.77 13.8
## 375 37.97 13.8
## 376 13.44 15.0
## 377    NA 13.9
## 378 21.24   NA
## 379 23.69 13.1
## 380 21.78 10.2
## 381 17.21 10.4
## 382 21.08 10.9
## 383 23.60 11.3
## 384 24.56   NA
## 385 30.63  8.8
## 386 30.81  7.2
## 387 28.28 10.5
## 388 31.99  7.4
## 389 30.62 10.2
## 390 20.85 11.5
## 391 17.11   NA
## 392 18.76 23.2
## 393 25.68  9.7
## 394 15.17 13.8
## 395 16.35 12.7
## 396 17.12 13.1
## 397 19.37 12.5
## 398 19.92  8.5
## 399 30.59  5.0
## 400 29.97  6.3
## 401 26.77  5.6
## 402 20.32  7.2
## 403 20.31 12.1
## 404 19.77  8.3
## 405 27.38  8.5
## 406    NA  5.0
## 407 23.34 11.9
```

```
## 408 12.13 27.9
## 409 26.40 17.2
## 410 19.78 27.5
## 411 10.11 15.0
## 412    NA 17.2
## 413 34.37 17.9
## 414 20.08 16.3
## 415 36.98  7.0
## 416 29.05  7.2
## 417 25.79   NA
## 418 26.64   NA
## 419 20.62  8.8
## 420 22.74  8.4
## 421 15.02 16.7
## 422 15.70   NA
## 423 14.10 20.8
## 424 23.29 13.4
## 425 17.16 11.7
## 426 24.39  8.3
## 427 15.69 10.2
## 428 14.52   NA
## 429 21.52 11.0
## 430 24.08  9.5
## 431 17.64 14.5
## 432 19.69   NA
## 433 12.03 16.1
## 434 16.22 14.3
## 435 15.17 11.7
## 436 23.27 13.4
## 437 18.05  9.6
## 438 26.45  8.7
## 439 34.02  8.4
## 440 22.88 12.8
## 441 22.11 10.5
## 442 19.52 17.1
## 443 16.59 18.4
## 444 18.85 15.4
## 445 23.79 10.8
## 446 23.98 11.8
## 447 17.79 14.9
## 448 16.44   NA
## 449 18.13 14.1
## 450    NA 13.0
## 451 17.44 13.4
## 452 17.73 15.2
## 453 17.27 16.1
## 454 16.74 17.8
## 455 18.71 14.9
## 456    NA 14.1
## 457 19.01 12.7
## 458    NA 13.5
## 459    NA 14.9
## 460 14.70 20.0
## 461 16.42 16.4
```

```
## 462 14.65 17.7
## 463 13.99 19.5
## 464    NA 20.2
## 465 13.22 21.4
## 466 14.13 19.9
## 467 17.15 19.0
## 468 21.32 19.1
## 469 18.13 19.1
## 470    NA 20.1
## 471 16.29 19.9
## 472 12.87 19.6
## 473 14.36 23.2
## 474 11.66   NA
## 475 18.14 13.8
## 476    NA 13.3
## 477 18.68   NA
## 478 24.91 12.0
## 479 18.03 14.6
## 480 13.11 21.4
## 481    NA 23.0
## 482  7.74 23.7
## 483  7.01 25.0
## 484 10.42   NA
## 485    NA 20.6
## 486 10.58 21.2
## 487 14.98 19.1
## 488 11.45 20.6
## 489 18.06 15.2
## 490 23.97  7.0
## 491 29.68  8.1
## 492    NA 13.6
## 493 13.35 20.1
## 494 12.01 21.8
## 495 13.59 24.5
## 496    NA 23.1
## 497    NA 19.7
## 498 14.10 18.3
## 499 12.92 21.2
## 500 15.10 17.5
## 501 14.33   NA
## 502  9.67 22.4
## 503  9.08 20.6
## 504  5.64   NA
## 505  6.48 22.0
## 506  7.88 11.9
```

Use a random forest modeling procedure to iteratively fill in the `NA`'s by predicting each feature of X using every other feature of X. You need to start by filling in the holes to use RF. So fill them in with the average of the feature.

```
pacman::p_load(randomForest)
library(tidyr)
```

```
## Warning: package 'tidyr' was built under R version 4.0.4
```

```
X = Boston
X = data.frame(punching(0.1, X)) # 10% of the values of the data is NA
```

```
## Warning in matrix(nrow = n, ncol = p, sample(c(rep(0, n * p * (1 -
## prob_missing)), : data length [7083] is not a sub-multiple or multiple of the
## number of rows [506]
```

```
n = nrow(X)
p = ncol(X)



for(i in 1:n){
  for(j in 1:p){
    if(is.na(X[i,j])){
      # Replacing NA values with column means
      X_naive = X %>%
 replace_na(as.list(colMeans(X, na.rm = TRUE)))

      # Initialize random forest model
      rf_mod = randomForest(X_naive[,j] ~ ., data = X_naive, ntree = 100)

      # Setting the value at X[i,j] to be the prediction
      X[i,j] = predict(rf_mod, X_naive[i,])
    }
  }
}
```

```
## Warning in randomForest.default(m, y, ...): The response has five or fewer
## unique values. Are you sure you want to do regression?

## Warning in randomForest.default(m, y, ...): The response has five or fewer
## unique values. Are you sure you want to do regression?

## Warning in randomForest.default(m, y, ...): The response has five or fewer
## unique values. Are you sure you want to do regression?
```

```
X
```

```
##          crim        zn     indus       chas       nox       rm       age
## 1    0.006320  18.00000  2.310000 0.06757174 0.5380000 6.575000  65.20000
## 2    0.027310   0.00000  7.070000 0.00000000 0.4690000 6.421000  78.90000
## 3    0.027290   0.00000 10.969586 0.06614767 0.5475630 7.185000  61.10000
## 4    0.032370   0.00000 10.990846 0.06067824 0.4580000 6.998000  45.80000
## 5    0.069050   0.00000  2.180000 0.00000000 0.4580000 7.147000  54.20000
## 6    0.029850   0.00000 11.095366 0.00000000 0.4580000 6.430000  58.70000
## 7    0.088290  12.50000  7.870000 0.00000000 0.5240000 6.012000  66.60000
## 8    0.144550  12.50000  7.870000 0.00000000 0.5240000 6.281943  96.10000
## 9    0.211240  12.50000 10.870225 0.00000000 0.5240000 5.631000 100.00000
## 10   0.170040  12.50000  7.870000 0.00000000 0.5240000 6.004000  85.90000
## 11   3.564132  12.50000  7.870000 0.00000000 0.5240000 6.377000  70.98378
## 12   0.117470  12.50000  7.870000 0.00000000 0.5240000 6.009000  82.90000
```

```
## 13   0.093780  12.50000  7.870000 0.00000000 0.5240000 6.278016  39.00000
## 14   0.629760   0.00000  8.140000 0.00000000 0.5380000 5.949000  69.62569
## 15   0.637960   0.00000  8.140000 0.00000000 0.5380000 6.096000  84.50000
## 16   0.627390  11.33748  8.140000 0.00000000 0.5380000 5.834000  56.50000
## 17   1.053930   0.00000  8.140000 0.00000000 0.5380000 5.935000  69.02626
## 18   0.784200   0.00000 10.810641 0.00000000 0.5380000 5.990000  70.51500
## 19   0.802710   0.00000  8.140000 0.00000000 0.5380000 5.456000  36.60000
## 20   0.725800   0.00000  8.140000 0.00000000 0.5380000 5.727000  69.50000
## 21   1.251790   0.00000  8.140000 0.00000000 0.5380000 5.570000  98.10000
## 22   0.852040   0.00000  8.140000 0.00000000 0.5380000 5.965000  69.50192
## 23   1.232470   0.00000  8.140000 0.00000000 0.5380000 6.278738  72.14711
## 24   0.988430   0.00000  8.140000 0.00000000 0.5380000 5.813000 100.00000
## 25   0.750260   0.00000 10.810280 0.00000000 0.5380000 5.924000  94.10000
## 26   0.840540  11.05013 10.917393 0.00000000 0.5519634 5.599000  70.88985
## 27   0.671910   0.00000  8.140000 0.00000000 0.5501323 5.813000  90.30000
## 28   0.955770   0.00000  8.140000 0.06180140 0.5380000 6.266108  88.80000
## 29   0.772990   0.00000  8.140000 0.00000000 0.5380000 6.495000  94.40000
## 30   1.002450   0.00000  8.140000 0.00000000 0.5521281 6.276970  69.77052
## 31   1.130810   0.00000  8.140000 0.00000000 0.5516324 6.246203  94.10000
## 32   1.354720   0.00000  8.140000 0.00000000 0.5380000 6.072000 100.00000
## 33   1.387990   0.00000  8.140000 0.00000000 0.5380000 5.950000  82.00000
## 34   1.151720   0.00000  8.140000 0.00000000 0.5380000 6.275736  69.42394
## 35   1.612820   0.00000 10.840993 0.00000000 0.5380000 6.096000  96.90000
## 36   0.064170   0.00000  5.960000 0.00000000 0.4990000 6.282191  68.20000
## 37   0.097440   0.00000  5.960000 0.00000000 0.4990000 5.841000  61.40000
## 38   0.080140   0.00000  5.960000 0.00000000 0.4990000 5.850000  41.50000
## 39   0.175050   0.00000  5.960000 0.00000000 0.4990000 5.966000  30.20000
## 40   0.027630  75.00000  2.950000 0.06036373 0.4280000 6.595000  21.80000
## 41   0.033590  75.00000  2.950000 0.00000000 0.4280000 6.360081  15.80000
## 42   0.127440   0.00000  6.910000 0.00000000 0.4480000 6.770000   2.90000
## 43   0.141500   0.00000  6.910000 0.06938635 0.4480000 6.169000   6.60000
## 44   0.159360   0.00000  6.910000 0.00000000 0.4480000 6.211000   6.50000
## 45   0.122690   0.00000  6.910000 0.00000000 0.4480000 6.069000  40.00000
## 46   0.171420   0.00000 10.868807 0.00000000 0.4480000 5.682000  33.80000
## 47   0.188360   0.00000  6.910000 0.00000000 0.4480000 5.786000  33.30000
## 48   0.229270  11.66188  6.910000 0.00000000 0.4480000 6.030000  85.50000
## 49   0.253870   0.00000 10.719488 0.00000000 0.4480000 5.399000  95.30000
## 50   0.219770   0.00000  6.910000 0.06015651 0.4480000 5.602000  62.00000
## 51   0.088730  21.00000 10.862732 0.06766523 0.4390000 5.963000  45.70000
## 52   0.043370  21.00000  5.640000 0.00000000 0.4390000 6.115000  63.00000
## 53   0.053600  21.00000  5.640000 0.00000000 0.4390000 6.511000  21.10000
## 54   0.049810  13.43189  5.640000 0.00000000 0.4390000 5.998000  21.40000
## 55   0.013600  18.48211  4.000000 0.05855800 0.4100000 6.275445  47.60000
## 56   0.013110  90.00000  1.220000 0.00000000 0.4030000 7.249000  21.90000
## 57   3.423651  85.00000  0.740000 0.00000000 0.4100000 6.383000  35.70000
## 58   0.014320 100.00000  1.320000 0.00000000 0.4110000 6.816000  40.50000
## 59   0.154450  25.00000  5.130000 0.00000000 0.4530000 6.145000  67.05695
## 60   3.586534  11.68915 10.664797 0.06356479 0.4530000 5.927000  47.20000
## 61   0.149320  25.00000  5.130000 0.00000000 0.4530000 5.741000  66.20000
## 62   0.171710  25.00000  5.130000 0.00000000 0.4530000 5.966000  93.40000
## 63   3.546252  25.00000  5.130000 0.06113144 0.4530000 6.456000  67.80000
## 64   0.126500  25.00000  5.130000 0.00000000 0.4530000 6.762000  67.39265
## 65   0.019510  17.50000  1.380000 0.07782649 0.4161000 7.104000  64.05412
## 66   0.035840  80.00000  3.370000 0.00000000 0.3980000 6.290000  17.80000
```

```
## 67   0.043790  80.00000  3.370000 0.00000000 0.3980000 5.787000  31.10000
## 68   0.057890  12.50000  6.070000 0.00000000 0.4090000 5.878000  21.40000
## 69   0.135540  12.50000  6.070000 0.00000000 0.4090000 5.594000  36.80000
## 70   0.128160  12.50000  6.070000 0.00000000 0.4090000 6.274183  33.00000
## 71   0.088260   0.00000 10.810000 0.00000000 0.4130000 6.417000  66.70107
## 72   0.158760   0.00000 10.810000 0.00000000 0.4130000 5.961000  17.50000
## 73   0.091640   0.00000 10.810000 0.00000000 0.4130000 6.065000  64.50591
## 74   0.195390   0.00000 10.810000 0.00000000 0.4130000 6.245000   6.20000
## 75   0.078960   0.00000 12.830000 0.00000000 0.4370000 6.273000   6.00000
## 76   0.095120   0.00000 12.830000 0.00000000 0.4370000 6.286000  45.00000
## 77   0.101530   0.00000 12.830000 0.00000000 0.4370000 6.279000  74.50000
## 78   0.087070  11.09680 12.830000 0.00000000 0.4370000 6.272937  45.80000
## 79   0.056460   0.00000 12.830000 0.00000000 0.4370000 6.232000  53.70000
## 80   0.083870   0.00000 12.830000 0.00000000 0.4370000 5.874000  36.60000
## 81   0.041130  12.37042 10.388771 0.00000000 0.5443357 6.727000  33.50000
## 82   3.578138  25.00000  4.860000 0.00000000 0.4260000 6.295471  70.40000
## 83   0.036590  25.00000  4.860000 0.00000000 0.4260000 6.302000  32.20000
## 84   0.035510  14.19611  4.860000 0.00000000 0.4260000 6.167000  46.70000
## 85   0.050590   0.00000  4.490000 0.00000000 0.4490000 6.389000  48.00000
## 86   0.057350   0.00000  4.490000 0.00000000 0.4490000 6.630000  66.22317
## 87   0.051880  12.13085  4.490000 0.00000000 0.5408108 6.015000  45.10000
## 88   0.071510   0.00000  4.490000 0.00000000 0.4490000 6.121000  56.80000
## 89   0.056600   0.00000  3.410000 0.00000000 0.4890000 7.007000  86.30000
## 90   0.053020   0.00000  3.410000 0.06368936 0.4890000 7.079000  63.10000
## 91   0.046840   0.00000  3.410000 0.00000000 0.4890000 6.417000  66.10000
## 92   0.039320   0.00000  3.410000 0.00000000 0.4890000 6.405000  67.81578
## 93   3.612259  28.00000 15.040000 0.00000000 0.4640000 6.290050  53.60000
## 94   0.028750  15.53131 15.040000 0.00000000 0.4640000 6.211000  28.90000
## 95   3.699710  28.00000 15.040000 0.07170008 0.4640000 6.249000  77.30000
## 96   0.122040   0.00000  2.890000 0.00000000 0.4450000 6.625000  57.80000
## 97   0.115040   0.00000  2.890000 0.00000000 0.4450000 6.163000  69.60000
## 98   0.120830   0.00000 10.533903 0.00000000 0.4450000 6.334506  76.00000
## 99   3.670898   0.00000  2.890000 0.00000000 0.4450000 7.820000  36.90000
## 100  0.068600   0.00000  2.890000 0.00000000 0.4450000 6.279223  62.50000
## 101  0.148660   0.00000  8.560000 0.06906168 0.5200000 6.727000  79.90000
## 102  0.114320   0.00000  8.560000 0.00000000 0.5200000 6.781000  71.30000
## 103  0.228760  11.07842  8.560000 0.00000000 0.5200000 6.405000  85.40000
## 104  0.211610   0.00000  8.560000 0.00000000 0.5200000 6.137000  87.40000
## 105  0.139600   0.00000  8.560000 0.00000000 0.5200000 6.167000  90.00000
## 106  0.132620   0.00000  8.560000 0.00000000 0.5573716 5.851000  96.70000
## 107  0.171200   0.00000  8.560000 0.00000000 0.5200000 6.273690  91.90000
## 108  0.131170   0.00000  8.560000 0.00000000 0.5200000 6.127000  71.48891
## 109  0.128020   0.00000 10.854652 0.00000000 0.5200000 6.275084  97.10000
## 110  0.263630   0.00000  8.560000 0.00000000 0.5200000 6.229000  91.20000
## 111  0.107930   0.00000  8.560000 0.00000000 0.5517252 6.195000  54.40000
## 112  0.100840   0.00000 10.010000 0.00000000 0.5470000 6.274839  81.60000
## 113  0.123290   0.00000 10.010000 0.00000000 0.5470000 6.284478  92.90000
## 114  0.222120   0.00000 10.010000 0.00000000 0.5470000 6.092000  71.19186
## 115  0.142310   0.00000 10.010000 0.00000000 0.5544661 6.254000  84.20000
## 116  0.171340   0.00000 10.010000 0.00000000 0.5470000 5.928000  88.20000
## 117  0.131580   0.00000 10.010000 0.00000000 0.5470000 6.176000  72.50000
## 118  0.150980   0.00000 10.010000 0.06074731 0.5470000 6.021000  82.60000
## 119  0.130580   0.00000 10.010000 0.00000000 0.5470000 5.872000  73.10000
## 120  0.144760   0.00000 10.010000 0.00000000 0.5470000 5.731000  65.20000
```

```
## 121  0.068990   0.00000 25.650000 0.00000000 0.5810000 5.870000  68.89132
## 122  0.071650   0.00000 25.650000 0.00000000 0.5810000 6.004000  84.10000
## 123  0.092990   0.00000 12.432163 0.07207719 0.5810000 5.961000  92.90000
## 124  3.483388   0.00000 25.650000 0.00000000 0.5810000 5.856000  97.00000
## 125  0.098490   0.00000 25.650000 0.00000000 0.5810000 5.879000  95.80000
## 126  0.169020   0.00000 25.650000 0.00000000 0.5810000 5.986000  88.40000
## 127  0.387350  11.32436 25.650000 0.06520405 0.5810000 6.266335  70.86059
## 128  0.259150   0.00000 21.890000 0.00000000 0.6240000 5.693000  96.00000
## 129  0.325430   0.00000 21.890000 0.00000000 0.6240000 6.431000  98.80000
## 130  0.881250   0.00000 21.890000 0.00000000 0.6240000 5.637000  94.70000
## 131  0.340060   0.00000 11.960293 0.00000000 0.6240000 6.458000  98.90000
## 132  1.192940   0.00000 21.890000 0.00000000 0.6240000 6.326000  97.70000
## 133  0.590050   0.00000 21.890000 0.00000000 0.5670708 6.292386  97.90000
## 134  0.329820   0.00000 21.890000 0.00000000 0.6240000 5.822000  70.03184
## 135  0.976170   0.00000 21.890000 0.00000000 0.6240000 5.757000  98.40000
## 136  3.373706   0.00000 21.890000 0.00000000 0.6240000 6.335000  98.20000
## 137  0.322640   0.00000 21.890000 0.00000000 0.5638575 6.284370  93.50000
## 138  0.352330   0.00000 21.890000 0.00000000 0.6240000 6.454000  98.40000
## 139  0.249800   0.00000 21.890000 0.00000000 0.6240000 5.857000  98.20000
## 140  0.544520   0.00000 21.890000 0.00000000 0.6240000 6.151000  97.90000
## 141  0.290900   0.00000 21.890000 0.00000000 0.6240000 6.174000  93.60000
## 142  1.628640   0.00000 11.491787 0.00000000 0.6240000 5.019000 100.00000
## 143  3.321050   0.00000 19.580000 0.06015347 0.8710000 5.403000 100.00000
## 144  4.097400   0.00000 19.580000 0.00000000 0.8710000 5.468000 100.00000
## 145  2.779740   0.00000 19.580000 0.07600862 0.8710000 4.903000  97.80000
## 146  2.379340   0.00000 19.580000 0.00000000 0.5726517 6.130000 100.00000
## 147  2.155050   0.00000 11.116283 0.00000000 0.8710000 5.628000 100.00000
## 148  3.699717   0.00000 19.580000 0.00000000 0.8710000 4.926000  95.70000
## 149  2.330990  11.11732 19.580000 0.00000000 0.8710000 5.186000  93.80000
## 150  2.733970   0.00000 19.580000 0.00000000 0.5894637 5.597000  94.90000
## 151  1.656600   0.00000 19.580000 0.00000000 0.8710000 6.122000  97.30000
## 152  1.496320  11.00004 11.156156 0.00000000 0.8710000 5.404000 100.00000
## 153  3.527584   0.00000 19.580000 0.07693441 0.8710000 5.012000  88.00000
## 154  2.149180   0.00000 19.580000 0.00000000 0.8710000 5.709000  71.58422
## 155  3.532928   0.00000 19.580000 1.00000000 0.8710000 6.129000  96.00000
## 156  3.535010   0.00000 19.580000 1.00000000 0.8710000 6.206697  71.52858
## 157  2.446680   0.00000 19.580000 0.00000000 0.8710000 5.272000  94.00000
## 158  1.223580   0.00000 19.580000 0.00000000 0.6050000 6.943000  71.22001
## 159  1.342840   0.00000 19.580000 0.00000000 0.6050000 6.066000 100.00000
## 160  1.425020   0.00000 11.061639 0.00000000 0.8710000 6.182280  70.08694
## 161  1.273460   0.00000 11.637396 1.00000000 0.6050000 6.250000  92.60000
## 162  1.463360   0.00000 19.580000 0.00000000 0.6050000 7.489000  90.80000
## 163  1.833770   0.00000 11.326349 0.07926094 0.6050000 7.802000  98.20000
## 164  1.519020   0.00000 19.580000 1.00000000 0.5549867 8.375000  93.90000
## 165  2.242360   0.00000 19.580000 0.07570511 0.6050000 5.854000  91.80000
## 166  2.924000   0.00000 19.580000 0.00000000 0.5689968 6.101000  93.00000
## 167  2.010190   0.00000 19.580000 0.00000000 0.6050000 7.929000  96.20000
## 168  1.800280   0.00000 19.580000 0.00000000 0.6050000 5.877000  79.20000
## 169  2.300400   0.00000 19.580000 0.00000000 0.6050000 6.319000  96.10000
## 170  2.449530   0.00000 19.580000 0.00000000 0.6050000 6.402000  95.20000
## 171  3.668003   0.00000 19.580000 0.00000000 0.6050000 5.875000  94.60000
## 172  2.313900   0.00000 19.580000 0.00000000 0.6050000 6.273152  70.44081
## 173  3.604897   0.00000  4.050000 0.00000000 0.5100000 5.572000  88.50000
## 174  3.605920   0.00000  4.050000 0.00000000 0.5100000 6.416000  84.10000
```

```
## 175  0.084470   0.00000  4.050000 0.00000000 0.5100000 5.859000  68.70000
## 176  0.066640   0.00000  4.050000 0.00000000 0.5100000 6.546000  33.10000
## 177  0.070220   0.00000  4.050000 0.00000000 0.5100000 6.020000  67.85150
## 178  0.054250   0.00000  4.050000 0.00000000 0.5100000 6.315000  68.01875
## 179  0.066420   0.00000  4.050000 0.06305185 0.5100000 6.860000  74.40000
## 180  0.057800   0.00000  2.460000 0.00000000 0.4880000 6.980000  69.28648
## 181  0.065880   0.00000  2.460000 0.00000000 0.4880000 6.322413  69.25357
## 182  0.068880   0.00000  2.460000 0.00000000 0.4880000 6.144000  62.20000
## 183  0.091030   0.00000  2.460000 0.00000000 0.4880000 7.155000  92.20000
## 184  3.525399   0.00000 10.625002 0.00000000 0.4880000 6.563000  95.60000
## 185  0.083080   0.00000  2.460000 0.00000000 0.4880000 5.604000  89.80000
## 186  0.060470   0.00000  2.460000 0.00000000 0.4880000 6.153000  68.80000
## 187  0.056020   0.00000 10.856694 0.00000000 0.4880000 7.831000  53.60000
## 188  0.078750  13.13966  3.440000 0.00000000 0.4370000 6.782000  41.10000
## 189  0.125790  45.00000  3.440000 0.00000000 0.4370000 6.556000  29.10000
## 190  0.083700  45.00000  3.440000 0.00000000 0.4370000 6.374535  38.90000
## 191  0.090680  14.27467  3.440000 0.00000000 0.4370000 6.951000  66.98990
## 192  0.069110  45.00000  3.440000 0.00000000 0.4370000 6.739000  30.80000
## 193  0.086640  45.00000  3.440000 0.00000000 0.4370000 7.178000  26.30000
## 194  0.021870  60.00000  9.945881 0.00000000 0.4010000 6.800000   9.90000
## 195  0.014390  18.27346  2.930000 0.06205481 0.4010000 6.604000  66.65882
## 196  0.013810  80.00000  0.460000 0.00000000 0.4220000 6.474049  32.00000
## 197  0.040110  80.00000  1.520000 0.00000000 0.4040000 7.287000  34.10000
## 198  3.551161  80.00000  1.520000 0.00000000 0.4040000 7.107000  65.24398
## 199  0.037680  80.00000 10.004460 0.00000000 0.4040000 7.274000  38.30000
## 200  0.031500  95.00000 10.227976 0.00000000 0.4030000 6.975000  15.30000
## 201  0.017780  95.00000  1.470000 0.00000000 0.4030000 7.135000  13.90000
## 202  0.034450  82.50000  2.030000 0.00000000 0.4150000 6.162000  38.40000
## 203  0.021770  21.11787  2.030000 0.00000000 0.4150000 7.610000  65.87452
## 204  0.035100  95.00000  2.680000 0.00000000 0.5419967 7.853000  33.20000
## 205  0.020090  95.00000  2.680000 0.00000000 0.4161000 8.034000  31.90000
## 206  0.136420   0.00000 11.027266 0.00000000 0.4890000 5.891000  22.30000
## 207  0.229690   0.00000 10.590000 0.00000000 0.4890000 6.326000  52.50000
## 208  0.251990   0.00000 10.590000 0.00000000 0.4890000 5.783000  72.70000
## 209  0.135870   0.00000 10.943501 1.00000000 0.4890000 6.064000  59.10000
## 210  3.575246   0.00000 10.590000 1.00000000 0.4890000 6.286726 100.00000
## 211  0.174460   0.00000 10.590000 1.00000000 0.4890000 5.960000  92.10000
## 212  0.375780   0.00000 10.590000 1.00000000 0.5489126 5.404000  88.60000
## 213  0.217190   0.00000 10.590000 1.00000000 0.4890000 5.807000  53.80000
## 214  0.140520  10.65052 10.590000 0.00000000 0.4890000 6.375000  32.30000
## 215  0.289550   0.00000 10.590000 0.00000000 0.4890000 5.412000   9.80000
## 216  0.198020   0.00000 10.590000 0.06271074 0.4890000 6.182000  67.97771
## 217  0.045600   0.00000 13.890000 1.00000000 0.5500000 5.888000  68.92788
## 218  0.070130   0.00000 13.890000 0.00000000 0.5500000 6.642000  85.10000
## 219  0.110690   0.00000 13.890000 1.00000000 0.5500000 5.951000  93.80000
## 220  0.114250   0.00000 13.890000 0.06366971 0.5500000 6.267389  92.40000
## 221  0.358090   0.00000  6.200000 1.00000000 0.5070000 6.951000  88.50000
## 222  0.407710   0.00000  6.200000 1.00000000 0.5070000 6.164000  91.30000
## 223  0.623560   0.00000 10.773548 1.00000000 0.5070000 6.879000  77.70000
## 224  0.614700   0.00000  6.200000 0.00000000 0.5070000 6.618000  80.80000
## 225  0.315330   0.00000  6.200000 0.00000000 0.5040000 8.266000  78.30000
## 226  0.526930   0.00000  6.200000 0.00000000 0.5040000 6.447046  83.00000
## 227  0.382140   0.00000  6.200000 0.00000000 0.5040000 8.040000  68.62764
## 228  0.412380   0.00000  6.200000 0.06883026 0.5040000 6.367563  79.90000
```

```
## 229  0.298190  12.45839  6.200000 0.00000000 0.5040000 7.686000  17.00000
## 230  0.441780   0.00000  6.200000 0.00000000 0.5040000 6.552000  21.40000
## 231  0.537000   0.00000  6.200000 0.00000000 0.5040000 6.293271  68.10000
## 232  0.462960   0.00000  6.200000 0.00000000 0.5040000 7.412000  76.90000
## 233  0.575290   0.00000 10.698280 0.00000000 0.5070000 8.337000  73.30000
## 234  0.331470   0.00000  6.200000 0.00000000 0.5070000 8.247000  70.40000
## 235  3.578670   0.00000  6.200000 1.00000000 0.5070000 6.726000  66.50000
## 236  3.681810  11.70500  6.200000 0.00000000 0.5070000 6.086000  61.50000
## 237  0.520580   0.00000  6.200000 1.00000000 0.5070000 6.631000  76.50000
## 238  0.511830  11.33469  6.200000 0.00000000 0.5070000 7.358000  71.60000
## 239  0.082440  30.00000  4.930000 0.05582029 0.4280000 6.481000  18.50000
## 240  3.634169  30.00000  4.930000 0.00000000 0.4280000 6.606000  42.20000
## 241  0.113290  30.00000  4.930000 0.00000000 0.4280000 6.897000  54.30000
## 242  0.106120  30.00000  4.930000 0.00000000 0.4280000 6.095000  67.13159
## 243  0.102900  30.00000  4.930000 0.00000000 0.4280000 6.358000  52.90000
## 244  0.127570  30.00000  4.930000 0.00000000 0.5370860 6.393000   7.80000
## 245  0.206080  22.00000  5.860000 0.00000000 0.4310000 5.593000  76.50000
## 246  0.191330  22.00000  5.860000 0.00000000 0.4310000 5.605000  69.28435
## 247  0.339830  12.84862  5.860000 0.00000000 0.5472711 6.108000  34.90000
## 248  0.196570  22.00000  5.860000 0.00000000 0.4310000 6.226000  79.20000
## 249  0.164390  22.00000  5.860000 0.00000000 0.4310000 6.433000  49.10000
## 250  0.190730  22.00000  5.860000 0.00000000 0.4310000 6.718000  66.99669
## 251  0.140300  22.00000  5.860000 0.00000000 0.4310000 6.487000  13.00000
## 252  0.214090  22.00000  5.860000 0.00000000 0.4310000 6.438000   8.90000
## 253  0.082210  22.00000  5.860000 0.00000000 0.4310000 6.957000   6.80000
## 254  0.368940  22.00000  5.860000 0.00000000 0.4310000 8.259000   8.40000
## 255  0.048190  80.00000  3.640000 0.06112200 0.3920000 6.108000  32.00000
## 256  0.035480  80.00000  3.640000 0.00000000 0.3920000 5.876000  19.10000
## 257  0.015380  90.00000  3.750000 0.00000000 0.3940000 7.454000  63.49677
## 258  0.611540  20.00000  3.970000 0.00000000 0.6470000 8.704000  86.90000
## 259  3.261458  20.00000  3.970000 0.00000000 0.6470000 7.333000 100.00000
## 260  0.656650  20.00000  3.970000 0.00000000 0.6470000 6.842000 100.00000
## 261  0.540110  13.48467  3.970000 0.00000000 0.6470000 7.203000  81.80000
## 262  0.534120  13.43827  3.970000 0.00000000 0.6470000 7.520000  89.40000
## 263  0.520140  20.00000  3.970000 0.13671557 0.6470000 8.398000  91.50000
## 264  0.825260  20.00000  3.970000 0.00000000 0.6470000 7.327000  94.50000
## 265  0.550070  20.00000  3.970000 0.00000000 0.6470000 7.206000  91.60000
## 266  3.492009  20.00000 10.878420 0.00000000 0.6470000 5.560000  62.80000
## 267  0.785700  20.00000  3.970000 0.00000000 0.6470000 7.014000  84.60000
## 268  0.578340  20.00000 10.205699 0.00000000 0.5750000 8.297000  67.00000
## 269  0.540500  20.00000 10.850419 0.00000000 0.5750000 6.365995  52.60000
## 270  0.090650  20.00000  6.960000 1.00000000 0.4640000 5.920000  61.50000
## 271  0.299160  20.00000  6.960000 0.00000000 0.4640000 5.856000  42.10000
## 272  0.162110  20.00000  6.960000 0.00000000 0.5441377 6.240000  16.30000
## 273  0.114600  20.00000 10.482132 0.00000000 0.4640000 6.538000  58.70000
## 274  0.221880  20.00000  6.960000 1.00000000 0.5468793 7.691000  51.80000
## 275  0.056440  40.00000  6.410000 1.00000000 0.4470000 6.758000  32.90000
## 276  0.096040  40.00000  6.410000 0.00000000 0.4470000 6.854000  42.80000
## 277  0.104690  40.00000  6.410000 1.00000000 0.4470000 6.377027  49.00000
## 278  0.061270  40.00000  6.410000 0.08466786 0.4470000 6.826000  27.60000
## 279  3.501698  40.00000  6.410000 0.00000000 0.4470000 6.482000  32.10000
## 280  0.210380  20.00000  3.330000 0.00000000 0.4429000 6.812000  32.20000
## 281  0.035780  20.00000  3.330000 0.06786875 0.4429000 7.820000  64.50000
## 282  0.037050  20.00000  3.330000 0.00000000 0.4429000 6.968000  37.20000
```

```
## 283  0.061290  20.00000  3.330000 1.00000000 0.4429000 7.645000  49.70000
## 284  0.015010  90.00000  1.210000 1.00000000 0.4010000 7.923000  24.80000
## 285  0.009060  90.00000  2.970000 0.00000000 0.4000000 7.088000  20.80000
## 286  0.010960  55.00000  2.250000 0.00000000 0.3890000 6.453000  31.90000
## 287  0.019650  80.00000  1.760000 0.00000000 0.3850000 6.285836  66.50338
## 288  0.038710  52.50000  5.320000 0.00000000 0.4050000 6.209000  65.77592
## 289  0.045900  52.50000  5.320000 0.05808891 0.4050000 6.315000  45.60000
## 290  0.042970  52.50000  5.320000 0.00000000 0.4050000 6.565000  22.90000
## 291  0.035020  80.00000  4.950000 0.00000000 0.4110000 6.861000  27.90000
## 292  0.078860  80.00000  4.950000 0.00000000 0.4110000 7.148000  27.70000
## 293  0.036150  80.00000  4.950000 0.00000000 0.4110000 6.630000  23.40000
## 294  0.082650   0.00000 13.920000 0.00000000 0.4370000 6.127000  66.86589
## 295  0.081990   0.00000 13.920000 0.00000000 0.4370000 6.009000  42.30000
## 296  0.129320   0.00000 13.920000 0.00000000 0.5430697 6.678000  31.10000
## 297  0.053720   0.00000 13.920000 0.00000000 0.4370000 6.549000  51.00000
## 298  0.141030   0.00000 13.920000 0.00000000 0.4370000 5.790000  58.00000
## 299  0.064660  70.00000  2.240000 0.00000000 0.5351099 6.345000  20.10000
## 300  3.558445  70.00000  2.240000 0.00000000 0.4000000 7.041000  10.00000
## 301  3.489088  70.00000  2.240000 0.00000000 0.4000000 6.871000  47.40000
## 302  0.035370  34.00000 10.427210 0.00000000 0.5391130 6.590000  40.40000
## 303  0.092660  34.00000  6.090000 0.00000000 0.4330000 6.495000  18.40000
## 304  0.100000  34.00000  6.090000 0.00000000 0.5443609 6.982000  17.70000
## 305  0.055150  33.00000  2.180000 0.00000000 0.5406495 7.236000  41.10000
## 306  0.054790  33.00000  2.180000 0.00000000 0.4720000 6.616000  68.32998
## 307  0.075030  33.00000 10.350875 0.00000000 0.4720000 7.420000  71.90000
## 308  0.049320  33.00000  2.180000 0.00000000 0.4720000 6.849000  70.30000
## 309  3.539564   0.00000  9.900000 0.00000000 0.5440000 6.635000  68.45103
## 310  0.349400   0.00000  9.900000 0.00000000 0.5440000 5.972000  76.70000
## 311  2.635480   0.00000  9.900000 0.00000000 0.5440000 6.265483  37.80000
## 312  0.790410   0.00000 10.884271 0.00000000 0.5440000 6.122000  69.99280
## 313  0.261690   0.00000  9.900000 0.00000000 0.5440000 6.023000  90.40000
## 314  0.269380   0.00000 10.920537 0.00000000 0.5527067 6.266000  82.80000
## 315  0.369200   0.00000  9.900000 0.00000000 0.5517464 6.567000  87.30000
## 316  3.580676   0.00000  9.900000 0.00000000 0.5440000 5.705000  77.70000
## 317  3.601844   0.00000  9.900000 0.00000000 0.5440000 5.914000  83.20000
## 318  0.245220   0.00000  9.900000 0.06200320 0.5440000 5.782000  71.70000
## 319  0.402020   0.00000  9.900000 0.00000000 0.5440000 6.382000  67.20000
## 320  0.475470   0.00000  9.900000 0.00000000 0.5440000 6.113000  58.80000
## 321  0.167600   0.00000  7.380000 0.06406398 0.4930000 6.271538  52.30000
## 322  0.181590   0.00000  7.380000 0.06382545 0.4930000 6.376000  66.82153
## 323  0.351140   0.00000  7.380000 0.00000000 0.4930000 6.041000  49.90000
## 324  0.283920   0.00000  7.380000 0.00000000 0.4930000 5.708000  74.30000
## 325  0.341090   0.00000  7.380000 0.06371120 0.4930000 6.415000  40.10000
## 326  0.191860   0.00000  7.380000 0.00000000 0.4930000 6.431000  14.70000
## 327  0.303470   0.00000  7.380000 0.00000000 0.5414977 6.312000  28.90000
## 328  0.241030  11.68898  7.380000 0.00000000 0.4930000 6.083000  43.70000
## 329  0.066170   0.00000  3.240000 0.00000000 0.4600000 5.868000  25.80000
## 330  0.067240   0.00000  3.240000 0.00000000 0.4600000 6.333000  17.20000
## 331  0.045440   0.00000  3.240000 0.00000000 0.4600000 6.144000  65.69222
## 332  0.050230  35.00000  6.060000 0.00000000 0.4379000 5.706000  28.40000
## 333  0.034660  35.00000  6.060000 0.00000000 0.4379000 6.031000  23.30000
## 334  0.050830   0.00000 10.446155 0.00000000 0.5150000 6.316000  38.10000
## 335  0.037380   0.00000  5.190000 0.00000000 0.5150000 6.310000  38.50000
## 336  0.039610   0.00000  5.190000 0.00000000 0.5150000 6.037000  34.50000
```

```
## 337  0.034270   0.00000  5.190000 0.00000000 0.5150000 5.869000  46.30000
## 338  0.030410  11.32404  5.190000 0.00000000 0.5150000 5.895000  59.60000
## 339  0.033060   0.00000  5.190000 0.00000000 0.5150000 6.059000  37.30000
## 340  0.054970   0.00000  5.190000 0.05867622 0.5150000 5.985000  45.40000
## 341  0.061510   0.00000  5.190000 0.00000000 0.5150000 6.259595  58.50000
## 342  0.013010  35.00000  1.520000 0.00000000 0.5341303 7.241000  49.30000
## 343  0.024980   0.00000  1.890000 0.00000000 0.5180000 6.540000  59.70000
## 344  0.025430  55.00000 10.722366 0.00000000 0.4840000 6.283559  56.40000
## 345  3.523906  14.24558  3.780000 0.00000000 0.4840000 6.874000  69.02357
## 346  0.031130   0.00000 10.597164 0.00000000 0.4420000 6.014000  48.50000
## 347  0.061620   0.00000  4.390000 0.00000000 0.4420000 5.898000  52.30000
## 348  0.018700  85.00000  4.150000 0.00000000 0.4290000 6.516000  27.70000
## 349  0.015010  80.00000  2.010000 0.06076161 0.4350000 6.635000  65.48300
## 350  3.477478  40.00000  1.250000 0.06011974 0.5396310 6.939000  34.50000
## 351  0.062110  40.00000  1.250000 0.00000000 0.4290000 6.490000  44.40000
## 352  0.079500  60.00000  1.690000 0.00000000 0.4110000 6.302738  35.90000
## 353  0.072440  60.00000  9.925627 0.00000000 0.4110000 5.884000  18.50000
## 354  0.017090  90.00000  2.020000 0.00000000 0.4100000 6.728000  36.10000
## 355  0.043010  80.00000  1.910000 0.00000000 0.4130000 5.663000  21.90000
## 356  0.106590  80.00000  1.910000 0.00000000 0.4130000 5.936000  19.50000
## 357  8.982960  10.97410 18.100000 1.00000000 0.7700000 6.212000  97.40000
## 358  3.849700   0.00000 18.100000 1.00000000 0.7700000 6.395000  91.00000
## 359  5.201770   0.00000 18.100000 1.00000000 0.7700000 6.127000  83.40000
## 360  4.261310   0.00000 18.100000 0.00000000 0.7700000 6.112000  70.52835
## 361  4.541920   0.00000 11.481116 0.00000000 0.7700000 6.398000  88.00000
## 362  3.836840  11.03827 18.100000 0.00000000 0.7700000 6.251000  91.10000
## 363  3.678220   0.00000 18.100000 0.00000000 0.7700000 5.362000  96.20000
## 364  4.222390   0.00000 18.100000 1.00000000 0.7700000 5.803000  89.00000
## 365  3.474280   0.00000 18.100000 1.00000000 0.7180000 8.780000  82.90000
## 366  4.555870   0.00000 18.100000 0.00000000 0.7180000 3.561000  87.90000
## 367  3.696950   0.00000 18.100000 0.00000000 0.7180000 4.963000  91.40000
## 368 13.522200   0.00000 18.100000 0.00000000 0.6310000 3.863000 100.00000
## 369  4.898220   0.00000 18.100000 0.00000000 0.6310000 4.970000 100.00000
## 370  5.669980   0.00000 18.100000 1.00000000 0.6310000 6.281930  96.80000
## 371  6.538760   0.00000 18.100000 1.00000000 0.6310000 7.016000  97.50000
## 372  9.232300   0.00000 11.397002 0.15025573 0.6310000 6.216000 100.00000
## 373  8.267250  11.79661 18.100000 1.00000000 0.6680000 5.875000  89.60000
## 374 11.108100   0.00000 18.100000 0.00000000 0.6680000 4.906000 100.00000
## 375 18.498200   0.00000 18.100000 0.00000000 0.6680000 6.280490 100.00000
## 376 19.609100   0.00000 18.100000 0.07903959 0.6710000 7.313000  97.90000
## 377 15.288000   0.00000 18.100000 0.00000000 0.6710000 6.649000  93.30000
## 378  9.823490   0.00000 11.112959 0.00000000 0.6710000 6.794000  98.80000
## 379 23.648200  10.95268 18.100000 0.00000000 0.6710000 6.380000  96.20000
## 380 17.866700   0.00000 18.100000 0.06304644 0.6710000 6.223000 100.00000
## 381 88.976200   0.00000 18.100000 0.00000000 0.6710000 6.968000  91.90000
## 382 15.874400   0.00000 18.100000 0.00000000 0.6710000 6.545000  71.51678
## 383  6.867021   0.00000 18.100000 0.00000000 0.7000000 6.229984 100.00000
## 384  7.992480  10.93745 18.100000 0.00000000 0.7000000 5.520000  71.32546
## 385 20.084900   0.00000 11.341413 0.06452736 0.7000000 4.368000  91.20000
## 386 16.811800  10.94449 18.100000 0.00000000 0.7000000 5.277000  98.10000
## 387 24.393800   0.00000 18.100000 0.00000000 0.7000000 4.652000  71.00401
## 388 22.597100   0.00000 18.100000 0.00000000 0.7000000 6.107215  89.50000
## 389 14.333700   0.00000 18.100000 0.00000000 0.7000000 4.880000 100.00000
## 390  8.151740   0.00000 11.191277 0.00000000 0.7000000 5.390000  98.90000
```

```
## 391  6.962150   0.00000 18.100000 0.00000000 0.7000000 5.713000  97.00000
## 392  5.293050   0.00000 18.100000 0.00000000 0.7000000 6.051000  82.50000
## 393 11.577900   0.00000 18.100000 0.00000000 0.7000000 5.036000  97.00000
## 394  5.087937  11.33267 11.222391 0.00000000 0.6930000 6.193000  92.60000
## 395 13.359800   0.00000 18.100000 0.00000000 0.6930000 5.887000  94.70000
## 396  8.716750   0.00000 18.100000 0.06154780 0.6930000 6.471000  98.80000
## 397  5.872050   0.00000 18.100000 0.00000000 0.6930000 6.405000  96.00000
## 398  7.672020   0.00000 18.100000 0.00000000 0.6930000 5.747000  98.90000
## 399 38.351800   0.00000 18.100000 0.06656501 0.6930000 5.453000 100.00000
## 400  9.916550  10.85166 18.100000 0.00000000 0.6930000 5.852000  77.80000
## 401 25.046100   0.00000 18.100000 0.00000000 0.6930000 5.987000 100.00000
## 402 14.236200   0.00000 18.100000 0.00000000 0.6930000 6.343000 100.00000
## 403  9.595710   0.00000 18.100000 0.00000000 0.6930000 6.404000  71.98764
## 404 24.801700   0.00000 18.100000 0.00000000 0.6930000 5.349000  96.00000
## 405 41.529200  11.01654 18.100000 0.05996383 0.6930000 5.531000  85.40000
## 406 67.920800   0.00000 18.100000 0.00000000 0.6930000 5.683000 100.00000
## 407 20.716200   0.00000 18.100000 0.10940462 0.6590000 6.274412 100.00000
## 408  5.534199   0.00000 18.100000 0.00000000 0.6590000 5.608000 100.00000
## 409  7.403890  11.06726 18.100000 0.00000000 0.5970000 5.617000  97.90000
## 410 14.438300   0.00000 18.100000 0.07549273 0.5970000 6.852000 100.00000
## 411 51.135800   0.00000 18.100000 0.00000000 0.5970000 5.757000 100.00000
## 412 14.050700   0.00000 11.347993 0.00000000 0.5970000 6.657000 100.00000
## 413 18.811000   0.00000 18.100000 0.00000000 0.5646099 4.628000 100.00000
## 414 28.655800   0.00000 11.228003 0.00000000 0.5970000 5.155000 100.00000
## 415 45.746100   0.00000 18.100000 0.00000000 0.6930000 4.519000 100.00000
## 416 18.084600   0.00000 18.100000 0.00000000 0.6790000 6.204847 100.00000
## 417 10.834200   0.00000 18.100000 0.00000000 0.6790000 6.782000  90.80000
## 418 25.940600   0.00000 11.330407 0.00000000 0.6790000 5.304000  89.10000
## 419 73.534100   0.00000 18.100000 0.00000000 0.6790000 5.957000 100.00000
## 420 11.812300   0.00000 18.100000 0.00000000 0.5677187 6.824000  76.50000
## 421 11.087400   0.00000 18.100000 0.06193921 0.7180000 6.411000 100.00000
## 422  7.022590   0.00000 18.100000 0.00000000 0.7180000 6.006000  95.30000
## 423 12.048200   0.00000 11.346882 0.00000000 0.6140000 5.648000  87.60000
## 424  7.050420  11.06296 18.100000 0.00000000 0.6140000 6.103000  85.10000
## 425  8.792120   0.00000 18.100000 0.00000000 0.5840000 5.565000  70.60000
## 426  7.532341   0.00000 18.100000 0.00000000 0.6790000 5.896000  95.40000
## 427  5.691246   0.00000 18.100000 0.00000000 0.5840000 5.837000  59.70000
## 428 37.661900   0.00000 18.100000 0.00000000 0.6790000 6.202000  78.70000
## 429  7.367110   0.00000 18.100000 0.00000000 0.6790000 6.193000  78.10000
## 430  9.338890   0.00000 18.100000 0.00000000 0.6790000 6.380000  95.60000
## 431  8.492130   0.00000 18.100000 0.00000000 0.5840000 6.348000  86.10000
## 432 10.062300   0.00000 18.100000 0.00000000 0.5840000 6.833000  94.30000
## 433  6.444050   0.00000 18.100000 0.00000000 0.5840000 6.425000  74.80000
## 434  5.581070   0.00000 18.100000 0.00000000 0.7130000 6.436000  87.90000
## 435 13.913400   0.00000 18.100000 0.00000000 0.7130000 6.208000  70.10320
## 436 11.160400   0.00000 18.100000 0.00000000 0.7400000 6.629000  94.60000
## 437 14.420800   0.00000 18.100000 0.00000000 0.5618814 6.461000  93.30000
## 438 15.177200   0.00000 18.100000 0.00000000 0.5642470 6.152000 100.00000
## 439 13.678100   0.00000 18.100000 0.00000000 0.7400000 5.935000  87.90000
## 440  9.390630   0.00000 18.100000 0.00000000 0.7400000 5.627000  71.25080
## 441 22.051100   0.00000 11.298432 0.00000000 0.7400000 5.818000  92.40000
## 442  9.724180  10.76520 18.100000 0.00000000 0.5669705 6.406000  97.20000
## 443  5.666370   0.00000 11.284082 0.00000000 0.7400000 6.219000 100.00000
## 444  9.966540   0.00000 18.100000 0.00000000 0.7400000 6.485000 100.00000
```

```
## 445 12.802300   0.00000 18.100000 0.00000000 0.7400000 5.854000  96.60000
## 446  4.626667  10.85263 18.100000 0.00000000 0.7400000 6.459000  94.80000
## 447  6.288070   0.00000 18.100000 0.00000000 0.7400000 6.341000  96.40000
## 448  4.661872   0.00000 18.100000 0.00000000 0.7400000 6.251000  96.60000
## 449  9.329090   0.00000 18.100000 0.00000000 0.7130000 6.185000  98.70000
## 450  7.526010   0.00000 18.100000 0.00000000 0.7130000 6.417000  98.30000
## 451  6.717720  11.24722 18.100000 0.00000000 0.7130000 6.749000  92.60000
## 452  5.441140   0.00000 18.100000 0.00000000 0.7130000 6.655000  98.20000
## 453  5.090170   0.00000 18.100000 0.00000000 0.7130000 6.297000  91.80000
## 454  8.248090   0.00000 18.100000 0.00000000 0.7130000 7.393000  99.30000
## 455  9.513630  11.20907 18.100000 0.00000000 0.7130000 6.728000  94.10000
## 456  4.752370   0.00000 18.100000 0.00000000 0.7130000 6.525000  86.50000
## 457  4.668830   0.00000 18.100000 0.00000000 0.7130000 5.976000  87.90000
## 458  8.200580   0.00000 18.100000 0.00000000 0.7130000 5.936000  80.30000
## 459  7.752230   0.00000 18.100000 0.00000000 0.7130000 6.301000  83.70000
## 460  3.995982   0.00000 18.100000 0.00000000 0.7130000 6.081000  84.40000
## 461  4.812130   0.00000 18.100000 0.00000000 0.7130000 6.701000  90.00000
## 462  3.693110   0.00000 18.100000 0.00000000 0.7130000 6.376000  88.40000
## 463  3.937019   0.00000 18.100000 0.00000000 0.7130000 6.317000  83.00000
## 464  5.821150   0.00000 18.100000 0.00000000 0.7130000 6.513000  89.90000
## 465  7.839320   0.00000 18.100000 0.00000000 0.6550000 6.209000  65.40000
## 466  3.163600   0.00000 18.100000 0.00000000 0.6550000 6.280548  48.20000
## 467  4.023105   0.00000 18.100000 0.00000000 0.6550000 5.952000  84.70000
## 468  4.422280   0.00000 18.100000 0.00000000 0.5840000 6.003000  94.50000
## 469 15.575700   0.00000 18.100000 0.00000000 0.5800000 5.926000  71.00000
## 470 13.075100   0.00000 18.100000 0.00000000 0.5800000 5.713000  56.70000
## 471  4.348790   0.00000 11.966242 0.00000000 0.5800000 6.167000  84.00000
## 472  4.038410   0.00000 18.100000 0.00000000 0.5320000 6.229000  90.70000
## 473  3.568680   0.00000 18.100000 0.00000000 0.5800000 6.437000  69.04464
## 474  4.646890   0.00000 18.100000 0.00000000 0.5595365 6.980000  67.60000
## 475  8.055790   0.00000 18.100000 0.00000000 0.5840000 5.427000  68.38849
## 476  6.393120  10.94686 11.482192 0.06252229 0.5840000 6.162000  97.40000
## 477  4.871410   0.00000 18.100000 0.00000000 0.6140000 6.484000  93.60000
## 478 15.023400   0.00000 18.100000 0.00000000 0.6140000 5.304000  97.30000
## 479 10.233000   0.00000 18.100000 0.00000000 0.6140000 6.185000  96.70000
## 480 14.333700   0.00000 18.100000 0.00000000 0.6140000 6.229000  71.05883
## 481  5.824010   0.00000 18.100000 0.00000000 0.5320000 6.242000  68.87175
## 482  5.708180   0.00000 18.100000 0.00000000 0.5320000 6.750000  67.70065
## 483  5.731160   0.00000 18.100000 0.00000000 0.5320000 7.061000  77.00000
## 484  2.818380   0.00000 18.100000 0.00000000 0.5320000 6.285719  40.30000
## 485  2.378570   0.00000 18.100000 0.00000000 0.5830000 5.871000  41.90000
## 486  3.673670   0.00000 18.100000 0.00000000 0.5830000 6.312000  51.90000
## 487  5.691750   0.00000 18.100000 0.00000000 0.5830000 6.114000  79.80000
## 488  4.835670   0.00000 18.100000 0.00000000 0.5830000 5.905000  53.20000
## 489  0.150860   0.00000 11.854279 0.00000000 0.6090000 5.454000  92.70000
## 490  0.183370   0.00000 27.740000 0.00000000 0.6090000 5.414000  98.30000
## 491  0.207460   0.00000 27.740000 0.00000000 0.6090000 5.093000  98.00000
## 492  3.743170   0.00000 27.740000 0.00000000 0.6090000 5.983000  98.80000
## 493  3.588173   0.00000 27.740000 0.00000000 0.6090000 5.983000  70.53132
## 494  0.173310   0.00000 10.772643 0.00000000 0.5850000 6.273331  54.00000
## 495  0.279570   0.00000  9.690000 0.00000000 0.5850000 5.926000  42.60000
## 496  0.178990   0.00000  9.690000 0.00000000 0.5850000 5.670000  28.80000
## 497  0.289600   0.00000  9.690000 0.00000000 0.5850000 5.390000  72.90000
## 498  0.268380   0.00000  9.690000 0.00000000 0.5850000 5.794000  70.60000
```

```
## 499  0.239120   0.00000  9.690000 0.00000000 0.5850000 6.019000  65.30000
## 500  0.177830   0.00000  9.690000 0.00000000 0.5850000 5.569000  73.50000
## 501  0.224380   0.00000  9.690000 0.00000000 0.5850000 6.027000  69.34482
## 502  0.062630   0.00000 11.930000 0.00000000 0.5730000 6.593000  69.10000
## 503  3.492146   0.00000 11.930000 0.00000000 0.5730000 6.120000  76.70000
## 504  0.060760   0.00000 11.930000 0.00000000 0.5730000 6.976000  91.00000
## 505  0.109590   0.00000 11.930000 0.06737452 0.5730000 6.794000  69.58469
## 506  0.047410   0.00000 11.930000 0.00000000 0.5730000 6.030000  80.80000
##          dis       rad      tax  ptratio    black    lstat     medv
## 1   4.090000  1.000000 296.0000 15.30000 396.9000  4.98000 24.00000
## 2   4.967100  8.870255 242.0000 17.80000 396.9000  9.14000 21.60000
## 3   4.967100  2.000000 242.0000 17.80000 392.8300  4.03000 34.70000
## 4   6.062200  3.000000 222.0000 18.70000 394.6300  2.94000 33.40000
## 5   6.062200  3.000000 222.0000 18.70000 396.9000  5.33000 36.20000
## 6   6.062200  3.000000 222.0000 18.70000 394.1200  5.21000 28.70000
## 7   5.560500  5.000000 311.0000 15.20000 395.6000 12.43000 22.90000
## 8   5.950500  5.000000 311.0000 15.20000 396.9000 12.64361 22.30389
## 9   3.885466  5.000000 311.0000 15.20000 386.6300 29.93000 16.50000
## 10  6.592100  5.000000 311.0000 15.20000 386.7100 17.10000 18.90000
## 11  6.346700  5.000000 311.0000 15.20000 392.5200 20.45000 15.00000
## 12  6.226700  5.000000 311.0000 15.20000 396.9000 13.27000 18.90000
## 13  5.450900  5.000000 311.0000 15.20000 358.5599 15.71000 21.70000
## 14  4.707500  4.000000 307.0000 21.00000 396.9000  8.26000 20.40000
## 15  4.461900  4.000000 407.5929 21.00000 380.0200 10.26000 18.20000
## 16  4.498600  4.000000 401.8995 21.00000 395.6200  8.47000 19.90000
## 17  4.498600  4.000000 307.0000 21.00000 386.8500  6.58000 23.10000
## 18  4.257900  4.000000 307.0000 21.00000 386.7500 14.67000 17.50000
## 19  3.796500  4.000000 307.0000 21.00000 288.9900 11.69000 22.08701
## 20  3.796500  4.000000 307.0000 21.00000 390.9500 11.28000 18.20000
## 21  3.797900  4.000000 307.0000 18.57987 376.5700 21.02000 13.60000
## 22  4.012300  4.000000 307.0000 21.00000 392.5300 13.83000 19.60000
## 23  3.976900  9.376104 307.0000 21.00000 396.9000 18.72000 15.20000
## 24  4.095200  9.066623 400.4324 21.00000 394.5400 19.88000 14.50000
## 25  3.869571  4.000000 307.0000 21.00000 394.3300 16.30000 15.60000
## 26  4.454600  4.000000 307.0000 21.00000 303.4200 16.51000 13.90000
## 27  4.682000  9.246126 307.0000 21.00000 376.8800 14.81000 16.60000
## 28  4.453400  4.000000 307.0000 18.84971 306.3800 12.64501 14.80000
## 29  4.454700  4.000000 307.0000 21.00000 387.9400 12.80000 21.92220
## 30  4.239000  4.000000 307.0000 21.00000 380.2300 11.98000 21.00000
## 31  4.233000  4.000000 307.0000 21.00000 360.1700 22.60000 12.70000
## 32  4.175000  4.000000 307.0000 21.00000 376.7300 13.04000 14.50000
## 33  3.990000  9.142434 307.0000 21.00000 232.6000 27.71000 13.20000
## 34  3.787200  4.000000 307.0000 21.00000 358.7700 12.48302 22.27915
## 35  3.759800  4.000000 307.0000 18.64622 248.3100 20.34000 13.50000
## 36  3.360300  9.034628 279.0000 19.20000 396.9000  9.68000 18.90000
## 37  3.377900  5.000000 279.0000 19.20000 377.5600 11.41000 20.00000
## 38  3.845829  5.000000 404.0762 19.20000 359.1457  8.77000 21.00000
## 39  3.847300  5.000000 279.0000 19.20000 393.4300 10.13000 24.70000
## 40  5.401100  3.000000 252.0000 18.30000 395.6300  4.32000 30.80000
## 41  4.048226  3.000000 252.0000 18.30000 395.6200  1.98000 34.90000
## 42  5.720900  3.000000 233.0000 17.90000 385.4100 12.13691 26.60000
## 43  5.720900  3.000000 233.0000 17.90000 383.3700  5.81000 25.30000
## 44  5.720900  3.000000 233.0000 18.43063 394.4600  7.44000 24.70000
## 45  5.720900  3.000000 403.0863 17.90000 389.3900  9.55000 21.20000
```

```
## 46   5.100400  3.000000 233.0000 17.90000 396.9000 10.21000 19.30000
## 47   5.100400  3.000000 233.0000 17.90000 396.9000 14.15000 20.00000
## 48   5.689400  3.000000 233.0000 17.90000 392.7400 18.80000 16.60000
## 49   5.870000  3.000000 233.0000 18.36976 396.9000 30.81000 14.40000
## 50   6.087700  9.264899 233.0000 17.90000 360.8678 16.20000 19.40000
## 51   6.814700  4.000000 243.0000 16.80000 395.5600 13.45000 19.70000
## 52   6.814700  4.000000 243.0000 18.46437 393.9700  9.43000 22.63510
## 53   6.814700  4.000000 243.0000 16.80000 396.9000  5.28000 25.00000
## 54   6.814700  4.000000 243.0000 18.47245 396.9000  8.43000 23.40000
## 55   7.319700  3.000000 469.0000 21.10000 396.9000 14.80000 18.90000
## 56   8.696600  8.559878 226.0000 17.90000 395.9300  4.81000 35.40000
## 57   9.187600  2.000000 397.7363 17.30000 396.9000  5.77000 24.70000
## 58   8.324800  5.000000 256.0000 15.10000 392.9000 11.79576 31.60000
## 59   7.814800  8.000000 284.0000 19.70000 390.6800  6.86000 23.30000
## 60   6.932000  8.000000 401.9161 19.70000 396.9000  9.22000 19.60000
## 61   7.225400  8.000000 284.0000 19.70000 395.1100 13.15000 22.36783
## 62   6.818500  8.000000 284.0000 19.70000 378.0800 14.44000 16.00000
## 63   7.225500  9.153942 284.0000 19.70000 396.9000  6.73000 22.20000
## 64   7.980900  8.000000 284.0000 19.70000 395.5800  9.50000 25.00000
## 65   9.222900  3.000000 216.0000 18.60000 393.2400  8.05000 33.00000
## 66   6.611500  8.894860 337.0000 16.10000 396.9000  4.67000 23.50000
## 67   6.611500  4.000000 337.0000 16.10000 396.9000 10.24000 19.40000
## 68   6.498000  9.018803 345.0000 18.90000 396.2100  8.10000 22.00000
## 69   6.498000  4.000000 345.0000 18.90000 396.9000 13.09000 22.27034
## 70   6.498000  4.000000 345.0000 18.90000 396.9000  8.79000 20.90000
## 71   5.287300  4.000000 305.0000 19.20000 383.7300  6.72000 24.20000
## 72   5.287300  9.256564 305.0000 19.20000 376.9400  9.88000 21.70000
## 73   5.287300  4.000000 404.5140 19.20000 359.0570  5.52000 22.80000
## 74   5.287300  4.000000 305.0000 19.20000 377.1700  7.54000 23.40000
## 75   4.251500  5.000000 398.0000 18.70000 394.9200  6.78000 24.10000
## 76   4.502600  5.000000 398.0000 18.70000 383.2300  8.94000 22.46002
## 77   4.052200  5.000000 398.0000 18.70000 373.6600 11.97000 20.00000
## 78   4.026919  5.000000 398.0000 18.70000 386.9600 10.27000 22.30527
## 79   5.014100  5.000000 398.0000 18.70000 386.4000 12.34000 21.20000
## 80   4.502600  5.000000 398.0000 18.53548 396.0600  9.10000 20.30000
## 81   5.400700  4.000000 398.2093 19.00000 396.9000  5.29000 22.70007
## 82   5.400700  4.000000 281.0000 19.00000 395.6300  7.22000 23.90000
## 83   5.400700  4.000000 281.0000 19.00000 396.9000  6.72000 24.80000
## 84   5.400700  4.000000 400.5462 19.00000 359.5759  7.51000 22.90000
## 85   4.779400  3.000000 402.0534 18.50000 358.6387  9.62000 23.90000
## 86   4.437700  3.000000 247.0000 18.50000 392.3000  6.53000 26.60000
## 87   4.427200  3.000000 400.6978 18.50000 395.9900 12.86000 22.50000
## 88   3.747600  3.000000 247.0000 18.50000 395.1500  8.44000 22.20000
## 89   3.850521  2.000000 270.0000 17.80000 396.9000  5.50000 23.60000
## 90   3.414500  8.788191 270.0000 17.80000 396.0600  5.70000 28.70000
## 91   3.092300  2.000000 270.0000 17.80000 392.1800  8.81000 22.60000
## 92   3.092100  2.000000 270.0000 17.80000 393.5500  8.20000 22.00000
## 93   3.665900  4.000000 270.0000 18.43087 395.0100  8.16000 22.90000
## 94   3.910012  4.000000 270.0000 18.20000 396.3300  6.21000 25.00000
## 95   3.615000  4.000000 270.0000 18.20000 396.9000 10.59000 20.60000
## 96   3.495200  2.000000 399.0177 18.00000 357.9800  6.65000 28.40000
## 97   3.495200  2.000000 276.0000 18.00000 391.8300 11.34000 22.54591
## 98   3.495200  2.000000 276.0000 18.00000 396.9000  4.21000 38.70000
## 99   3.495200  2.000000 276.0000 18.00000 393.5300  3.57000 43.80000
```

```
## 100  3.495200  2.000000 276.0000 18.00000 396.9000 12.24767 22.42880
## 101  2.777800  5.000000 384.0000 20.90000 358.4324  9.42000 27.50000
## 102  2.856100  5.000000 402.4503 20.90000 395.5800  7.67000 26.50000
## 103  2.714700  5.000000 406.9746 20.90000  70.8000 10.63000 18.60000
## 104  3.772801  5.000000 384.0000 20.90000 394.4700 13.44000 19.30000
## 105  2.421000  5.000000 384.0000 20.90000 392.6900 12.55722 20.10000
## 106  2.106900  5.000000 384.0000 20.90000 394.0500 16.47000 19.50000
## 107  2.211000  5.000000 406.8894 20.90000 395.6700 18.66000 19.50000
## 108  2.122400  5.000000 384.0000 20.90000 360.5620 14.09000 20.40000
## 109  2.432900  5.000000 384.0000 20.90000 395.2400 12.27000 19.80000
## 110  2.545100  5.000000 384.0000 20.90000 391.2300 12.62803 19.40000
## 111  2.777800  5.000000 384.0000 20.90000 393.4900 13.00000 21.70000
## 112  2.677500  6.000000 432.0000 17.80000 359.6541 10.16000 22.80000
## 113  2.353400  9.347874 432.0000 17.80000 394.9500 16.21000 18.80000
## 114  2.548000  6.000000 432.0000 17.80000 396.9000 17.09000 18.70000
## 115  2.256500  6.000000 432.0000 17.80000 388.7400 10.45000 18.50000
## 116  3.745185  6.000000 406.3290 17.80000 344.9100 15.76000 18.30000
## 117  3.724987  6.000000 432.0000 17.80000 393.3000 12.04000 21.20000
## 118  2.747400  6.000000 432.0000 17.80000 394.5100 10.30000 19.20000
## 119  2.477500  6.000000 432.0000 17.80000 357.5668 15.37000 20.40000
## 120  2.759200  9.366127 432.0000 18.42568 358.5454 13.61000 19.30000
## 121  2.257700  2.000000 188.0000 19.10000 389.1500 14.37000 22.00000
## 122  2.197400  2.000000 188.0000 19.10000 377.6700 12.73195 20.30000
## 123  2.086900  8.678755 188.0000 19.10000 378.0900 17.93000 20.50000
## 124  1.944400  2.000000 406.1483 19.10000 370.3100 25.41000 17.30000
## 125  2.006300  2.000000 188.0000 19.10000 379.3800 17.58000 18.80000
## 126  1.992900  2.000000 391.5289 19.10000 385.0200 14.81000 21.40000
## 127  1.757200  2.000000 392.3293 19.10000 359.2900 12.76487 15.70000
## 128  1.788300  4.000000 437.0000 21.20000 392.1100 17.19000 16.20000
## 129  1.812500  4.000000 437.0000 21.20000 396.9000 15.39000 21.53700
## 130  3.564970  4.000000 437.0000 21.20000 396.9000 18.34000 14.30000
## 131  2.118500  4.000000 437.0000 21.20000 360.9198 12.60000 19.20000
## 132  2.271000  4.000000 437.0000 21.20000 396.9000 12.26000 19.60000
## 133  2.327400  4.000000 437.0000 21.20000 385.7600 11.12000 23.00000
## 134  2.469900  4.000000 437.0000 21.20000 388.6900 15.03000 18.40000
## 135  2.346000  9.219260 437.0000 21.20000 262.7600 17.31000 15.60000
## 136  2.110700  9.108932 437.0000 18.63173 394.6700 16.96000 18.10000
## 137  1.966900  9.110101 437.0000 21.20000 378.2500 16.90000 17.40000
## 138  1.849800  4.000000 414.8753 21.20000 394.0800 14.59000 17.10000
## 139  1.668600  4.000000 437.0000 21.20000 392.0400 21.32000 13.30000
## 140  1.668700  9.173948 437.0000 21.20000 396.9000 18.46000 17.80000
## 141  1.611900  4.000000 437.0000 21.20000 388.0800 24.16000 14.00000
## 142  1.439400  4.000000 437.0000 21.20000 354.6130 34.41000 14.40000
## 143  1.321600  5.000000 403.0000 14.70000 360.5115 26.82000 13.40000
## 144  1.411800  5.000000 417.7910 14.70000 396.9000 26.42000 15.60000
## 145  1.345900  5.000000 403.0000 14.70000 396.9000 29.29000 11.80000
## 146  1.419100  5.000000 407.6921 14.70000 172.9100 13.52426 13.80000
## 147  1.516600  5.000000 403.0000 14.70000 169.2700 16.65000 21.48667
## 148  1.460800  5.000000 403.0000 14.70000 391.7100 29.53000 14.60000
## 149  1.529600  5.000000 403.0000 18.17178 356.9900 28.32000 17.80000
## 150  1.525700  5.000000 403.0000 14.70000 351.8500 21.45000 15.40000
## 151  1.618000  5.000000 403.0000 14.70000 372.8000 14.10000 21.50000
## 152  1.591600  5.000000 403.0000 18.28455 353.6944 13.28000 19.60000
## 153  1.610200  5.000000 403.0000 14.70000 343.2800 14.31101 15.30000
```

```
## 154  1.623200  8.909997 403.0000 14.70000 261.9500 15.79000 19.40000
## 155  1.749400  5.000000 403.0000 14.70000 321.0200 15.12000 17.00000
## 156  1.745500  5.000000 403.0000 14.70000  88.0100 15.02000 15.60000
## 157  1.736400  8.789837 403.0000 14.70000  88.6300 16.14000 13.10000
## 158  1.877300  5.000000 403.0000 14.70000 363.4300  4.59000 41.30000
## 159  1.757300  5.000000 403.0000 18.44415 353.8900  6.43000 24.30000
## 160  1.765900  5.000000 403.0000 14.70000 364.3100  7.39000 23.30000
## 161  1.798400  5.000000 403.0000 14.70000 338.9200  5.50000 27.00000
## 162  3.702406  5.000000 407.7012 14.70000 374.4300  1.73000 50.00000
## 163  2.040700  5.000000 403.0000 18.35304 389.6100  1.92000 50.00000
## 164  3.691061  5.000000 403.0000 14.70000 388.4500  3.32000 50.00000
## 165  2.422000  5.000000 403.0000 14.70000 395.1100 11.64000 22.70000
## 166  2.283400  5.000000 403.0000 14.70000 240.1600  9.81000 22.32779
## 167  2.045900  5.000000 403.0000 14.70000 369.3000  3.70000 50.00000
## 168  2.425900  5.000000 406.0364 14.70000 227.6100 12.14000 23.80000
## 169  2.100000  5.000000 403.0000 14.70000 297.0900 11.10000 23.80000
## 170  2.262500  5.000000 403.0000 14.70000 330.0400 11.32000 22.30000
## 171  2.425900  9.055128 403.0000 14.70000 292.2900 14.43000 17.40000
## 172  2.388700  5.000000 403.0000 14.70000 348.1300 12.03000 19.10000
## 173  2.596100  5.000000 296.0000 16.60000 396.9000 14.69000 23.10000
## 174  2.646300  5.000000 296.0000 16.60000 395.5000  9.04000 23.60000
## 175  2.701900  5.000000 296.0000 16.60000 393.2300  9.64000 22.60000
## 176  3.132300  5.000000 296.0000 16.60000 390.9600  5.33000 29.40000
## 177  3.554900  5.000000 402.9881 16.60000 393.2300 10.11000 23.20000
## 178  3.317500  5.000000 296.0000 16.60000 395.6000  6.29000 24.60000
## 179  3.783724  5.000000 296.0000 16.60000 391.2700  6.92000 29.90000
## 180  2.829000  3.000000 193.0000 17.80000 396.9000  5.04000 37.20000
## 181  2.741000  3.000000 193.0000 17.80000 395.5600  7.56000 39.80000
## 182  2.597900  3.000000 193.0000 17.80000 396.9000  9.45000 36.20000
## 183  2.700600  3.000000 193.0000 17.80000 394.1200  4.82000 37.90000
## 184  2.847000  3.000000 193.0000 17.80000 396.9000  5.68000 32.50000
## 185  2.987900  3.000000 193.0000 17.80000 391.0000 13.98000 26.40000
## 186  3.279700  3.000000 193.0000 17.80000 387.1100 13.15000 29.60000
## 187  3.199200  3.000000 193.0000 17.80000 392.6300  4.45000 50.00000
## 188  3.788600  5.000000 398.0000 18.32999 393.8700  6.68000 32.00000
## 189  4.566700  5.000000 398.0000 15.20000 382.8400  4.56000 29.80000
## 190  4.566700  5.000000 398.0000 15.20000 359.6659  5.39000 34.90000
## 191  6.479800  5.000000 398.0000 15.20000 377.6800  5.10000 23.00909
## 192  6.479800  9.050812 398.0000 15.20000 389.7100  4.69000 23.29165
## 193  6.479800  5.000000 398.0000 15.20000 390.4900  2.87000 36.40000
## 194  4.167617  1.000000 265.0000 15.60000 393.3700  5.03000 22.66798
## 195  6.219600  1.000000 265.0000 15.60000 359.3648  4.38000 29.10000
## 196  4.367892  4.000000 255.0000 18.40573 394.2300  2.97000 50.00000
## 197  7.309000  2.000000 329.0000 12.60000 396.9000  4.08000 33.30000
## 198  7.309000  2.000000 329.0000 12.60000 354.3100  8.61000 30.30000
## 199  7.309000  9.033638 329.0000 12.60000 392.2000  6.62000 34.60000
## 200  7.653400  3.000000 402.0000 17.00000 396.9000  4.56000 34.90000
## 201  7.653400  3.000000 402.0000 17.00000 384.3000  4.45000 32.90000
## 202  6.270000  2.000000 348.0000 14.70000 393.7700  7.43000 24.10000
## 203  6.270000  2.000000 348.0000 14.70000 359.1055  3.11000 42.30000
## 204  5.118000  4.000000 224.0000 14.70000 392.7800 11.46294 48.50000
## 205  5.118000  4.000000 224.0000 14.70000 390.5500  2.88000 25.72232
## 206  3.945400  4.000000 277.0000 18.60000 396.9000 10.87000 22.60000
## 207  4.354900  4.000000 277.0000 18.60000 394.8700 10.97000 24.40000
```

```
## 208  4.354900  4.000000 277.0000 18.60000 389.4300 18.06000 22.50000
## 209  4.239200  4.000000 277.0000 18.60000 359.4212 14.66000 24.40000
## 210  3.808402  4.000000 277.0000 18.60000 360.9688 23.09000 20.00000
## 211  3.877100  4.000000 277.0000 18.60000 361.1331 17.27000 21.70000
## 212  3.665000  4.000000 277.0000 18.60000 395.2400 23.98000 19.30000
## 213  3.652600  4.000000 277.0000 18.60000 390.9400 16.03000 22.40000
## 214  3.945400  4.000000 277.0000 18.60000 385.8100  9.38000 28.10000
## 215  3.587500  4.000000 277.0000 18.60000 348.9300 29.55000 23.70000
## 216  3.945400  4.000000 277.0000 18.60000 393.6300  9.47000 25.00000
## 217  3.112100  5.000000 276.0000 16.40000 392.8000 13.51000 23.30000
## 218  3.421100  5.000000 276.0000 16.40000 392.7800  9.69000 28.70000
## 219  2.889300  5.000000 276.0000 16.40000 396.9000 17.92000 21.50000
## 220  3.363300  5.000000 276.0000 16.40000 393.7400 10.50000 23.00000
## 221  2.861700  9.235107 307.0000 18.49929 391.7000  9.71000 26.70000
## 222  3.048000  9.192895 307.0000 17.40000 395.2400 21.46000 22.30794
## 223  3.845912  8.000000 307.0000 18.50328 390.3900  9.93000 27.50000
## 224  3.272100  9.351637 307.0000 17.40000 396.9000  7.60000 30.10000
## 225  2.894400  8.000000 307.0000 17.40000 385.0500 11.27391 44.80000
## 226  2.894400  8.000000 307.0000 17.40000 382.0000  4.63000 50.00000
## 227  3.215700  8.000000 307.0000 17.40000 387.3800  3.13000 37.60000
## 228  3.215700  8.000000 307.0000 17.40000 372.0800  6.36000 31.60000
## 229  3.375100  8.986543 307.0000 17.40000 377.5100  3.92000 46.70000
## 230  3.375100  8.000000 307.0000 17.40000 360.9762  3.76000 31.50000
## 231  3.671500  8.000000 307.0000 17.40000 378.3500 11.65000 24.30000
## 232  3.671500  8.000000 307.0000 17.40000 376.1400  5.25000 31.70000
## 233  3.838400  8.000000 307.0000 17.40000 385.9100  2.47000 41.70000
## 234  3.651900  8.000000 307.0000 17.40000 378.9500  3.95000 48.30000
## 235  3.651900  8.000000 307.0000 17.40000 360.1990  8.05000 29.00000
## 236  3.651900  8.000000 307.0000 17.40000 376.7500 10.88000 24.00000
## 237  4.148000  8.000000 402.1653 17.40000 388.4500 12.10849 25.10000
## 238  4.148000  8.000000 402.8650 17.40000 390.0700  4.73000 31.50000
## 239  4.066100  6.000000 300.0000 16.60000 379.4100  6.36000 23.70000
## 240  6.189900  6.000000 300.0000 16.60000 383.7800  7.37000 23.30000
## 241  6.336100  6.000000 300.0000 16.60000 391.2500 11.38000 22.00000
## 242  6.336100  9.060322 400.1936 16.60000 394.6200 12.40000 22.33592
## 243  7.035500  6.000000 300.0000 18.45417 372.7500 11.22000 22.44758
## 244  7.035500  6.000000 300.0000 16.60000 374.7100  5.19000 23.70000
## 245  7.954900  7.000000 330.0000 19.10000 360.4669 12.97519 17.60000
## 246  7.954900  7.000000 330.0000 19.10000 389.1300 18.46000 21.86869
## 247  8.055500  7.000000 330.0000 19.10000 390.1800  9.16000 22.42538
## 248  4.291944  7.000000 330.0000 19.10000 376.1400 10.15000 20.50000
## 249  7.826500  7.000000 330.0000 19.10000 374.7100  9.52000 24.50000
## 250  7.826500  7.000000 330.0000 19.10000 393.7400  6.56000 26.20000
## 251  7.396700  7.000000 330.0000 19.10000 396.2800  5.90000 24.40000
## 252  7.396700  7.000000 330.0000 19.10000 377.0700  3.59000 24.80000
## 253  8.906700  7.000000 330.0000 19.10000 386.0900  3.53000 29.60000
## 254  8.906700  7.000000 330.0000 19.10000 396.9000  3.54000 42.80000
## 255  9.220300  1.000000 315.0000 18.39001 392.8900  6.57000 22.49752
## 256  9.220300  1.000000 315.0000 16.40000 395.1800  9.25000 22.30631
## 257  6.336100  3.000000 244.0000 15.90000 386.3400  3.11000 44.00000
## 258  1.801000  5.000000 264.0000 13.00000 389.7000  5.12000 23.96768
## 259  1.894600  5.000000 264.0000 13.00000 383.2900  7.79000 23.90342
## 260  2.010700  8.903326 264.0000 13.00000 391.9300  6.90000 30.10000
## 261  2.112100  5.000000 264.0000 13.00000 392.8000  9.59000 23.55286
```

```
## 262  2.139800  5.000000 388.9142 13.00000 388.3700  7.26000 43.10000
## 263  2.288500  5.000000 264.0000 13.00000 358.2504  5.91000 48.80000
## 264  2.078800  5.000000 264.0000 13.00000 393.4200 11.25000 31.00000
## 265  1.930100  5.000000 264.0000 13.00000 387.8900  8.10000 36.50000
## 266  1.986500  5.000000 264.0000 18.45675 392.4000 10.45000 22.80000
## 267  3.609746  5.000000 264.0000 13.00000 384.0700 14.79000 23.01649
## 268  2.421600  5.000000 264.0000 13.00000 360.8055  7.44000 50.00000
## 269  2.872000  5.000000 264.0000 18.42100 390.3000  3.16000 24.51787
## 270  3.917500  3.000000 223.0000 18.60000 391.3400 13.65000 20.70000
## 271  4.429000  3.000000 223.0000 18.50678 388.6500 13.00000 21.10000
## 272  4.429000  8.993677 223.0000 18.60000 396.9000  6.59000 25.20000
## 273  3.917500  3.000000 403.0653 18.49680 394.9600  7.73000 24.40000
## 274  4.366500  3.000000 223.0000 18.60000 390.7700  6.58000 35.20000
## 275  4.077600  4.000000 254.0000 17.60000 396.9000  3.53000 32.40000
## 276  4.267300  4.000000 254.0000 17.60000 396.9000  2.98000 32.00000
## 277  4.787200  4.000000 254.0000 17.60000 389.2500  6.05000 33.20000
## 278  4.862800  4.000000 254.0000 17.60000 393.4500  4.16000 33.10000
## 279  4.140300  4.000000 254.0000 17.60000 396.9000  7.19000 29.10000
## 280  4.100700  5.000000 216.0000 14.90000 359.8279 11.87753 35.10000
## 281  4.694700  8.627784 216.0000 14.90000 387.3100  3.76000 45.40000
## 282  4.061569  9.172957 394.7774 14.90000 392.2300  4.59000 35.40000
## 283  5.211900  5.000000 216.0000 14.90000 377.0700  3.01000 25.80731
## 284  5.885000  1.000000 198.0000 13.60000 395.5200  3.16000 50.00000
## 285  7.307300  8.818108 285.0000 15.30000 394.7200  7.85000 32.20000
## 286  4.298479  8.901304 300.0000 15.30000 394.7200  8.23000 22.00000
## 287  9.089200  1.000000 241.0000 18.20000 341.6000 12.93000 20.10000
## 288  7.317200  6.000000 293.0000 18.42184 396.9000 12.18052 23.20000
## 289  7.317200  6.000000 293.0000 16.60000 396.9000  7.60000 22.30000
## 290  7.317200  6.000000 293.0000 16.60000 371.7200  9.51000 24.80000
## 291  5.116700  4.000000 245.0000 18.49838 359.3645  3.33000 23.86068
## 292  5.116700  4.000000 245.0000 19.20000 396.9000  3.56000 37.30000
## 293  5.116700  4.000000 245.0000 19.20000 396.9000  4.70000 27.90000
## 294  5.502700  4.000000 289.0000 16.00000 396.9000  8.58000 23.90000
## 295  5.502700  4.000000 289.0000 16.00000 396.9000 10.40000 21.70000
## 296  5.960400  8.979514 289.0000 18.51765 396.9000  6.27000 28.60000
## 297  5.960400  4.000000 289.0000 16.00000 392.8500  7.39000 27.10000
## 298  6.320000  4.000000 289.0000 16.00000 396.9000 15.84000 20.30000
## 299  7.827800  5.000000 358.0000 14.80000 360.0224  4.97000 22.50000
## 300  4.417751  5.000000 358.0000 14.80000 371.5800  4.74000 29.00000
## 301  7.827800  8.811394 358.0000 14.80000 390.8600  6.07000 24.80000
## 302  5.491700  7.000000 329.0000 16.10000 395.7500  9.50000 22.00000
## 303  5.491700  7.000000 329.0000 16.10000 383.6100  8.67000 26.40000
## 304  5.491700  7.000000 329.0000 18.36572 360.8370  4.86000 23.40004
## 305  3.920197  8.566105 222.0000 18.40000 393.6800 11.60899 36.10000
## 306  3.370000  7.000000 222.0000 18.40000 393.3600  8.93000 28.40000
## 307  3.099200  7.000000 222.0000 18.40000 396.9000 11.74414 33.40000
## 308  3.182700  7.000000 222.0000 18.40000 396.9000  7.53000 28.20000
## 309  3.317500  4.000000 304.0000 18.40000 396.9000  4.54000 22.80000
## 310  3.102500  4.000000 304.0000 18.40000 396.2400  9.97000 20.30000
## 311  3.857586  9.176400 403.3606 18.40000 350.4500 12.64000 16.10000
## 312  2.640300  8.873832 304.0000 18.40000 396.9000  5.98000 22.10000
## 313  2.834000  4.000000 304.0000 18.40000 396.3000 11.72000 19.40000
## 314  3.262800  4.000000 304.0000 18.55248 393.3900 12.43293 21.60000
## 315  3.602300  4.000000 403.3148 18.40000 395.6900  9.28000 23.80000
```

```
## 316  3.945000  4.000000 304.0000 18.40000 396.4200 11.50000 16.20000
## 317  3.998600  4.000000 304.0000 18.54892 390.7000 18.33000 17.80000
## 318  4.031700  4.000000 304.0000 18.40000 396.9000 15.94000 19.80000
## 319  3.532500  4.000000 304.0000 18.40000 395.2100 12.22244 22.42654
## 320  4.001900  4.000000 304.0000 18.40000 396.2300 12.73000 21.00000
## 321  4.540400  5.000000 287.0000 19.60000 396.9000 12.13631 23.80000
## 322  4.540400  5.000000 402.9566 19.60000 396.9000  6.87000 23.10000
## 323  4.721100  5.000000 287.0000 18.50740 396.9000  7.70000 20.40000
## 324  4.721100  5.000000 287.0000 19.60000 391.1300 11.74000 22.37081
## 325  4.721100  5.000000 287.0000 19.60000 396.9000  6.12000 25.00000
## 326  5.415900  5.000000 287.0000 19.60000 393.6800  5.08000 24.60000
## 327  5.415900  5.000000 287.0000 19.60000 396.9000  6.15000 23.00000
## 328  5.415900  5.000000 287.0000 19.60000 396.9000 12.79000 22.20000
## 329  5.214600  4.000000 430.0000 16.90000 382.4400  9.97000 19.30000
## 330  5.214600  4.000000 430.0000 16.90000 375.2100  7.34000 22.60000
## 331  5.873600  4.000000 430.0000 16.90000 368.5700  9.09000 22.39802
## 332  6.640700  1.000000 406.1279 16.90000 394.0200 12.43000 17.10000
## 333  6.640700  1.000000 304.0000 16.90000 362.2500  7.83000 22.50331
## 334  6.458400  5.000000 224.0000 20.20000 360.1355  5.68000 22.20000
## 335  6.458400  5.000000 224.0000 20.20000 389.4000  6.75000 20.70000
## 336  5.985300  9.090950 224.0000 20.20000 360.0012  8.01000 21.10000
## 337  5.231100  9.048240 224.0000 20.20000 360.1220  9.80000 19.50000
## 338  5.615000  5.000000 224.0000 18.53245 394.8100 10.56000 18.50000
## 339  4.812200  5.000000 224.0000 20.20000 396.1400  8.51000 20.60000
## 340  4.812200  5.000000 224.0000 20.20000 396.9000  9.74000 19.00000
## 341  4.812200  5.000000 224.0000 20.20000 396.9000  9.29000 18.70000
## 342  7.037900  1.000000 284.0000 18.31416 394.7400  5.49000 32.70000
## 343  6.266900  1.000000 422.0000 15.90000 389.9600  8.65000 16.50000
## 344  5.732100  5.000000 370.0000 17.60000 360.2914  7.18000 23.90000
## 345  6.465400  5.000000 370.0000 17.60000 387.9700  4.61000 31.20000
## 346  8.013600  3.000000 352.0000 18.53698 385.6400 10.53000 17.50000
## 347  8.013600  3.000000 352.0000 18.80000 364.6100 12.67000 17.20000
## 348  8.535300  4.000000 351.0000 18.42714 392.4300  6.36000 23.10000
## 349  8.344000  8.528292 280.0000 17.00000 390.9400  5.99000 24.50000
## 350  8.792100  1.000000 335.0000 19.70000 389.8500 12.01257 26.60000
## 351  8.792100  1.000000 335.0000 19.70000 396.9000  5.98000 22.90000
## 352 10.710300  4.000000 411.0000 18.30000 370.7800  5.49000 24.10000
## 353 10.710300  4.000000 411.0000 18.30000 392.3300  7.79000 18.60000
## 354 12.126500  5.000000 187.0000 17.00000 384.4600  4.50000 30.10000
## 355 10.585700  4.000000 408.6828 22.00000 382.8000  8.05000 18.20000
## 356 10.585700  4.000000 334.0000 22.00000 376.0400  5.57000 20.60000
## 357  2.122200 24.000000 666.0000 20.20000 377.7300 17.60000 17.80000
## 358  2.505200 10.506987 666.0000 20.20000 391.3400 13.27000 21.70000
## 359  2.722700 24.000000 666.0000 20.20000 395.4300 11.48000 22.70000
## 360  2.509100 24.000000 666.0000 20.20000 390.7400 12.67000 22.60000
## 361  2.518200 24.000000 666.0000 20.20000 374.5600  7.79000 25.00000
## 362  2.295500 24.000000 666.0000 20.20000 350.6500 14.19000 19.90000
## 363  2.103600 24.000000 666.0000 20.20000 354.8333 10.19000 20.80000
## 364  1.904700 24.000000 666.0000 20.20000 353.0400 14.64000 22.42320
## 365  1.904700 24.000000 419.4814 20.20000 354.5500  5.29000 21.90000
## 366  1.613200 24.000000 421.4230 20.20000 354.7000  7.12000 27.50000
## 367  1.752300 24.000000 666.0000 20.20000 316.0300 14.00000 22.15868
## 368  1.510600 24.000000 666.0000 18.52920 131.4200 13.33000 23.10000
## 369  1.332500 10.260620 666.0000 20.20000 375.5200  3.26000 50.00000
```

```
## 370  1.356700 10.062988 666.0000 20.20000 375.3300 11.67202 50.00000
## 371  1.202400 24.000000 666.0000 18.65952 392.0500  2.96000 50.00000
## 372  1.169100 11.293564 666.0000 20.20000 366.1500  9.53000 50.00000
## 373  1.129600 24.000000 424.1549 20.20000 347.8800  8.88000 50.00000
## 374  1.174200 24.000000 666.0000 20.20000 396.9000 34.77000 13.80000
## 375  3.506328 24.000000 426.2033 20.20000 396.9000 13.09749 13.80000
## 376  1.316300 24.000000 666.0000 20.20000 396.9000 13.44000 15.00000
## 377  3.581410 24.000000 666.0000 20.20000 363.0200 23.24000 13.90000
## 378  1.358000 24.000000 666.0000 20.20000 353.3195 21.24000 13.30000
## 379  1.386100 24.000000 666.0000 20.20000 396.9000 23.69000 13.10000
## 380  1.386100 24.000000 430.1425 20.20000 393.7400 12.88518 10.20000
## 381  3.686415 24.000000 417.6090 20.20000 396.9000 17.21000 10.40000
## 382  3.608764 24.000000 666.0000 20.20000 396.9000 21.08000 10.90000
## 383  1.580400 24.000000 666.0000 20.20000 396.9000 23.60000 11.30000
## 384  1.533100 24.000000 666.0000 20.20000 358.8477 24.56000 12.30000
## 385  1.439500 24.000000 666.0000 20.20000 285.8300 13.24503 21.55815
## 386  1.426100 24.000000 666.0000 20.20000 396.9000 30.81000  7.20000
## 387  1.467200 10.970435 666.0000 20.20000 396.9000 28.28000 10.50000
## 388  1.518400 24.000000 666.0000 20.20000 396.9000 31.99000  7.40000
## 389  1.589500 11.434957 666.0000 20.20000 372.9200 30.62000 10.20000
## 390  1.728100 24.000000 666.0000 20.20000 396.9000 13.47628 11.50000
## 391  1.926500 24.000000 666.0000 20.20000 354.7276 17.11000 15.10000
## 392  2.167800 24.000000 666.0000 20.20000 378.3800 18.76000 23.20000
## 393  1.770000 24.000000 666.0000 20.20000 396.9000 25.68000  9.70000
## 394  1.791200 24.000000 666.0000 18.58111 396.9000 15.17000 13.80000
## 395  1.782100 11.383217 423.9426 20.20000 396.9000 16.35000 12.70000
## 396  1.725700 24.000000 666.0000 20.20000 391.9800 17.12000 13.10000
## 397  1.676800 24.000000 666.0000 20.20000 396.9000 19.37000 12.50000
## 398  3.586994 24.000000 666.0000 20.20000 393.1000 19.92000  8.50000
## 399  1.489600 24.000000 666.0000 18.67225 396.9000 30.59000  5.00000
## 400  1.500400 24.000000 666.0000 20.20000 338.1600 29.97000  6.30000
## 401  1.588800 24.000000 666.0000 20.20000 360.8941 26.77000  5.60000
## 402  1.574100 24.000000 666.0000 20.20000 358.6770 20.32000  7.20000
## 403  1.639000 24.000000 666.0000 20.20000 376.1100 20.31000 12.10000
## 404  1.702800 24.000000 666.0000 20.20000 396.9000 19.77000  8.30000
## 405  1.607400 24.000000 666.0000 20.20000 329.4600 13.92023  8.50000
## 406  1.425400 24.000000 666.0000 20.20000 384.9700 22.98000  5.00000
## 407  1.178100 24.000000 666.0000 20.20000 370.2200 23.34000 11.90000
## 408  1.285200 24.000000 666.0000 20.20000 332.0900 12.13000 27.90000
## 409  1.454700 24.000000 435.4989 20.20000 341.8759 26.40000 17.20000
## 410  1.465500 24.000000 666.0000 20.20000 179.3600 19.78000 27.50000
## 411  1.413000 24.000000 666.0000 20.20000   2.6000 10.11000 15.00000
## 412  1.527500 24.000000 666.0000 20.20000  35.0500 21.22000 20.49290
## 413  1.553900 24.000000 666.0000 20.20000  28.7900 34.37000 21.05304
## 414  1.589400 24.000000 666.0000 20.20000 210.9700 20.08000 16.30000
## 415  1.658200 24.000000 666.0000 20.20000  88.2700 36.98000  7.00000
## 416  1.834700 24.000000 666.0000 20.20000  27.2500 29.05000  7.20000
## 417  1.819500 24.000000 666.0000 20.20000  21.5700 14.01679  7.50000
## 418  1.647500 24.000000 666.0000 20.20000 127.3600 26.64000 10.40000
## 419  1.802600 24.000000 666.0000 20.20000  16.4500 20.62000  8.80000
## 420  1.794000 24.000000 666.0000 18.54387  48.4500 13.27876  8.40000
## 421  1.858900 24.000000 666.0000 18.59934 318.7500 13.29273 16.70000
## 422  3.648635 24.000000 666.0000 20.20000 319.9800 13.12091 14.20000
## 423  1.951200 24.000000 666.0000 20.20000 291.5500 14.10000 20.80000
```

```
## 424  2.021800 24.000000 666.0000 20.20000   2.5200 23.29000 13.40000
## 425  2.063500 24.000000 666.0000 20.20000   3.6500 17.16000 11.70000
## 426  1.909600 24.000000 666.0000 18.66848   7.6800 24.39000  8.30000
## 427  1.997600 24.000000 666.0000 20.20000  24.6500 15.69000 10.20000
## 428  1.862900 24.000000 666.0000 20.20000 354.6092 14.52000 20.75352
## 429  1.935600 24.000000 666.0000 20.20000  96.7300 21.52000 11.00000
## 430  1.968200 24.000000 666.0000 20.20000 350.7623 24.08000  9.50000
## 431  2.052700 24.000000 666.0000 20.20000  83.4500 17.64000 14.50000
## 432  2.088200 24.000000 666.0000 20.20000  81.3300 19.69000 14.10000
## 433  2.200400 24.000000 666.0000 20.20000  97.9500 12.03000 16.10000
## 434  2.315800 24.000000 666.0000 20.20000 100.1900 16.22000 14.30000
## 435  2.222200 24.000000 666.0000 18.56808 100.6300 15.17000 11.70000
## 436  2.124700 24.000000 666.0000 20.20000 109.8500 23.27000 13.40000
## 437  2.002600 24.000000 666.0000 20.20000  27.4900 18.05000  9.60000
## 438  1.914200 11.265531 666.0000 20.20000   9.3200 26.45000  8.70000
## 439  1.820600 24.000000 666.0000 20.20000  68.9500 34.02000  8.40000
## 440  1.817200 24.000000 666.0000 20.20000 396.9000 22.88000 12.80000
## 441  1.866200 24.000000 666.0000 20.20000 391.4500 22.11000 10.50000
## 442  2.065100 24.000000 666.0000 20.20000 385.9600 19.52000 17.10000
## 443  2.004800 24.000000 666.0000 20.20000 395.6900 13.04861 18.40000
## 444  1.978400 24.000000 666.0000 20.20000 386.7300 18.85000 15.40000
## 445  1.895600 24.000000 423.8488 20.20000 240.5200 12.73342 21.43269
## 446  1.987900 10.623669 666.0000 20.20000  43.0600 23.98000 21.37966
## 447  2.072000 10.780229 666.0000 20.20000 318.0100 17.79000 14.90000
## 448  2.198000 24.000000 666.0000 20.20000 388.5200 16.44000 12.60000
## 449  2.261600 24.000000 666.0000 18.55357 396.9000 18.13000 14.10000
## 450  2.185000 24.000000 666.0000 20.20000 359.9847 19.31000 13.00000
## 451  2.323600 24.000000 666.0000 20.20000   0.3200 17.44000 21.02164
## 452  3.692100 24.000000 423.9789 20.20000 355.2900 17.73000 15.20000
## 453  2.368200 24.000000 428.4484 20.20000 385.0900 17.27000 16.10000
## 454  2.452700 24.000000 666.0000 20.20000 375.8700 16.74000 17.80000
## 455  2.496100 24.000000 666.0000 18.57882   6.6800 18.71000 14.90000
## 456  3.671457 24.000000 666.0000 20.20000  50.9200 12.95437 14.10000
## 457  2.580600 24.000000 427.2168 18.61898 350.1203 12.99790 12.70000
## 458  2.779200 24.000000 666.0000 20.20000 358.7206 16.94000 13.50000
## 459  3.641011 24.000000 666.0000 20.20000 272.2100 16.23000 14.90000
## 460  2.717500 24.000000 666.0000 20.20000 396.9000 12.73426 21.91476
## 461  2.597500 24.000000 666.0000 18.64507 255.2300 16.42000 16.40000
## 462  2.567100 24.000000 666.0000 20.20000 391.4300 14.65000 17.70000
## 463  2.734400 24.000000 666.0000 20.20000 396.9000 13.99000 19.50000
## 464  2.801600 10.599343 666.0000 20.20000 393.8200 10.29000 20.20000
## 465  2.963400 24.000000 666.0000 20.20000 396.9000 13.22000 21.40000
## 466  3.066500 24.000000 436.4719 20.20000 334.4000 14.13000 19.90000
## 467  2.871500 24.000000 666.0000 20.20000 356.5861 12.81207 19.00000
## 468  2.540300 24.000000 666.0000 20.20000 331.2900 21.32000 19.10000
## 469  2.908400 24.000000 666.0000 20.20000 368.7400 18.13000 19.10000
## 470  2.823700 24.000000 666.0000 20.20000 396.9000 14.76000 20.10000
## 471  3.033400 24.000000 666.0000 20.20000 396.9000 16.29000 19.90000
## 472  3.099300 10.684763 666.0000 20.20000 395.3300 12.87000 19.60000
## 473  2.896500 24.000000 666.0000 20.20000 393.3700 14.36000 22.07047
## 474  2.532900 24.000000 666.0000 20.20000 374.6800 11.66000 29.80000
## 475  2.429800 24.000000 666.0000 20.20000 344.9074 13.35226 21.86051
## 476  2.206000 24.000000 666.0000 20.20000 302.7600 24.10000 13.30000
## 477  2.305300 10.526968 666.0000 20.20000 396.2100 18.68000 16.70000
```

```
## 478  2.100700 24.000000 666.0000 20.20000 348.8793 24.91000 12.00000
## 479  2.170500 24.000000 666.0000 18.60906 379.7000 18.03000 14.60000
## 480  1.951200 11.302998 666.0000 20.20000 383.3200 13.11000 21.40000
## 481  3.424200 24.000000 666.0000 20.20000 396.9000 10.74000 23.00000
## 482  3.784887 24.000000 666.0000 20.20000 393.0700  7.74000 23.70000
## 483  3.410600 24.000000 666.0000 20.20000 395.2800  7.01000 25.00000
## 484  4.098300 11.411483 666.0000 20.20000 359.4843 10.42000 21.80000
## 485  3.724000 24.000000 666.0000 20.20000 370.7300 13.34000 20.60000
## 486  3.697032 24.000000 666.0000 20.20000 388.6200 10.58000 22.44407
## 487  3.545900 10.794399 666.0000 20.20000 392.6800 14.98000 19.10000
## 488  3.711297 24.000000 666.0000 20.20000 388.2200 11.45000 20.60000
## 489  1.820900  4.000000 414.2885 20.10000 395.0900 18.06000 15.20000
## 490  1.755400  4.000000 459.1037 20.10000 350.7875 23.97000  7.00000
## 491  1.822600  4.000000 711.0000 20.10000 318.4300 29.68000  8.10000
## 492  1.868100  4.000000 711.0000 20.10000 390.1100 18.07000 13.60000
## 493  2.109900  4.000000 711.0000 20.10000 396.9000 13.35000 20.10000
## 494  2.381700  6.000000 391.0000 19.20000 396.9000 12.01000 21.80000
## 495  2.381700  6.000000 391.0000 19.20000 396.9000 13.59000 24.50000
## 496  2.798600  6.000000 391.0000 19.20000 393.2900 17.60000 23.10000
## 497  2.798600  6.000000 391.0000 18.50438 396.9000 21.14000 19.70000
## 498  2.892700  6.000000 391.0000 19.20000 396.9000 14.10000 18.30000
## 499  2.409100  6.000000 391.0000 18.60880 396.9000 12.92000 21.20000
## 500  2.399900  6.000000 391.0000 19.20000 395.7700 15.10000 17.50000
## 501  2.498200  6.000000 391.0000 19.20000 396.9000 12.81480 16.80000
## 502  2.478600  1.000000 273.0000 21.00000 391.9900  9.67000 22.40000
## 503  3.654789  1.000000 273.0000 21.00000 396.9000  9.08000 22.40700
## 504  2.167500  1.000000 273.0000 21.00000 396.9000  5.64000 23.90000
## 505  2.388900  1.000000 273.0000 18.63768 393.4500 12.05670 22.00000
## 506  2.505000  1.000000 273.0000 21.00000 396.9000 13.01420 11.90000
```