Rolling Sales Queens

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Working directory is locally linked and pushed to GitHub.

```
#require(gdata)
#require(plyr) #Added by Monnie McGee
#install the gdata and plyr packages and load in to R.
setwd("C:\\Users\\Yao\\Documents\\GitHub\\DDS-HW6\\Data")
```

Saved the file as a csv to use read.csv to import the rolling sales for Queens, skipping 4 header lines from the original file.

```
qns <- read.csv("rollingsales_queens.csv",skip=4,header=TRUE)
```

Check the data attributes.

```
head(qns)
```

```
##   BOROUGH       NEIGHBORHOOD                    BUILDING.CLASS.CATEGORY
## 1       4 AIRPORT LA GUARDIA 01 ONE FAMILY DWELLINGS
## 2       4 AIRPORT LA GUARDIA 01 ONE FAMILY DWELLINGS
## 3       4 AIRPORT LA GUARDIA 02 TWO FAMILY DWELLINGS
## 4       4 AIRPORT LA GUARDIA 03 THREE FAMILY DWELLINGS
## 5       4 AIRPORT LA GUARDIA 03 THREE FAMILY DWELLINGS
## 6       4 AIRPORT LA GUARDIA 03 THREE FAMILY DWELLINGS
##   TAX.CLASS.AT.PRESENT BLOCK LOT EASE.MENT BUILDING.CLASS.AT.PRESENT
## 1                    1   976  61        NA                         A5
## 2                    1   976  63        NA                         A5
## 3                    1   976  70        NA                         B1
## 4                    1   949  15        NA                         C0
## 5                    1   949  56        NA                         C0
## 6                    1   949  59        NA                         C0
##               ADDRESS APARTMENT.NUMBER ZIP.CODE RESIDENTIAL.UNITS
## 1 21-21 80TH   STREET                    11370                1
## 2 21-17 80TH   STREET                    11370                1
## 3 21-03 80TH   STREET                    11370                2
## 4 19-08 81ST   STREET                    11370                3
## 5 19-69 80TH   STREET                    11370                3
## 6   19-63 80TH STREET                    11370                3
##   COMMERCIAL.UNITS TOTAL.UNITS LAND.SQUARE.FEET GROSS.SQUARE.FEET
## 1                -           1           1,800              1,224
## 2                -           1           1,800              1,224
## 3                -           2           1,800              1,224
## 4                -           3           2,112              4,300
## 5                -           3           2,000              2,835
## 6                -           3           2,000              2,835
##   YEAR.BUILT TAX.CLASS.AT.TIME.OF.SALE BUILDING.CLASS.AT.TIME.OF.SALE
## 1       1950                         1                             A5
## 2       1950                         1                             A5
## 3       1950                         1                             B1
## 4       1985                         1                             C0
```

```
## 5       1945                          1                              C0
## 6       1945                          1                              C0
##   SALE.PRICE  SALE.DATE
## 1  $660,000   7/26/2016
## 2  $275,500  11/18/2016
## 3      $-     6/13/2016
## 4  $940,000   4/14/2016
## 5      $-     8/15/2016
## 6  $470,000   4/15/2016
```

```
summary(qns)
```

```
##     BOROUGH           NEIGHBORHOOD
##  Min.   :4   FLUSHING-NORTH : 2575
##  1st Qu.:4   ASTORIA        : 1165
##  Median :4   BAYSIDE        : 1132
##  Mean   :4   FOREST HILLS   : 1052
##  3rd Qu.:4   JACKSON HEIGHTS:  993
##  Max.   :4   FLUSHING-SOUTH :  854
##              (Other)        :18549
##                                  BUILDING.CLASS.CATEGORY
##  01 ONE FAMILY DWELLINGS                    :8357
##  02 TWO FAMILY DWELLINGS                    :5681
##  10 COOPS - ELEVATOR APARTMENTS             :3867
##  13 CONDOS - ELEVATOR APARTMENTS            :1735
##  03 THREE FAMILY DWELLINGS                  :1235
##  09 COOPS - WALKUP APARTMENTS               :1226
##  (Other)                                    :4219
##  TAX.CLASS.AT.PRESENT     BLOCK            LOT         EASE.MENT
##  1      :15342        Min.   :   13   Min.   :   1.0   Mode:logical
##  2      : 7213        1st Qu.: 2694   1st Qu.:  16.0   NA's:26320
##  4      : 1797        Median : 5938   Median :  39.0
##  2A     :  629        Mean   : 6614   Mean   : 203.7
##  1B     :  429        3rd Qu.:10076   3rd Qu.:  81.0
##         :  373        Max.   :16322   Max.   :8007.0
##  (Other):  537
##  BUILDING.CLASS.AT.PRESENT                   ADDRESS      APARTMENT.NUMBER
##  A1     : 3870             120 BEACH 26 STREET   :  127          :23536
##  D4     : 3867             63-14 QUEENS BOULEVARD:   66   2A     :   48
##  A5     : 2034             31-35 31ST   STREET   :   63   2B     :   48
##  B3     : 1954             112-45 39TH    AVENUE :   60   3B     :   47
##  B2     : 1850             131-05 40TH   ROAD    :   55   3A     :   45
##  A2     : 1593             42-60 CRESCENT STREET :   54   4A     :   35
##  (Other):11152             (Other)               :25895   (Other): 2561
##     ZIP.CODE     RESIDENTIAL.UNITS COMMERCIAL.UNITS  TOTAL.UNITS
##  Min.   :    0    1     :5673      0      :12815     1     :6080
##  1st Qu.:11360   0      :5154       -     :12104    1      :5597
##  Median :11375   1      :4959      1      :  562    0      :4264
##  Mean   :11261    2     :3030       1     :  489     2     :2980
##  3rd Qu.:11419    -     :2703      2      :   88    2      :2669
##  Max.   :11697   2      :2699       2     :   78     -     :2144
##                  (Other):2102      (Other):  184    (Other):2586
##  LAND.SQUARE.FEET GROSS.SQUARE.FEET   YEAR.BUILT
##  0      : 5754    0      : 6033     Min.   :   0
##   -     : 2877     -     : 3330     1st Qu.:1925
```

```
##   4,000 : 1217     1,600 :  109     Median :1940
##   2,500 :  822    1224   :  103     Mean   :1825
##   2,000 :  708     1,440 :   82     3rd Qu.:1959
##  4000   :  687     1,224 :   76     Max.   :2016
##  (Other):14255    (Other):16587
##  TAX.CLASS.AT.TIME.OF.SALE BUILDING.CLASS.AT.TIME.OF.SALE
##  Min.   :1.000             D4     : 3867
##  1st Qu.:1.000             A1     : 3861
##  Median :1.000             A5     : 2032
##  Mean   :1.529             B3     : 1972
##  3rd Qu.:2.000             B2     : 1873
##  Max.   :4.000             R4     : 1735
##                            (Other):10980
##       SALE.PRICE         SALE.DATE
##   $-       : 8226   4/5/2016  :  210
##   $10      :  209   11/10/2016:  177
##   $450,000 :  156   6/30/2016 :  174
##   $650,000 :  150   2/29/2016 :  170
##   $250,000 :  137   11/22/2016:  161
##   $600,000 :  137   10/28/2016:  158
##  (Other)   :17305   (Other)   :25270
```

```
str(qns)
```

```
## 'data.frame':    26320 obs. of  21 variables:
##  $ BOROUGH                       : int  4 4 4 4 4 4 4 4 4 4 ...
##  $ NEIGHBORHOOD                  : Factor w/ 60 levels "AIRPORT LA GUARDIA",..: 1 1 1 1 1 1 1 1 2 2
##  $ BUILDING.CLASS.CATEGORY       : Factor w/ 44 levels "01 ONE FAMILY DWELLINGS                    "
##  $ TAX.CLASS.AT.PRESENT          : Factor w/ 11 levels " ","1","1A","1B",..: 2 2 2 2 2 2 6 6 2 2 ...
##  $ BLOCK                         : int  976 976 976 949 949 949 949 949 15828 15829 ...
##  $ LOT                           : int  61 63 70 15 56 59 1012 1025 53 22 ...
##  $ EASE.MENT                     : logi  NA NA NA NA NA NA ...
##  $ BUILDING.CLASS.AT.PRESENT     : Factor w/ 125 levels " ","A0","A1",..: 7 7 11 15 15 15 91 91 3 3
##  $ ADDRESS                       : Factor w/ 23093 levels "-00 136TH   AVENUE",..: 9305 9287 9243 848
##  $ APARTMENT.NUMBER              : Factor w/ 1193 levels " ","0.02","1",..: 1 1 1 1 1 1 225 3 1 1 ..
##  $ ZIP.CODE                      : int  11370 11370 11370 11370 11370 11370 11370 11370 11691 11691
##  $ RESIDENTIAL.UNITS             : Factor w/ 111 levels " -   "," 1 ",..: 2 2 14 22 22 22 2 2 2 2 ..
##  $ COMMERCIAL.UNITS              : Factor w/ 36 levels " -   "," 1 ",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ TOTAL.UNITS                   : Factor w/ 120 levels " -   "," 1 ",..: 2 2 15 22 22 22 2 2 2 2 ..
##  $ LAND.SQUARE.FEET              : Factor w/ 4202 levels " -   "," 1,000 ",..: 265 265 265 553 491 49
##  $ GROSS.SQUARE.FEET             : Factor w/ 4200 levels " -   "," 1,000 ",..: 178 178 178 1781 1348
##  $ YEAR.BUILT                    : int  1950 1950 1950 1985 1945 1945 0 0 2002 2005 ...
##  $ TAX.CLASS.AT.TIME.OF.SALE     : int  1 1 1 1 1 1 2 2 1 1 ...
##  $ BUILDING.CLASS.AT.TIME.OF.SALE: Factor w/ 124 levels "A0","A1","A2",..: 6 6 10 14 14 14 90 90 2 2
##  $ SALE.PRICE                    : Factor w/ 3272 levels " $-   "," $1 ",..: 2590 1188 1 3178 1 2018
##  $ SALE.DATE                     : Factor w/ 359 levels "1/1/2017","1/10/2017",..: 288 71 245 187 30
```

Using libraries gdata and plyr, clean/format the data with regular expressions. Using "[^[:digit:]]", we are only keeping and converting the numericals for new column names sale.price, gross.sqft, and land.sqft. Column name year.built is converted to numeric. Using gsub, we replaces nonnumericals with a missing values. The number of empty values are then counted. The row names of dataset qns are then converted into lowercase.

```
library(gdata)
library(plyr)
qns$SALE.PRICE.N <- as.numeric(gsub("[^[:digit:]]","", qns$SALE.PRICE))
count(is.na(qns$SALE.PRICE.N))
```

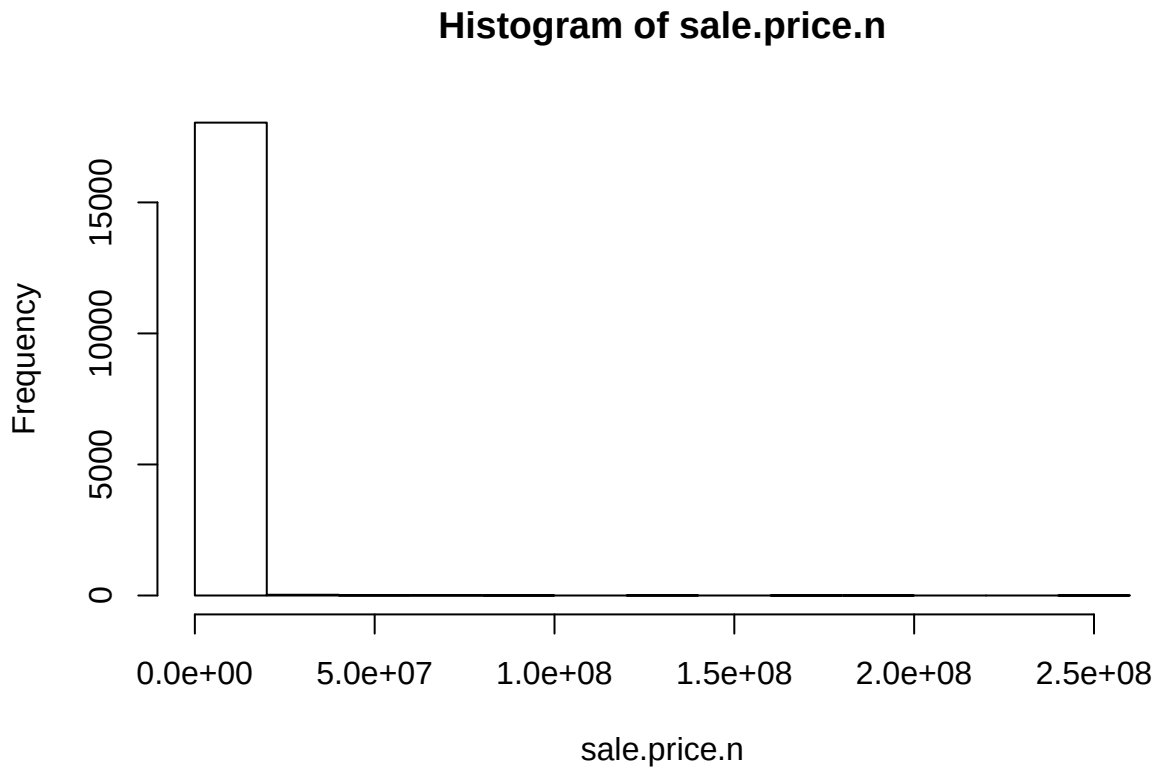
```
##       x  freq
## 1 FALSE 18094
## 2  TRUE  8226
```

```
names(qns) <- tolower(names(qns)) # make all variable names lower case
## Get rid of leading digits
qns$gross.sqft <- as.numeric(gsub("[^[:digit:]]","", qns$gross.square.feet))
qns$land.sqft <- as.numeric(gsub("[^[:digit:]]","", qns$land.square.feet))
qns$year.built <- as.numeric(as.character(qns$year.built))
```

After cleaning the data from character to numeric, we decided to plot a frequency diagram.

We attach the data set qns to the new column sale.price.n to make a histogram on frequency.

```
attach(qns)
hist(sale.price.n)
```

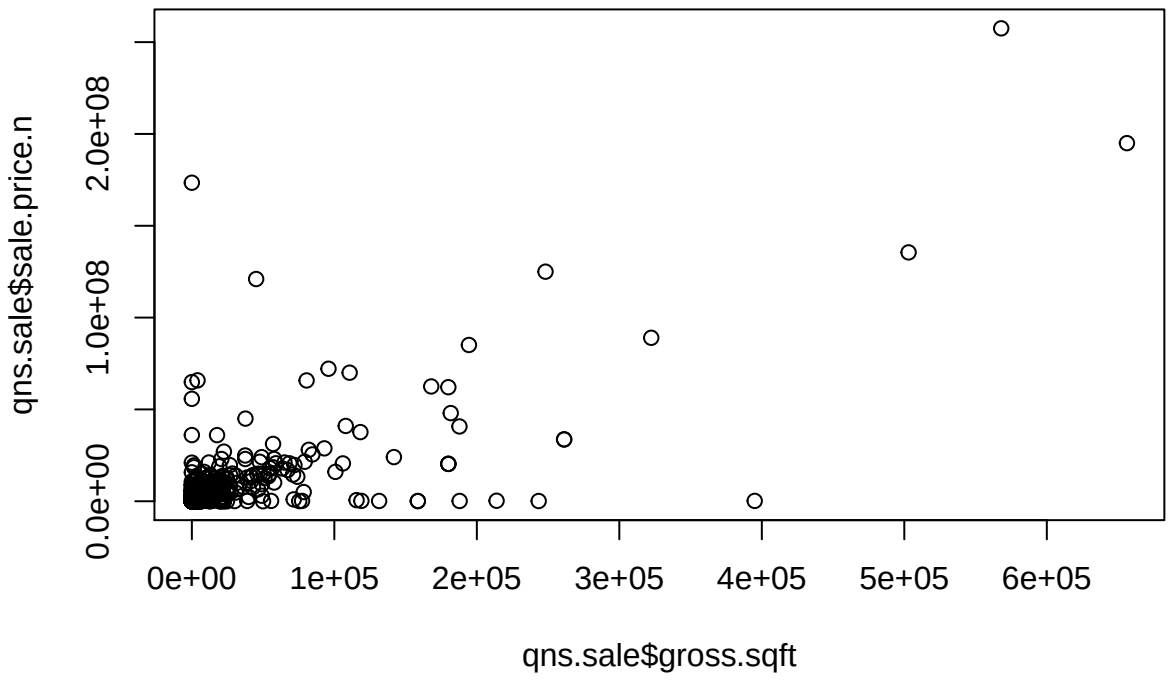



```
detach(qns)
```

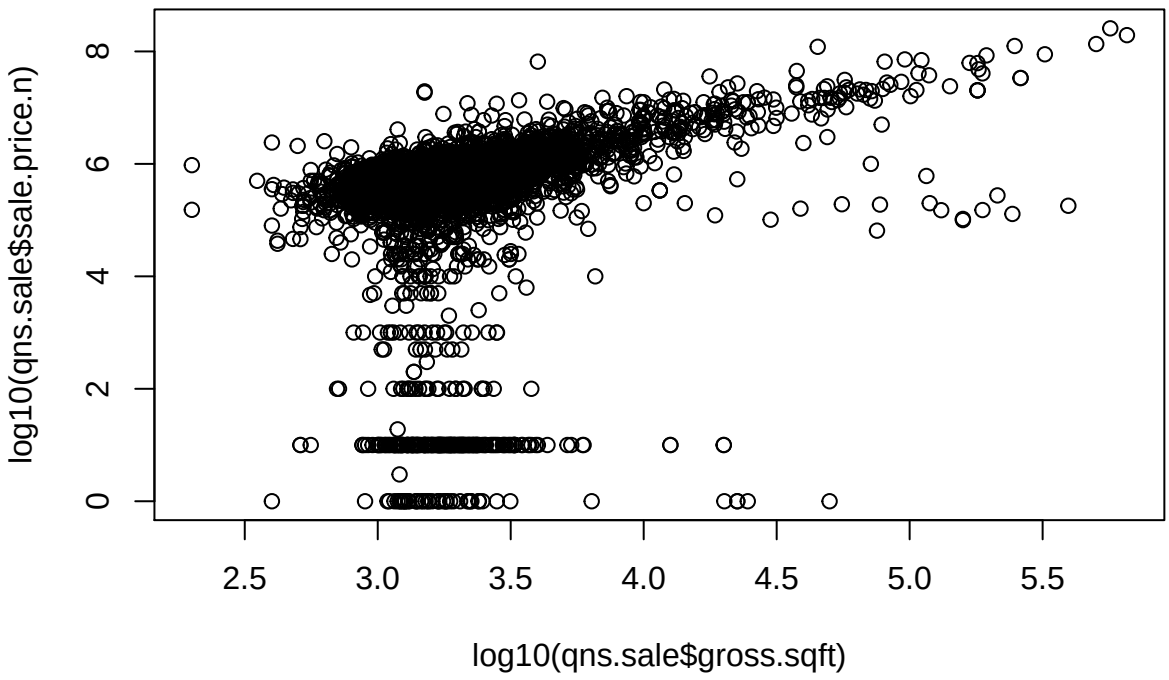
Looking at the frequency chart, we see a lot of outliers, but the chart came out correctly to show that the majority of the data hovered around the left and is skewed right.

Keep only the sales if they are not equal to 0, meaning that they were sold. We plot the scatterplot of gross sqft vs sale price and the log(gross sqft) vs log(sale price). The log-log plot fits the data better, so that is used for future scatter plots.

```
qns.sale <- qns[qns$sale.price.n!=0,]
plot(qns.sale$gross.sqft,qns.sale$sale.price.n)
```




```
plot(log10(qns.sale$gross.sqft),log10(qns.sale$sale.price.n))
```



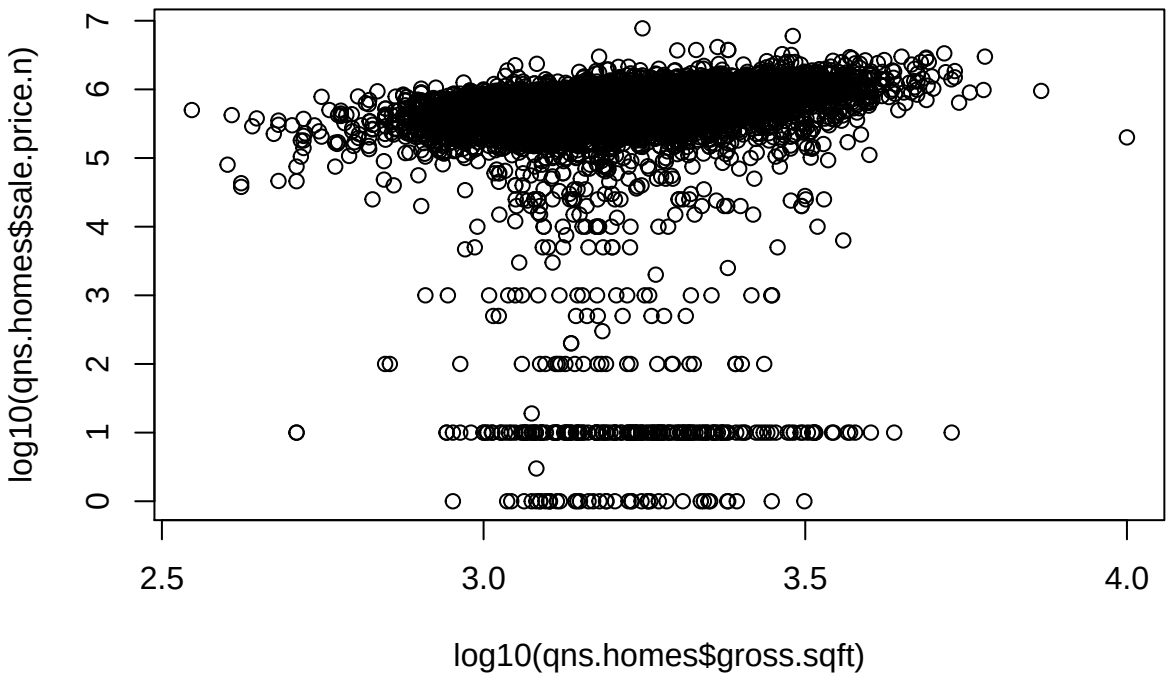
Of the houses not for sale, we eliminated those. After plotting a linear scatterplot, we decided to use a log-log plot to visually see points better whenn sale price was compared to square feet. A supposed qq-plot would also suggest that log transforming the data would give a better distribution.

For now, let's look at 1-, 2-, and 3-family homes. A new column homes is formed where we are searching the word 'Family' from building class category to filter the sale price for 1-, 2-, and 3-family homes. Dimensions of homes is checked. The log-log plot of gross sqft and sale price is plot for 1-, 2-, and 3-family homes. The summary output of family homes less than price 100,000 is made.

```
qns.homes <- qns.sale[which(grepl("FAMILY",qns.sale$building.class.category)),]
dim(qns.homes)
```

```
## [1] 10144    24
```

```
plot(log10(qns.homes$gross.sqft),log10(qns.homes$sale.price.n))
```




```
summary(qns.homes[which(qns.homes$sale.price.n<100000),])
```

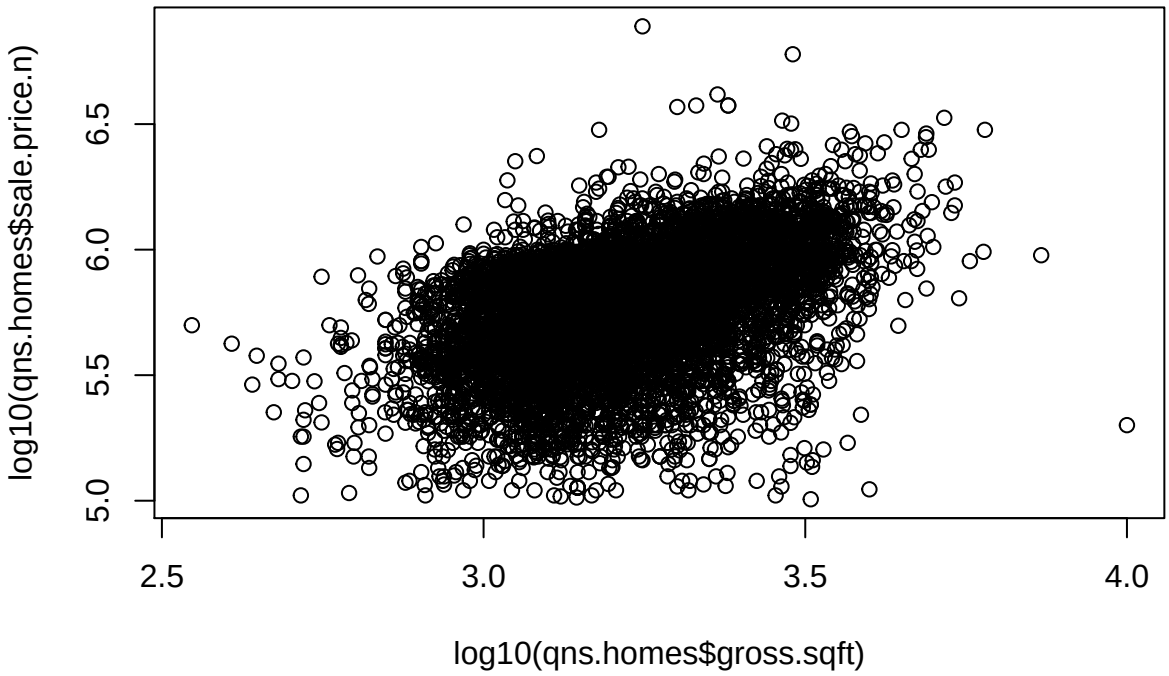
```
##     borough                    neighborhood
##  Min.   :4   SOUTH JAMAICA           : 26
##  1st Qu.:4   ST. ALBANS             : 22
##  Median :4   JACKSON HEIGHTS        : 21
##  Mean   :4   SO. JAMAICA-BAISLEY PARK: 21
##  3rd Qu.:4   SPRINGFIELD GARDENS     : 21
##  Max.   :4   HOLLIS                 : 19
##              (Other)                :303
##                                 building.class.category
##  01 ONE FAMILY DWELLINGS                    :244
##  02 TWO FAMILY DWELLINGS                    :158
##  03 THREE FAMILY DWELLINGS                  : 31
##  04 TAX CLASS 1 CONDOS                      :  0
##  05 TAX CLASS 1 VACANT LAND                 :  0
##  06 TAX CLASS 1 - OTHER                     :  0
##  (Other)                                    :  0
##  tax.class.at.present     block            lot          ease.ment
##  1      :432          Min.   :  155   Min.   :   1.00   Mode:logical
##         :  1          1st Qu.: 6353   1st Qu.:  18.00   NA's:433
##  1A     :  0          Median :10172   Median :  35.00
##  1B     :  0          Mean   : 9174   Mean   :  57.31
##  1C     :  0          3rd Qu.:12484   3rd Qu.:  64.00
##  2      :  0          Max.   :16201   Max.   :1351.00
##  (Other):  0
```

```
##  building.class.at.present                  address    apartment.number
##  A1     :114               48-15 187TH   STREET  :  3          :433
##  B3     : 72               10325 SPRINGFIELD BLVD:  2   0.02   :  0
##  A2     : 49               117-39 142ND   PLACE  :  2   1      :  0
##  A5     : 48               178-36 145TH AVENUE   :  2   1-A    :  0
##  B1     : 40               219 BEACH 91ST STREET :  2   1-B    :  0
##  B2     : 37               221-36 107TH   AVENUE :  2   1-C    :  0
##  (Other): 73               (Other)               :420   (Other):  0
##     zip.code     residential.units commercial.units  total.units
##  Min.   :11001    1     :132        -     :236       1     :131
##  1st Qu.:11373   1      :112       0      :192      1      :111
##  Median :11417    2     : 88       1      :  3       2     : 88
##  Mean   :11421   2      : 69        1     :  2      2      : 68
##  3rd Qu.:11432    3     : 17        12    :  0       3     : 18
##  Max.   :11694   3      : 14        17    :  0      3      : 16
##                 (Other):  1       (Other):  0      (Other):  1
##  land.square.feet gross.square.feet   year.built
##   4,000 : 35       1,120 :  4       Min.   :   0
##   2,500 : 17        512  :  4       1st Qu.:1925
##   3,000 : 17       1224  :  4       Median :1935
##   2,000 : 16        1,056 :  3       Mean   :1936
##  2500   : 16        1,188 :  3       3rd Qu.:1950
##  2000   : 15        1,534 :  3       Max.   :2014
##  (Other):317      (Other):412
##  tax.class.at.time.of.sale building.class.at.time.of.sale     sale.price
##  Min.   :1                 A1     :114                     $10     :170
##  1st Qu.:1                 B3     : 72                     $1      : 42
##  Median :1                 A2     : 49                     $100    : 26
##  Mean   :1                 A5     : 48                     $25,000 : 21
##  3rd Qu.:1                 B1     : 40                     $1,000  : 20
##  Max.   :1                 B2     : 38                     $10,000 : 16
##                            (Other): 72                    (Other)  :138
##       sale.date    sale.price.n     gross.sqft     land.sqft
##  11/28/2016:  6   Min.   :    1   Min.   : 400   Min.   :  613
##  3/7/2016  :  6   1st Qu.:   10   1st Qu.:1232   1st Qu.: 2107
##  10/14/2016:  5   Median :  100   Median :1535   Median : 2758
##  12/19/2016:  5   Mean   :14321   Mean   :1697   Mean   : 3116
##  2/22/2016 :  5   3rd Qu.:20000   3rd Qu.:2010   3rd Qu.: 4000
##  3/1/2016  :  5   Max.   :93000   Max.   :5341   Max.   :10293
##  (Other)   :401                   NA's   :1      NA's   :1
```

Of the houses, we decided to isolate the 1-,2-, and 3-family houses to see the scatterplot distribution prices vs square feet. A summary was outputted to figure out the affordibility of these houses under $100,000.

Remove outliers that seem like they weren't actual sales. If the log of family homes is less or equal to 5, these are outliers. Only the family homes where it is not outliers are kept. The log-log scatter plot of gross sqft vs sale price are plotted.

```
qns.homes$outliers <- (log10(qns.homes$sale.price.n) <=5) + 0
qns.homes <- qns.homes[which(qns.homes$outliers==0),]
plot(log10(qns.homes$gross.sqft),log10(qns.homes$sale.price.n))
```



We removed the outliers on the basis that any family house less $100,000 and then we plotted the log-log plot of family prices vs square feet.

As a prospective home buyer in Queens, we first cleaned the data of all the houses for sale. Then, we created a log-log scatter plot of all the family houses for sale. We wanted to see a summary of houses less than 100,000 dollars and we plotted a log-log scatter plot distribution of what the price range hovered above 100,000 dollars.

The distribution density of the plot is about 5.7 in price and 3.25 in gross square feet, ranging from 5.0 to 7.0 in price and from 2.6 and 4.0 in gross square feet.

Taken together, the median price of 1-, 2-, 3-family houses over 100,000 dollars in Queens hover at $501,187 for 1778 square feet, ranging from 100,000 to 100,000,000 in price and from 398 to 10,000 in square feet.