BSE658A-Summary-05

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2022-09-07

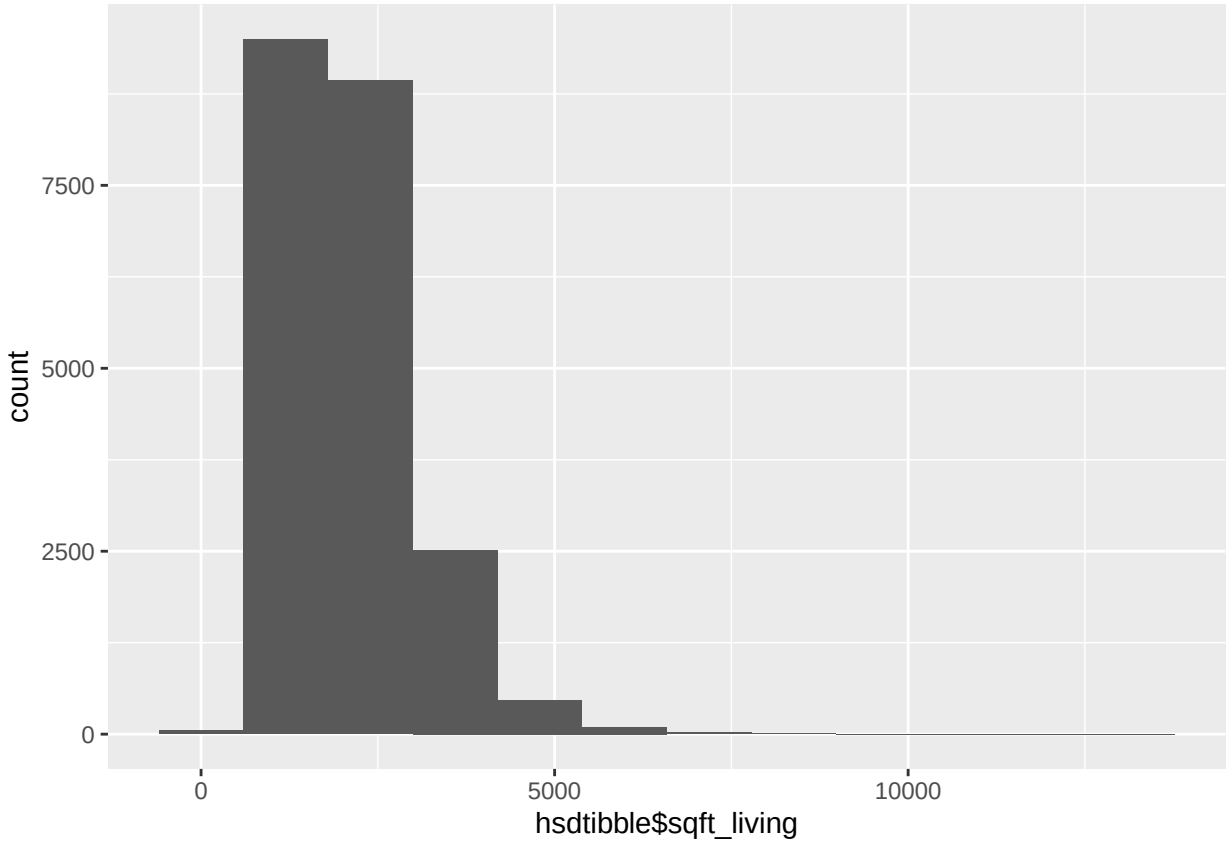
```
library(lsr)
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
## v ggplot2 3.3.6     v purrr   0.3.4
## v tibble  3.1.8     v dplyr   1.0.9
## v tidyr   1.2.0     v stringr 1.4.0
## v readr   2.1.2     v forcats 0.5.1
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
path <- "D:/Abin/Documents/BSE658A_BioStats/BSE658A-Assignments/kc_house_data.csv"
kc_housesales_data <- read.csv(path)
#kc_housesales_data
```

```
hsdtibble <- as_tibble(kc_housesales_data)
#hsdtibble
```

```
df <- data.frame(hsdtibble$sqft_living)

ggplot(df, aes(x = hsdtibble$sqft_living)) + geom_histogram(bins=12)
```




```
library(psych)
```

```
##
## Attaching package: 'psych'
```

```
## The following objects are masked from 'package:ggplot2':
##
##     %+%, alpha
```

```
#to find skewness of the data
skew(hsdtibble$sqft_living)
```

```
## [1] 1.473011
```

```
#Measures of Central Tendency

mean(hsdtibble$sqft_living)
```

```
## [1] 2080.322
```

```
median(hsdtibble$sqft_living)
```

```
## [1] 1910
```

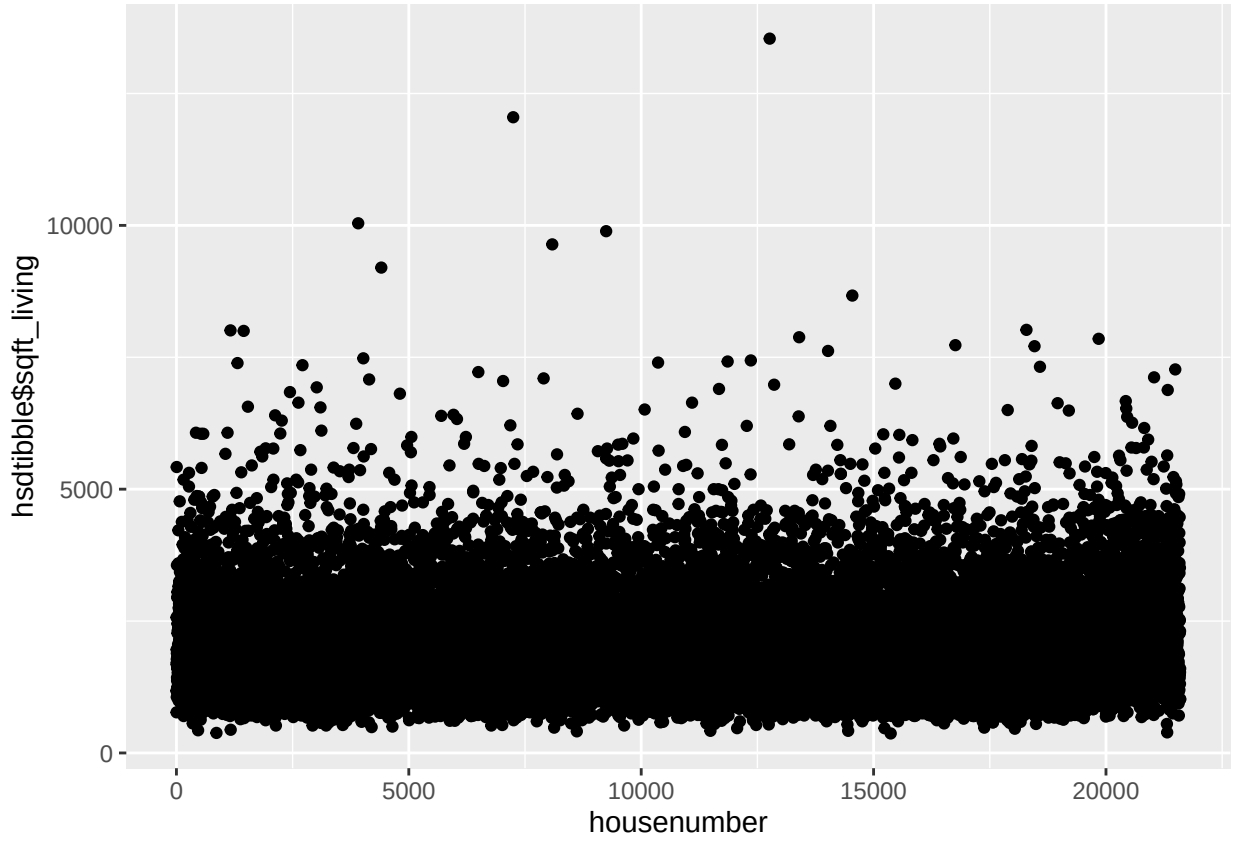
```
modeOf(hsdtibble$sqft_living)
```

```
## [1] 1300
```

```
maxFreq(hsdtibble$sqft_living)
```

```
## [1] 138
```

```
#Measures of variability
library(dplyr)
df <- mutate(df, housenumber= 1:length(hsdtibble$sqft_living))
ggplot(df, aes(y = hsdtibble$sqft_living, x = housenumber)) + geom_point()
```




```
range(hsdtibble$sqft_living)
```

```
## [1]   370 13540
```

```
#iqr
quantile(x = hsdtibble$sqft_living, probs = c(.25,.75)) #second
```

```
##  25%  75%
## 1430 2550
```

```r
#variance
var(hsdtibble$sqft_living)
```

```
## [1] 842918.9
```

```r
sd(hsdtibble$sqft_living)
```

```
## [1] 918.1061
```

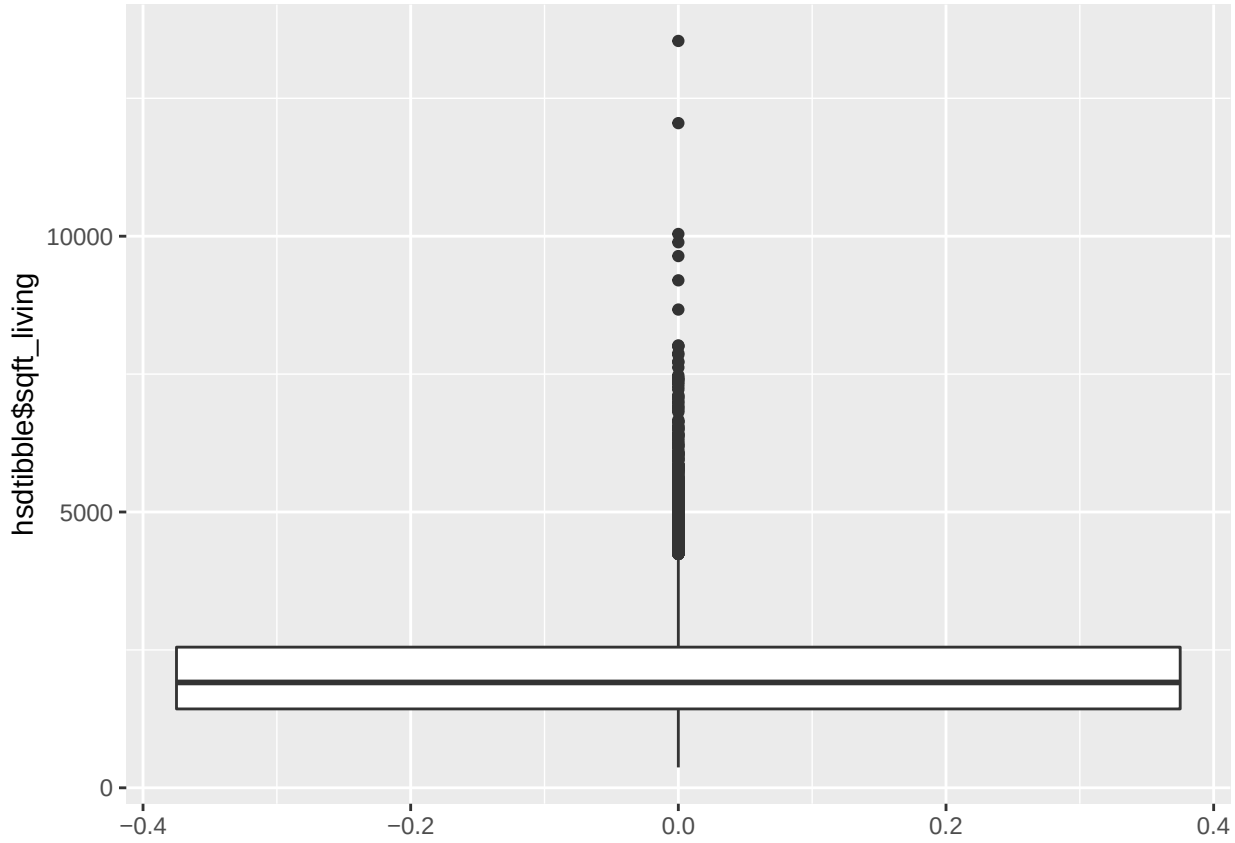
```r
#let's check if bessel's correction makes a difference

sdn <- function(x) {
  return(sqrt(mean((x - mean(x))^2)))
}
sdn(hsdtibble$sqft_living)
```

```
## [1] 918.0849
```

```r
summary(hsdtibble$sqft_living)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     370    1430    1910    2080    2550   13540
```

```r
#boxplot?
ggplot(df, aes(x=hsdtibble$sqft_living, )) +
  geom_boxplot()+ coord_flip()
```




```
#let's try the summary of whole dataset
summary(hsdtibble)
```

```
##        id                 date               price            bedrooms
##  Min.   :1.000e+06   Length:21597       Min.   :  78000   Min.   : 1.000
##  1st Qu.:2.123e+09   Class :character   1st Qu.: 322000   1st Qu.: 3.000
##  Median :3.905e+09   Mode  :character   Median : 450000   Median : 3.000
##  Mean   :4.580e+09                      Mean   : 540297   Mean   : 3.373
##  3rd Qu.:7.309e+09                      3rd Qu.: 645000   3rd Qu.: 4.000
##  Max.   :9.900e+09                      Max.   :7700000   Max.   :33.000
##    bathrooms      sqft_living       sqft_lot           floors
##  Min.   :0.500   Min.   :  370   Min.   :    520   Min.   :1.000
##  1st Qu.:1.750   1st Qu.: 1430   1st Qu.:   5040   1st Qu.:1.000
##  Median :2.250   Median : 1910   Median :   7618   Median :1.500
##  Mean   :2.116   Mean   : 2080   Mean   :  15099   Mean   :1.494
##  3rd Qu.:2.500   3rd Qu.: 2550   3rd Qu.:  10685   3rd Qu.:2.000
##  Max.   :8.000   Max.   :13540   Max.   :1651359   Max.   :3.500
##    waterfront            view          condition        grade
##  Min.   :0.000000   Min.   :0.0000   Min.   :1.00   Min.   : 3.000
##  1st Qu.:0.000000   1st Qu.:0.0000   1st Qu.:3.00   1st Qu.: 7.000
##  Median :0.000000   Median :0.0000   Median :3.00   Median : 7.000
##  Mean   :0.007547   Mean   :0.2343   Mean   :3.41   Mean   : 7.658
##  3rd Qu.:0.000000   3rd Qu.:0.0000   3rd Qu.:4.00   3rd Qu.: 8.000
##  Max.   :1.000000   Max.   :4.0000   Max.   :5.00   Max.   :13.000
##    sqft_above   sqft_basement       yr_built     yr_renovated
```

```
##  Min.   : 370   Min.   :   0.0   Min.   :1900   Min.   :   0.00
##  1st Qu.:1190   1st Qu.:   0.0   1st Qu.:1951   1st Qu.:   0.00
##  Median :1560   Median :   0.0   Median :1975   Median :   0.00
##  Mean   :1789   Mean   : 291.7   Mean   :1971   Mean   :  84.46
##  3rd Qu.:2210   3rd Qu.: 560.0   3rd Qu.:1997   3rd Qu.:   0.00
##  Max.   :9410   Max.   :4820.0   Max.   :2015   Max.   :2015.00
##     zipcode           lat             long        sqft_living15
##  Min.   :98001   Min.   :47.16   Min.   :-122.5   Min.   : 399
##  1st Qu.:98033   1st Qu.:47.47   1st Qu.:-122.3   1st Qu.:1490
##  Median :98065   Median :47.57   Median :-122.2   Median :1840
##  Mean   :98078   Mean   :47.56   Mean   :-122.2   Mean   :1987
##  3rd Qu.:98118   3rd Qu.:47.68   3rd Qu.:-122.1   3rd Qu.:2360
##  Max.   :98199   Max.   :47.78   Max.   :-121.3   Max.   :6210
##    sqft_lot15
##  Min.   :   651
##  1st Qu.:  5100
##  Median :  7620
##  Mean   : 12758
##  3rd Qu.: 10083
##  Max.   :871200
```

```
describe(hsdtibble)
```

```
##                vars     n          mean           sd       median       trimmed
## id                1 21597 4580474287.77 2.876736e+09  3.90493e+09 4500243579.12
## date*             2 21597        197.73 1.046800e+02  2.01000e+02        199.56
## price             3 21597     540296.57 3.673681e+05  4.50000e+05     481824.89
## bedrooms          4 21597          3.37 9.300000e-01  3.00000e+00          3.34
## bathrooms         5 21597          2.12 7.700000e-01  2.25000e+00          2.08
## sqft_living       6 21597       2080.32 9.181100e+02  1.91000e+03       1984.75
## sqft_lot          7 21597      15099.41 4.141264e+04  7.61800e+03       8257.51
## floors            8 21597          1.49 5.400000e-01  1.50000e+00          1.45
## waterfront        9 21597          0.01 9.000000e-02  0.00000e+00          0.00
## view             10 21597          0.23 7.700000e-01  0.00000e+00          0.00
## condition        11 21597          3.41 6.500000e-01  3.00000e+00          3.30
## grade            12 21597          7.66 1.170000e+00  7.00000e+00          7.58
## sqft_above       13 21597       1788.60 8.277600e+02  1.56000e+03       1683.11
## sqft_basement    14 21597        291.73 4.426700e+02  0.00000e+00        205.50
## yr_built         15 21597       1971.00 2.938000e+01  1.97500e+03       1973.09
## yr_renovated     16 21597         84.46 4.018200e+02  0.00000e+00          0.00
## zipcode          17 21597      98077.95 5.351000e+01  9.80650e+04      98074.73
## lat              18 21597         47.56 1.400000e-01  4.75700e+01         47.57
## long             19 21597       -122.21 1.400000e-01 -1.22230e+02       -122.23
## sqft_living15    20 21597       1986.62 6.852300e+02  1.84000e+03       1914.20
## sqft_lot15       21 21597      12758.28 2.727444e+04  7.62000e+03       7901.45
##                          mad        min           max        range  skew kurtosis
## id             3.561991e+09 1000102.00 9900000190.00 9.899000e+09  0.24    -1.26
## date*          1.304700e+02       1.00        372.00 3.710000e+02 -0.15    -1.16
## price          2.223900e+05   78000.00    7700000.00 7.622000e+06  4.02    34.53
## bedrooms       1.480000e+00       1.00         33.00 3.200000e+01  2.02    49.81
## bathrooms      7.400000e-01       0.50          8.00 7.500000e+00  0.52     1.28
## sqft_living    8.006000e+02     370.00      13540.00 1.317000e+04  1.47     5.25
## sqft_lot       3.881450e+03     520.00    1651359.00 1.650839e+06 13.07   285.40
## floors         7.400000e-01       1.00          3.50 2.500000e+00  0.61    -0.49
```

```
## waterfront    0.000000e+00       0.00          1.00 1.000000e+00 11.38   127.49
## view          0.000000e+00       0.00          4.00 4.000000e+00  3.40    10.89
## condition     0.000000e+00       1.00          5.00 4.000000e+00  1.04     0.52
## grade         1.480000e+00       3.00         13.00 1.000000e+01  0.79     1.13
## sqft_above    6.671700e+02     370.00       9410.00 9.040000e+03  1.45     3.40
## sqft_basement 0.000000e+00       0.00       4820.00 4.820000e+03  1.58     2.71
## yr_built      3.410000e+01    1900.00       2015.00 1.150000e+02 -0.47    -0.66
## yr_renovated  0.000000e+00       0.00       2015.00 2.015000e+03  4.55    18.68
## zipcode       6.227000e+01   98001.00      98199.00 1.980000e+02  0.41    -0.85
## lat           1.600000e-01      47.16         47.78 6.200000e-01 -0.49    -0.68
## long          1.500000e-01    -122.52       -121.32 1.200000e+00  0.88     1.05
## sqft_living15 6.078700e+02     399.00       6210.00 5.811000e+03  1.11     1.59
## sqft_lot15    3.713910e+03     651.00     871200.00 8.705490e+05  9.52   151.35
##                         se
## id             19575066.73
## date*                0.71
## price             2499.80
## bedrooms             0.01
## bathrooms            0.01
## sqft_living          6.25
## sqft_lot           281.80
## floors               0.00
## waterfront           0.00
## view                 0.01
## condition            0.00
## grade                0.01
## sqft_above           5.63
## sqft_basement        3.01
## yr_built             0.20
## yr_renovated         2.73
## zipcode              0.36
## lat                  0.00
## long                 0.00
## sqft_living15        4.66
## sqft_lot15         185.59
```

```
library(dplyr)
samplesz = c(1:2000)
sno = c(1:length(samplesz))
sz = as_tibble_col(sno,column_name = "Sample Number")
sz <- mutate(sz,'Sample Size' = samplesz)
#sz
```

```
#samples = tibble()
#for (i in sz$`Sample Size`) {
#  samplesi <- sample_n(hsdtibble,i)
#}
```

```
smean = c()
samsd = c()
for (i in sz$`Sample Size`) {
  sampled = (sample_n(hsdtibble,i))
  smean1 <- mean(sampled$sqft_living)
```

```
  smean = c(smean,smean1)
  samsd1 <- sd(sampled$sqft_living)
  samsd = c(samsd,samsd1)
}
```

```
Rsampletib <- sz %>% mutate('Sample Mean' = smean )
Popmean = c(rep(mean(hsdtibble$sqft_living),length(sno)))
Rsampletib <- Rsampletib %>% mutate('Population Mean' = Popmean )
Rsampletib
```

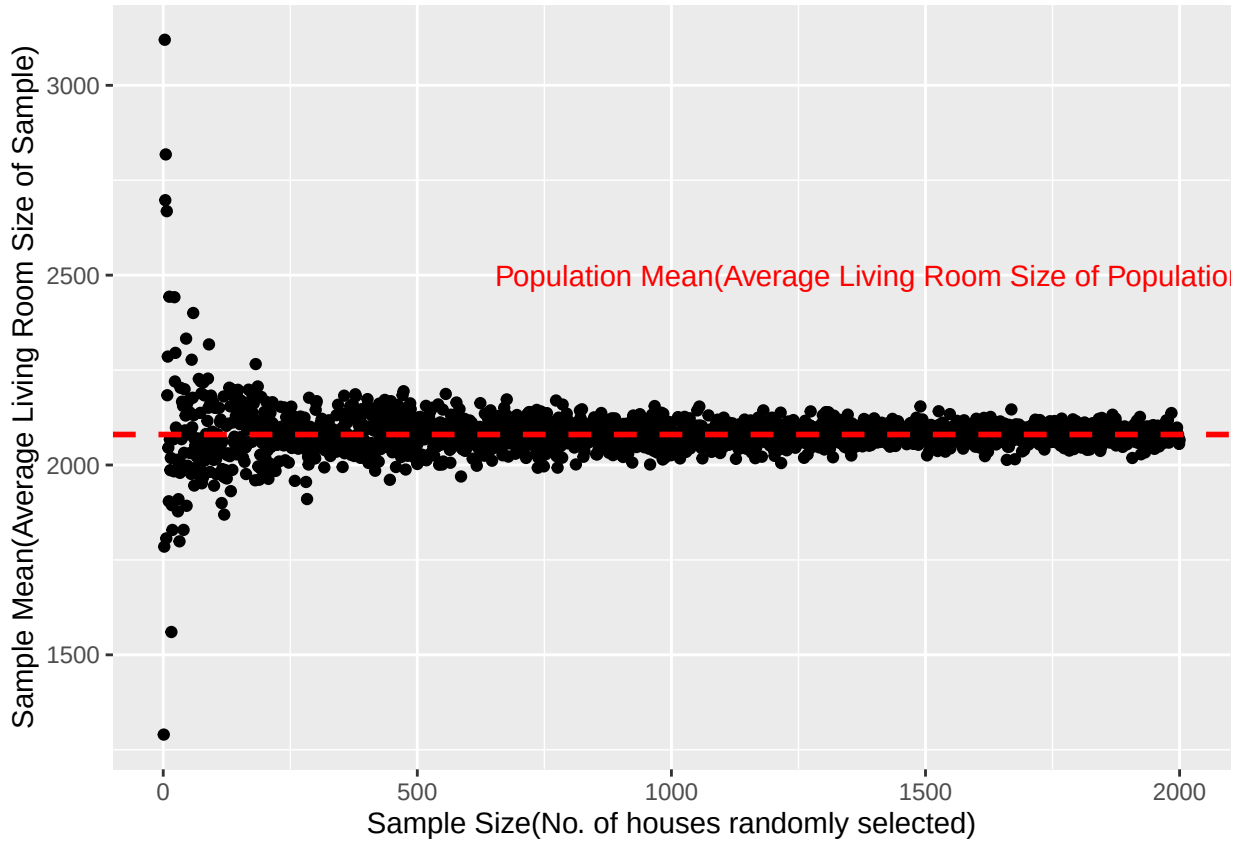
```
## # A tibble: 2,000 x 4
##    `Sample Number` `Sample Size` `Sample Mean` `Population Mean`
##              <int>         <int>         <dbl>             <dbl>
##  1               1             1         1290              2080.
##  2               2             2         1785              2080.
##  3               3             3         3120              2080.
##  4               4             4         2698.             2080.
##  5               5             5         2818              2080.
##  6               6             6         1807.             2080.
##  7               7             7         2669.             2080.
##  8               8             8         2184.             2080.
##  9               9             9         2286.             2080.
## 10              10            10         2046.             2080.
## # ... with 1,990 more rows
## # i Use `print(n = ...)` to see more rows
```

```
#samsd = c()
#for (i in sz$`Sample Size`) {
#  samsd1 <- sd((sample_n(hsdtibble,i))$sqft_living)
#  samsd = c(samsd,samsd1)
#}
```

```
Rsampletib <- Rsampletib %>% mutate('Sample Standard Deviation' = samsd )
Popsd = c(rep(sd(hsdtibble$sqft_living),length(sno)))
Rsampletib <- Rsampletib %>% mutate('Population Standard Deviation' = Popsd )
Rsampletib
```

```
## # A tibble: 2,000 x 6
##    `Sample Number` `Sample Size` `Sample Mean` `Population Mean` Sampl~1 Popul~2
##              <int>         <int>         <dbl>             <dbl>   <dbl>   <dbl>
##  1               1             1         1290              2080.     NA     918.
##  2               2             2         1785              2080.    841.    918.
##  3               3             3         3120              2080.    663.    918.
##  4               4             4         2698.             2080.   1054.    918.
##  5               5             5         2818              2080.   1377.    918.
##  6               6             6         1807.             2080.    666.    918.
##  7               7             7         2669.             2080.   1279.    918.
##  8               8             8         2184.             2080.    611.    918.
##  9               9             9         2286.             2080.   1008.    918.
## 10              10            10         2046.             2080.   1003.    918.
## # ... with 1,990 more rows, and abbreviated variable names
## #   1: `Sample Standard Deviation`, 2: `Population Standard Deviation`
## # i Use `print(n = ...)` to see more rows
```

```
df1 <- data.frame(Rsampletib$`Sample Mean`)
df1 <- mutate(df1,`Sample Size`= 1:length(Rsampletib$`Sample Size`))
ggplot(df1, aes(y = Rsampletib$`Sample Mean`, x = Rsampletib$`Sample Size`)) + geom_point() + geom_hlin
 geom_text(aes( 1400, 2500, label = "Population Mean(Average Living Room Size of Population)"),colour =
```




```
df2 <- data.frame(Rsampletib$`Sample Standard Deviation`)
df2 <- mutate(df2,`Sample Size`= 1:length(Rsampletib$`Sample Size`))
ggplot(df2, aes(y = Rsampletib$`Sample Standard Deviation`, x = Rsampletib$`Sample Size`)) + geom_point
 geom_text(aes( 1700, 1200, label = "Population Standard Deviation"),colour = "red", size = 4,show.lege
```


2000
1500
1000
500
Sample Standard Deviation
Population Standard Deviation
0
500
1000
1500
2000
Sample Size(No. of houses randomly selected)