

Assignment 1

The Source of the Dataset : <https://www.kaggle.com/yasserh/housing-prices-dataset>

part1

Importing data set

```
Housing <- read.csv("C:/Users/Dell/Desktop/Housing.csv")
View(Housing)
```

part2

Descriptive statistics for Quantitative Variables

```
summary(Housing)
```

```
##      price      area      bedrooms      bathrooms
##  Min.   : 1750000  Min.   : 1650  Min.   :1.000  Min.   :1.000
## 1st Qu.: 3430000  1st Qu.: 3600  1st Qu.:2.000  1st Qu.:1.000
## Median : 4340000  Median : 4600  Median :3.000  Median :1.000
## Mean   : 4766729  Mean   : 5151  Mean   :2.965  Mean   :1.286
## 3rd Qu.: 5740000  3rd Qu.: 6360  3rd Qu.:3.000  3rd Qu.:2.000
## Max.   :13300000  Max.   :16200  Max.   :6.000  Max.   :4.000
##      stories      mainroad      guestroom      basement
##  Min.   :1.000  Length:545  Length:545  Length:545
## 1st Qu.:1.000  Class :character  Class :character  Class :character
## Median :2.000  Mode  :character  Mode  :character  Mode  :character
## Mean   :1.806
## 3rd Qu.:2.000
## Max.   :4.000
## hotwaterheating  airconditioning      parking      prefarea
## Length:545      Length:545      Min.   :0.0000  Length:545
## Class :character  Class :character  1st Qu.:0.0000  Class :character
## Mode  :character  Mode  :character  Median :0.0000  Mode  :character
##                               Mean   :0.6936
##                               3rd Qu.:1.0000
##                               Max.   :3.0000
## furnishingstatus
## Length:545
## Class :character
## Mode  :character
##
##
##
```

```
mean(Housing$price)
```

```
## [1] 4766729
```

```
sd(Housing$price)
```

```
## [1] 1870440
```

```
var(Housing$price)
```

```
## [1] 3.498544e+12
```

```
min(Housing$area)
```

```
## [1] 1650
```

```
max(Housing$area)
```

```
## [1] 16200
```

```
median(Housing$bedrooms)
```

```
## [1] 3
```

Descriptive statistics for categorical variables:

```
Housing$hotwater
```

```
## [1] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "yes"
## [13] "no" "yes" "no" "no" "no" "no" "no" "no" "no" "yes" "no" "no" "no"
## [25] "no" "no" "no" "no" "yes" "no" "no" "no" "no" "no" "no" "no" "no"
## [37] "yes" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [49] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [61] "no" "no" "no" "no" "no" "no" "yes" "no" "no" "no" "no" "no" "no"
## [73] "no" "no" "yes" "yes" "no" "no" "no" "no" "no" "yes" "no" "no" "no"
## [85] "yes" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [97] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [109] "no" "yes" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [121] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [133] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "yes"
## [145] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [157] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "yes" "no" "no"
## [169] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [181] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [193] "no" "no" "no" "no" "yes" "no" "no" "no" "no" "no" "no" "no" "no"
## [205] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [217] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [229] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [241] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [253] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [265] "no" "no" "no" "no" "no" "no" "yes" "no" "no" "no" "no" "no" "no"
## [277] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [289] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "yes" "no"
## [301] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [313] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "yes" "no" "no"
## [325] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "yes" "no"
## [337] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [349] "no" "no" "yes" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
```

```
## [361] "no" "no" "no" "yes" "yes" "no" "no" "no" "no" "no" "no" "no" "no"
## [373] "no" "no" "no" "no" "no" "no" "yes" "no" "no" "no" "no" "no" "no"
## [385] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [397] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [409] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [421] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [433] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [445] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [457] "no" "no" "no" "no" "no" "no" "no" "no" "no" "yes" "no" "no" "no"
## [469] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [481] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "yes" "no"
## [493] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [505] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [517] "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [529] "no" "no" "yes" "no" "no" "no" "no" "no" "no" "no" "no" "no" "no"
## [541] "no" "no" "no" "no" "no"
```

```
table(Housing$hotwater)
```

```
##
## no yes
## 520 25
```

```
hotwater_table <- table(Housing$hotwater)
hotwater_table
```

```
##
## no yes
## 520 25
```

```
prop.table(hotwater_table)
```

```
##
## no yes
## 0.95412844 0.04587156
```

```
Housing$parking
```

```
## [1] 2 3 2 3 2 2 2 0 2 1 2 2 1 2 0 2 1 2 2 1 2 2 1 1 2 2 0 1 2 1 2 2 1 1 1 2 1
## [38] 2 2 1 0 0 2 2 1 0 1 3 1 0 1 1 1 2 1 1 1 1 1 1 1 1 1 2 1 1 1 2 1 2 0 0 0 0
## [75] 1 0 0 0 2 0 1 1 1 0 2 0 0 2 2 2 0 2 0 3 1 2 1 1 0 0 0 1 1 0 2 0 0 0 1 1 2
## [112] 2 0 2 2 2 0 0 0 2 2 0 1 0 1 2 2 0 1 2 0 0 0 0 2 0 2 1 0 2 0 1 1 0 1 0 1 1
## [149] 0 0 0 2 0 0 2 2 0 1 2 0 0 0 0 0 1 0 2 2 0 0 0 1 2 0 1 2 2 0 2 2 2 1 0 1 0
## [186] 0 0 0 0 0 2 0 0 0 0 2 0 1 0 1 0 0 1 0 0 2 0 0 0 0 2 2 2 0 0 0 2 2 0 0 2 0
## [223] 2 1 2 3 0 1 2 1 0 0 0 0 2 1 0 0 0 1 1 2 0 0 0 2 0 3 0 0 0 1 0 0 2 1 2 0 1
## [260] 1 1 0 0 0 0 0 2 1 0 0 1 0 2 2 0 0 1 1 2 0 0 2 0 0 1 0 0 0 0 2 0 0 0 1 0 0
## [297] 1 0 2 3 0 0 1 0 3 1 1 2 1 0 0 1 0 0 1 0 1 2 0 2 2 2 1 3 0 0 0 1 0 0 0 3 0
## [334] 0 1 2 2 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 2 0 1 2 1 1 0 1 0 0 0 0 0 0 0 0 0
## [371] 2 0 0 0 0 0 2 0 0 2 0 0 0 2 0 0 2 0 0 0 0 0 0 0 0 0 1 1 1 1 1 3 0 0 0 0 1
## [408] 0 0 2 0 0 0 0 0 1 2 0 2 0 0 0 0 0 0 2 0 0 1 0 0 0 0 1 0 0 0 1 0 0 0 0 1 1
## [445] 0 0 1 0 2 0 0 0 2 1 0 0 0 0 0 0 1 0 0 0 1 0 0 2 0 0 0 0 3 0 1 0 1 0 1 0 1
## [482] 0 0 0 0 0 0 0 0 1 1 1 1 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 1 1
## [519] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 2 0 0 0 0
```

```
table(Housing$parking)

##
##  0  1  2  3
## 299 126 108 12

parking_table <- table(Housing$parking)
parking_table

##
##  0  1  2  3
## 299 126 108 12

prop.table(parking_table)

##
##          0          1          2          3
## 0.54862385 0.23119266 0.19816514 0.02201835

library(gmodels)
CrossTable(Housing$mainroad,Housing$furnishingstatus)

##
##
##   Cell Contents
## |-----|
## |                      N |
## | Chi-square contribution |
## |      N / Row Total |
## |      N / Col Total |
## |      N / Table Total |
## |-----|
##
##
## Total Observations in Table:  545
##
##
##           | Housing$furnishingstatus
## Housing$mainroad |      furnished | semi-furnished |      unfurnished |      Row Total |
## -----|-----|-----|-----|-----|
##           no |           9 |           31 |           37 |           77 |
##           |           5.875 |           0.036 |           5.585 |           |
##           |           0.117 |           0.403 |           0.481 |           0.141 |
##           |           0.064 |           0.137 |           0.208 |           |
##           |           0.017 |           0.057 |           0.068 |           |
## -----|-----|-----|-----|
##           yes |          131 |          196 |          141 |          468 |
##           |          0.967 |          0.006 |          0.919 |           |
##           |          0.280 |          0.419 |          0.301 |           0.859 |
##           |          0.936 |          0.863 |          0.792 |           |
##           |          0.240 |          0.360 |          0.259 |           |
```

```
## -----|-----|-----|-----|
##      Column Total |          140 |          227 |          178 |          545 |
##                  |          0.257 |          0.417 |          0.327 |          |
## -----|-----|-----|-----|
##
##
```

```
CrossTable(Housing$mainroad,Housing$guestroom)
```

```
##
##
##      Cell Contents
## |-----|
## |              N |
## | Chi-square contribution |
## |      N / Row Total |
## |      N / Col Total |
## |      N / Table Total |
## |-----|
##
##
## Total Observations in Table:  545
##
##
##      | Housing$guestroom
## Housing$mainroad |      no |      yes | Row Total |
## -----|-----|-----|-----|
##              no |      70 |       7 |      77 |
##                  |      0.710 |      3.280 |      |
##                  |      0.909 |      0.091 |      0.141 |
##                  |      0.156 |      0.072 |      |
##                  |      0.128 |      0.013 |      |
## -----|-----|-----|-----|
##              yes |      378 |      90 |      468 |
##                  |      0.117 |      0.540 |      |
##                  |      0.808 |      0.192 |      0.859 |
##                  |      0.844 |      0.928 |      |
##                  |      0.694 |      0.165 |      |
## -----|-----|-----|-----|
##      Column Total |      448 |      97 |      545 |
##                  |      0.822 |      0.178 |      |
## -----|-----|-----|-----|
##
##
```

```
library("Hmisc")
```

```
## Loading required package: lattice
```

```
## Loading required package: survival
```

```
## Loading required package: Formula
```

```
## Loading required package: ggplot2
```

```
## Warning in register(): Can't find generic 'scale_type' in package ggplot2 to
## register S3 method.
```

```
##
```

```
## Attaching package: 'Hmisc'
```

```
## The following objects are masked from 'package:base':
```

```
##
```

```
##      format.pval, units
```

```
describe(Housing$guestroom)
```

```
## Housing$guestroom
```

```
##      n missing distinct
```

```
##    545      0         2
```

```
##
```

```
## Value      no  yes
```

```
## Frequency  448   97
```

```
## Proportion 0.822 0.178
```

```
describe(Housing$mainroad)
```

```
## Housing$mainroad
```

```
##      n missing distinct
```

```
##    545      0         2
```

```
##
```

```
## Value      no  yes
```

```
## Frequency   77  468
```

```
## Proportion 0.141 0.859
```

part3

Transformation of variables

```
log(Housing$price)
```

```
## [1] 16.40327 16.32104 16.32104 16.31818 16.25000 16.19968 16.13298 16.13298
## [9] 16.10501 16.09789 16.09789 16.08568 16.04660 16.03905 16.03905 16.02378
## [17] 16.02378 16.00828 16.00044 15.99649 15.98456 15.97653 15.97249 15.97249
## [25] 15.96436 15.96027 15.95121 15.94374 15.94374 15.94374 15.94374 15.94374
## [33] 15.93116 15.91842 15.90984 15.90502 15.90031 15.89245 15.89025 15.88364
## [41] 15.87920 15.87475 15.85673 15.85673 15.83838 15.83838 15.83374 15.82908
## [49] 15.82440 15.81969 15.81969 15.81969 15.81021 15.81021 15.81021 15.81021
## [57] 15.80926 15.79582 15.79098 15.79098 15.78122 15.77137 15.77137 15.76641
## [65] 15.76142 15.75137 15.75137 15.74631 15.74122 15.73096 15.73096 15.72579
## [73] 15.72060 15.71538 15.71013 15.71013 15.71013 15.71013 15.71013 15.71013
## [81] 15.70696 15.70485 15.70485 15.69955 15.68885 15.68885 15.68885 15.68346
## [89] 15.68346 15.67804 15.67804 15.67477 15.67259 15.65606 15.65606 15.65606
## [97] 15.65606 15.65606 15.65495 15.65049 15.64489 15.64489 15.63925 15.63925
```

[105] 15.63925 15.63359 15.63359 15.62789 15.62503 15.62216 15.62216 15.62216
 ## [113] 15.62101 15.62101 15.61060 15.61060 15.61060 15.59890 15.59890 15.59890
 ## [121] 15.59890 15.59890 15.59890 15.59890 15.59890 15.59772 15.58707 15.58707
 ## [129] 15.58588 15.58588 15.58468 15.57509 15.57509 15.57509 15.57389 15.56905
 ## [137] 15.56297 15.56297 15.56297 15.56297 15.56297 15.54761 15.53828 15.53828
 ## [145] 15.53828 15.53828 15.53828 15.53828 15.53828 15.53828 15.53828 15.53201
 ## [153] 15.53201 15.52570 15.52570 15.52570 15.52443 15.51935 15.51935 15.51296
 ## [161] 15.51296 15.51296 15.51296 15.50653 15.50006 15.49876 15.48698 15.48038
 ## [169] 15.47374 15.47374 15.47374 15.47374 15.47374 15.47374 15.47374 15.47374
 ## [177] 15.47374 15.47240 15.46973 15.46705 15.46705 15.46705 15.45354 15.45354
 ## [185] 15.44671 15.44671 15.44671 15.44671 15.43984 15.43292 15.43292 15.43292
 ## [193] 15.43292 15.43153 15.42595 15.41893 15.41893 15.41611 15.41186 15.40617
 ## [201] 15.40475 15.40475 15.40475 15.40475 15.40475 15.40475 15.40475 15.40475
 ## [209] 15.40475 15.40475 15.40475 15.40475 15.40332 15.40332 15.39758 15.39036
 ## [217] 15.39036 15.39036 15.39036 15.38308 15.38308 15.37723 15.37576 15.37576
 ## [225] 15.37576 15.37429 15.36094 15.36094 15.36094 15.36094 15.36094 15.36094
 ## [233] 15.35345 15.34591 15.34591 15.34591 15.34591 15.34591 15.34439 15.33830
 ## [241] 15.33830 15.33064 15.33064 15.33064 15.33064 15.33064 15.33064 15.33064
 ## [249] 15.32910 15.32910 15.32292 15.32292 15.32292 15.32292 15.31513 15.31513
 ## [257] 15.31513 15.31513 15.31513 15.31357 15.31357 15.31357 15.30729 15.29939
 ## [265] 15.29939 15.29780 15.29780 15.29780 15.29302 15.29142 15.28338 15.28338
 ## [273] 15.28338 15.28338 15.28338 15.27853 15.27529 15.27529 15.26876 15.26712
 ## [281] 15.26712 15.26712 15.26712 15.26712 15.26712 15.25889 15.25889 15.25060
 ## [289] 15.25060 15.25060 15.25060 15.25060 15.25060 15.25060 15.25060 15.25060
 ## [297] 15.25060 15.25060 15.25060 15.25060 15.25060 15.25060 15.25060 15.25060
 ## [305] 15.24893 15.24893 15.24223 15.24223 15.24223 15.23379 15.23379 15.23209
 ## [313] 15.22613 15.22528 15.22528 15.22528 15.21669 15.21669 15.21669 15.21669
 ## [321] 15.21669 15.20804 15.20804 15.20804 15.20368 15.20368 15.19930 15.19930
 ## [329] 15.19930 15.19930 15.19930 15.18160 15.18160 15.18160 15.18160 15.18160
 ## [337] 15.18160 15.18160 15.17263 15.17263 15.16358 15.16358 15.16358 15.16358
 ## [345] 15.16358 15.16358 15.16358 15.15994 15.15445 15.14523 15.14523 15.14523
 ## [353] 15.14523 15.14523 15.14523 15.14338 15.14338 15.14338 15.13593 15.12654
 ## [361] 15.12654 15.12654 15.12654 15.12654 15.12465 15.12465 15.11706 15.11706
 ## [369] 15.11706 15.11706 15.10749 15.10749 15.10749 15.10749 15.10749 15.10749
 ## [377] 15.10749 15.10749 15.10749 15.10557 15.09783 15.09783 15.08808 15.08808
 ## [385] 15.08808 15.08808 15.07822 15.06827 15.06827 15.06827 15.06827 15.06827
 ## [393] 15.06827 15.06827 15.06827 15.06827 15.06827 15.06827 15.06827 15.06827
 ## [401] 15.06827 15.06827 15.06827 15.06827 15.06627 15.05822 15.05822 15.05822
 ## [409] 15.04807 15.04807 15.04807 15.04807 15.04807 15.04807 15.04603 15.03781
 ## [417] 15.03781 15.03781 15.02745 15.02745 15.02745 15.02745 15.02745 15.02745
 ## [425] 15.02745 15.02745 15.02537 15.01908 15.01698 15.01698 15.00640 15.00640
 ## [433] 15.00640 15.00640 15.00640 15.00640 15.00640 15.00640 14.99570 14.99570
 ## [441] 14.98923 14.98489 14.98489 14.98489 14.98489 14.96291 14.96291 14.96291
 ## [449] 14.96291 14.96291 14.96291 14.96291 14.96291 14.96291 14.96069 14.95622
 ## [457] 14.95297 14.95174 14.95174 14.95174 14.94271 14.94044 14.94044 14.94044
 ## [465] 14.94044 14.92901 14.91745 14.91745 14.91745 14.91745 14.91745 14.91745
 ## [473] 14.91745 14.91512 14.90575 14.90104 14.89392 14.89392 14.89392 14.89392
 ## [481] 14.89392 14.89392 14.89392 14.89392 14.86982 14.86982 14.86982 14.86982
 ## [489] 14.86371 14.85755 14.85755 14.85755 14.84513 14.84513 14.81981 14.81981
 ## [497] 14.80691 14.79384 14.79384 14.79384 14.79384 14.79384 14.79384 14.79384
 ## [505] 14.79120 14.79120 14.77256 14.76717 14.76717 14.76717 14.73977 14.73977
 ## [513] 14.73977 14.72578 14.72578 14.71160 14.71160 14.71160 14.71160 14.71160
 ## [521] 14.71160 14.69431 14.68261 14.68261 14.68261 14.66780 14.65276 14.63749
 ## [529] 14.63749 14.63749 14.62199 14.61886 14.57398 14.55745 14.55745 14.55745

```
## [537] 14.48846 14.45209 14.45209 14.43340 14.41435 14.38488 14.37513 14.37513
## [545] 14.37513
```

```
Housing$price_ztransformed = (Housing$price - mean(Housing$price)) / sd(Housing$price)
```

```
Housing$price_ztransformed
```

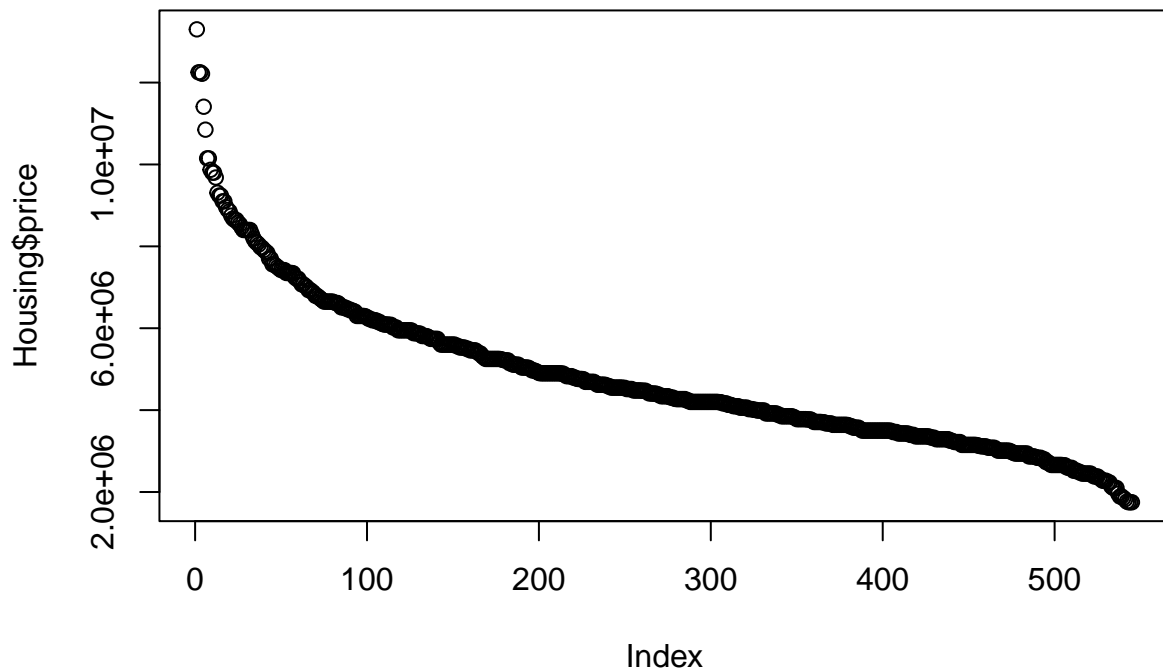
```
## [1] 13299997 12249997 12249997 12214997 11409997 10849997 10149997 10149997
## [9] 9869997 9799997 9799997 9680997 9309997 9239997 9239997 9099997
## [17] 9099997 8959997 8889997 8854997 8749997 8679997 8644997 8644997
## [25] 8574997 8539997 8462997 8399997 8399997 8399997 8399997 8399997
## [33] 8294997 8189997 8119997 8080937 8042997 7979997 7962497 7909997
## [41] 7874997 7839997 7699997 7699997 7559997 7559997 7524997 7489997
## [49] 7454997 7419997 7419997 7419997 7349997 7349997 7349997 7349997
## [57] 7342997 7244997 7209997 7209997 7139997 7069997 7069997 7034997
## [65] 6999997 6929997 6929997 6894997 6859997 6789997 6789997 6754997
## [73] 6719997 6684997 6649997 6649997 6649997 6649997 6649997 6649997
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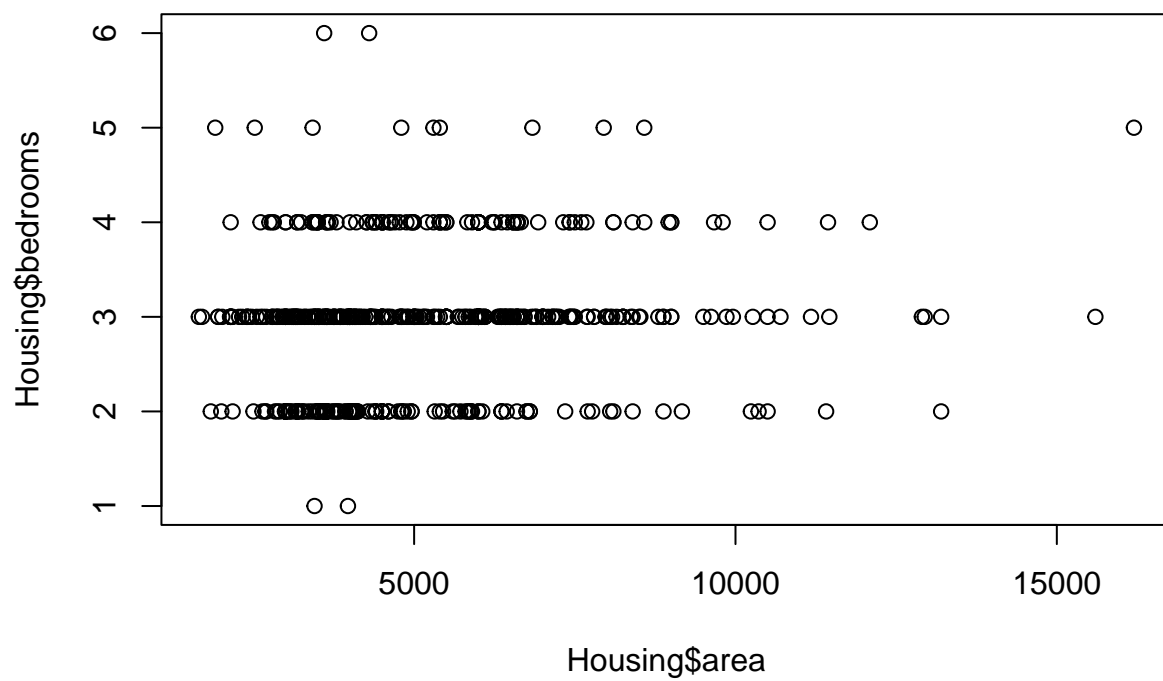
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part4

```
plot(Housing$price)
```

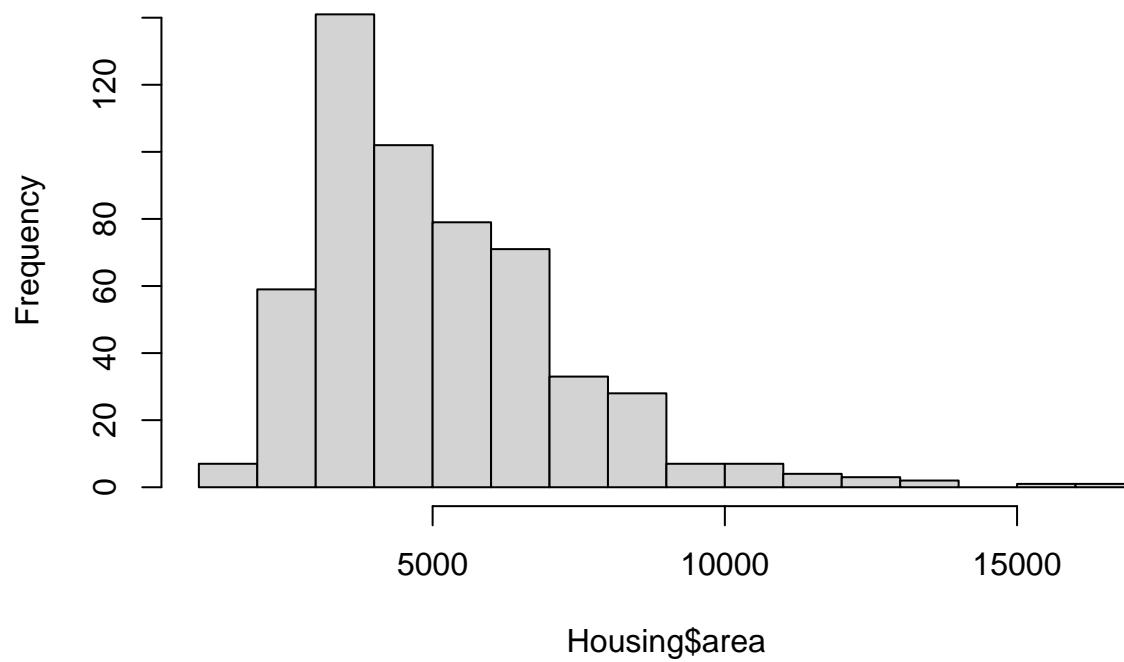


```
plot(Housing$area,Housing$bedrooms)
```



```
hist(Housing$area)
```

Histogram of Housing\$area



```
library(ggplot2)
ggplot(Housing,aes(x=price,y=area))+geom_point()
```

