Brazil House Rent

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After that Attach the dataset to R and start the Analysis.

```
BrazilianHousestoRent <- readxl::read_xlsx("BrazilianHousestoRent.xlsx")
str(BrazilianHousestoRent)  #column names and data type
```

```
## tibble [10,692 × 13] (S3: tbl_df/tbl/data.frame)
##  $ city          : chr [1:10692] "SÃ£o Paulo" "SÃ£o Paulo" "Porto Alegre"
"Porto Alegre" ...
##  $ area          : num [1:10692] 70 320 80 51 25 376 72 213 152 35 ...
##  $ rooms         : num [1:10692] 2 4 1 2 1 3 2 4 2 1 ...
##  $ bathroom      : num [1:10692] 1 4 1 1 1 3 1 4 2 1 ...
##  $ parking spaces: num [1:10692] 1 0 1 0 0 7 0 4 1 0 ...
##  $ floor         : chr [1:10692] "7" "20" "6" "2" ...
##  $ keeping animal: chr [1:10692] "acept" "acept" "acept" "acept" ...
##  $ furniture     : chr [1:10692] "furnished" "not furnished" "not
furnished" "not furnished" ...
##  $ hoa           : num [1:10692] 2065 1200 1000 270 0 ...
##  $ rent amount   : num [1:10692] 3300 4960 2800 1112 800 ...
##  $ property tax  : num [1:10692] 211 1750 0 22 25 ...
##  $ fire insurance: num [1:10692] 42 63 41 17 11 121 25 41 191 30 ...
##  $ total rent    : num [1:10692] 5618 7973 3841 1421 836 ...
```

```
colnames(BrazilianHousestoRent) #only column names
```

```
##  [1] "city"           "area"           "rooms"          "bathroom"
##  [5] "parking spaces" "floor"          "keeping animal" "furniture"
##  [9] "hoa"            "rent amount"    "property tax"   "fire insurance"
## [13] "total rent"
```

DATA PREPOSESING

First, we have to check if there are any missing values. In our dataset, there are no missing values.

###After that, we have to handle outliers. I used numerical methods to do this.

Now I replaced the 0 in the 'floor' variable instead of the "-" symbol.

```
BrazilHouserent=clean_dataFile
str(BrazilHouserent)
```

```
## tibble [8,873 × 13] (S3: tbl_df/tbl/data.frame)
##  $ city          : chr [1:8873] "SÃ£o Paulo" "Porto Alegre" "Porto Alegre"
```

```
"SÃ£o Paulo" ...
##  $ area          : num [1:8873] 70 80 51 25 72 35 26 46 36 55 ...
##  $ rooms         : num [1:8873] 2 1 2 1 2 1 1 1 1 1 ...
##  $ bathroom      : num [1:8873] 1 1 1 1 1 1 1 1 1 1 ...
##  $ parking spaces: num [1:8873] 1 1 0 0 0 0 0 1 0 1 ...
##  $ floor         : chr [1:8873] "7" "6" "2" "1" ...
##  $ keeping animal: chr [1:8873] "acept" "acept" "acept" "not acept" ...
##  $ furniture     : chr [1:8873] "furnished" "not furnished" "not
furnished" "not furnished" ...
##  $ hoa           : num [1:8873] 2065 1000 270 0 740 ...
##  $ rent amount   : num [1:8873] 3300 2800 1112 800 1900 ...
##  $ property tax  : num [1:8873] 211 0 22 25 85 35 150 43 70 224 ...
##  $ fire insurance: num [1:8873] 42 41 17 11 25 30 27 8 27 54 ...
##  $ total rent    : num [1:8873] 5618 3841 1421 836 2750 ...
##  - attr(*, "na.action")= 'omit' Named int [1:1819] 2 6 8 9 20 38 41 45 64
76 ...
##   ..- attr(*, "names")= chr [1:1819] "2" "6" "8" "9" ...
```

```
glimpse(BrazilHouserent)
```

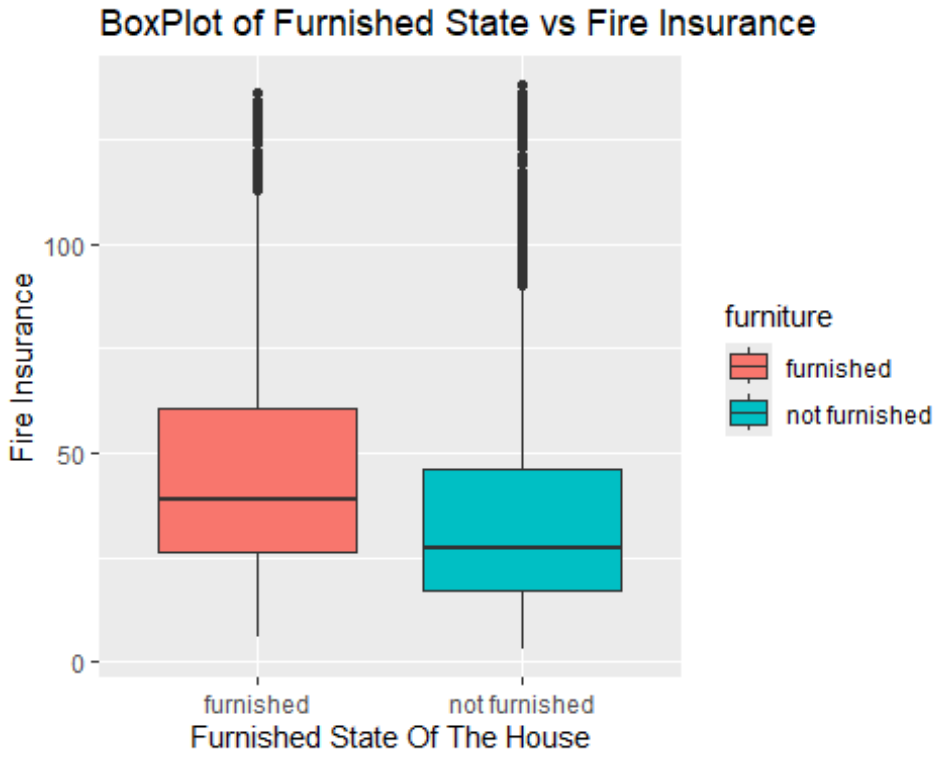
```
## Rows: 8,873
## Columns: 13
## $ city             <chr> "SÃ£o Paulo", "Porto Alegre", "Porto Alegre",
"SÃ£o P…
## $ area             <dbl> 70, 80, 51, 25, 72, 35, 26, 46, 36, 55, 100, 330,
110…
## $ rooms            <dbl> 2, 1, 2, 1, 2, 1, 1, 1, 1, 1, 2, 4, 2, 2, 2, 7,
1, 3,…
## $ bathroom         <dbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 6, 2, 3, 1, 4,
1, 2,…
## $ `parking spaces` <dbl> 1, 1, 0, 0, 0, 0, 0, 1, 0, 1, 2, 6, 1, 1, 0, 0,
1, 2,…
## $ floor            <chr> "7", "6", "2", "1", "7", "2", "2", "10", "11",
"2", "…
## $ `keeping animal` <chr> "acept", "acept", "acept", "not acept", "acept",
"ace…
## $ furniture        <chr> "furnished", "not furnished", "not furnished",
"not f…
## $ hoa              <dbl> 2065, 1000, 270, 0, 740, 590, 470, 550, 359, 790,
900…
## $ `rent amount`    <dbl> 3300, 2800, 1112, 800, 1900, 2300, 2100, 580,
2100, 4…
## $ `property tax`   <dbl> 211, 0, 22, 25, 85, 35, 150, 43, 70, 224, 17,
328, 12…
## $ `fire insurance` <dbl> 42, 41, 17, 11, 25, 30, 27, 8, 27, 54, 56, 121,
39, 1…
## $ `total rent`     <dbl> 5618, 3841, 1421, 836, 2750, 2955, 2747, 1181,
2556, …
```

```
BrazilHouserent <- BrazilHouserent %>%
  mutate(floor = ifelse(floor == "-", 0, floor))
View(BrazilHouserent)
```

DATA ANALYSIS

1. Does the fire insurance relate to when the house is furnished or not ?

```
ggplot(data = BrazilHouserent)+
  geom_boxplot(mapping =aes(x=furniture,y=`fire insurance`,fill=furniture) )+
  labs(x="Furnished State Of The House",y="Fire Insurance")+
  ggtitle("BoxPlot of Furnished State vs Fire Insurance")+
  scale_fill_discrete(name = "furniture")
```




```
summary_by_category <- by(BrazilHouserent$`fire insurance`,
BrazilHouserent$furniture, fivenum)
summary_by_category
```

```
## BrazilHouserent$furniture: furnished
## [1]   6  26  39  61 136
## ------------------------------------------------------------
## BrazilHouserent$furniture: not furnished
## [1]   3  17  27  46 138
```

```
kruskal.test(BrazilHouserent$`fire insurance` ~BrazilHouserent$furniture,
data=BrazilHouserent)
```

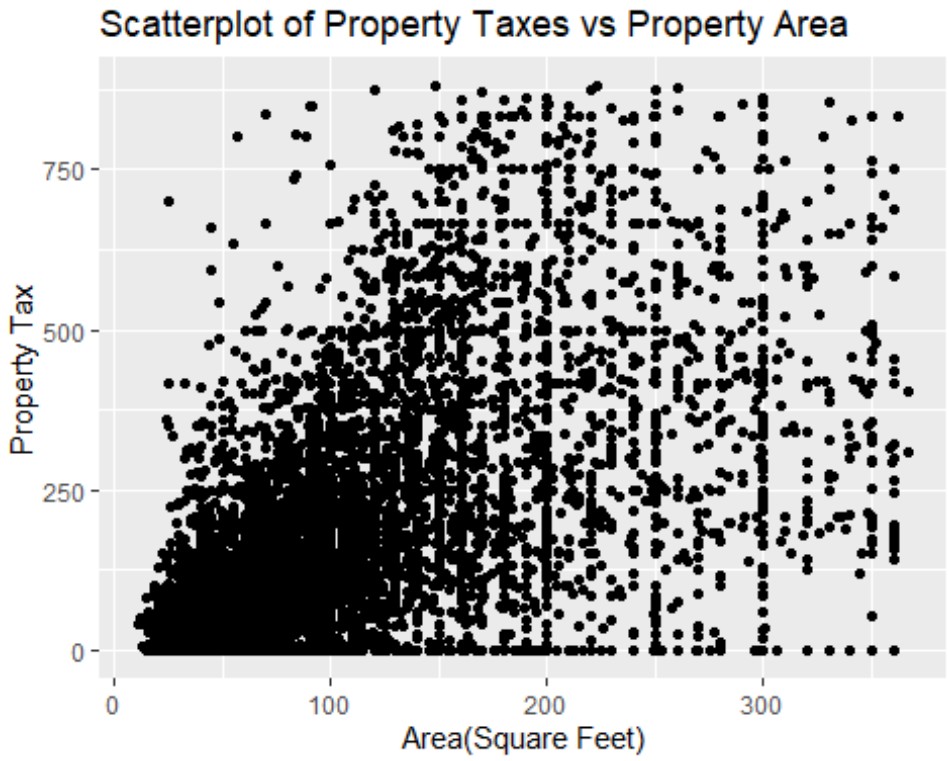
```
##
##  Kruskal-Wallis rank sum test
##
## data:  BrazilHouserent$`fire insurance` by BrazilHouserent$furniture
## Kruskal-Wallis chi-squared = 434.54, df = 1, p-value < 2.2e-16
```

```
qchisq(0.95,1,lower.tail = TRUE)
```

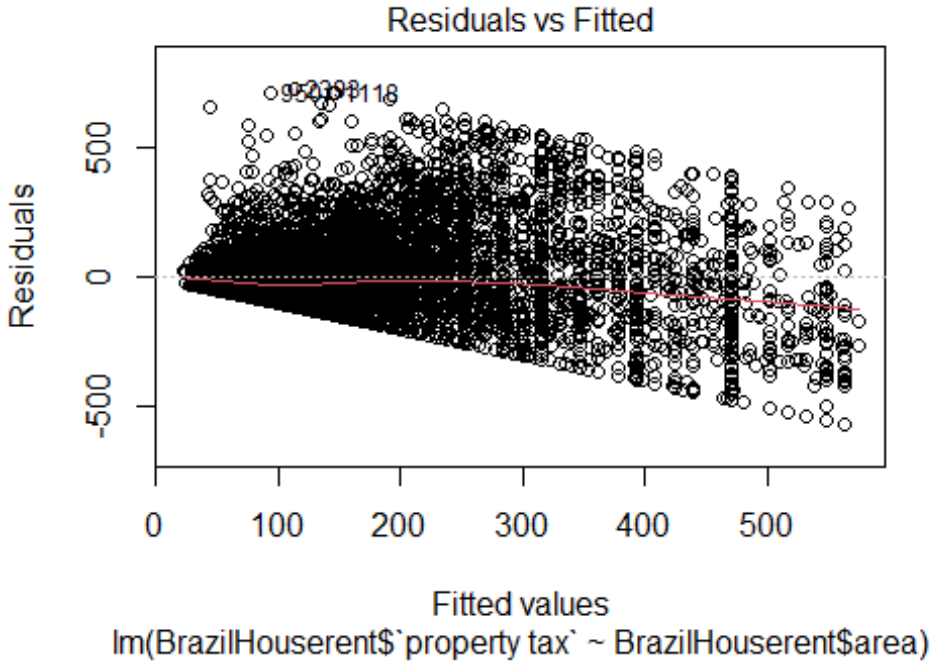
```
## [1] 3.841459
```

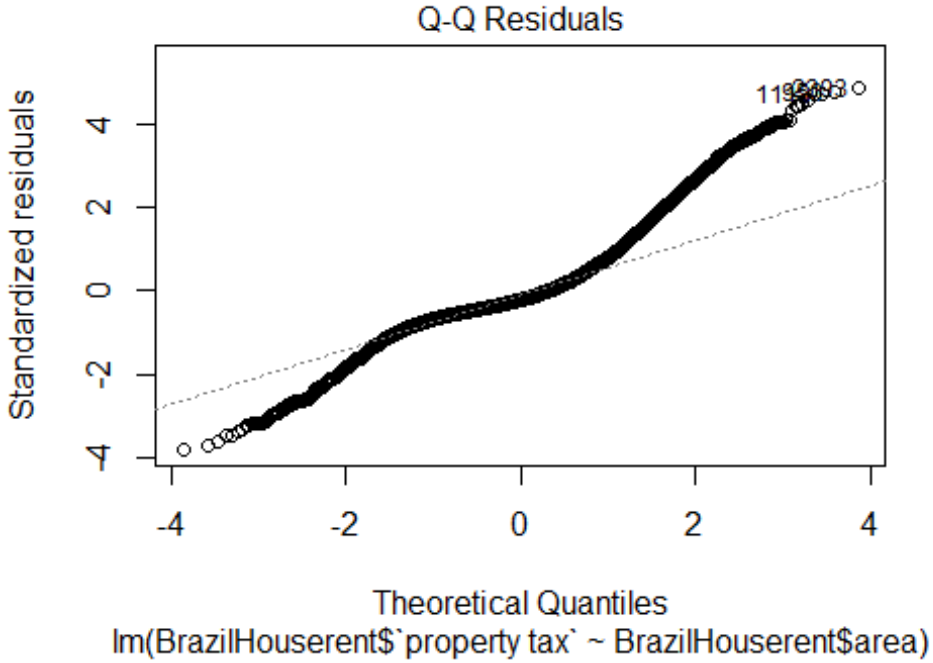
2. Does the property taxes relate to the area ?

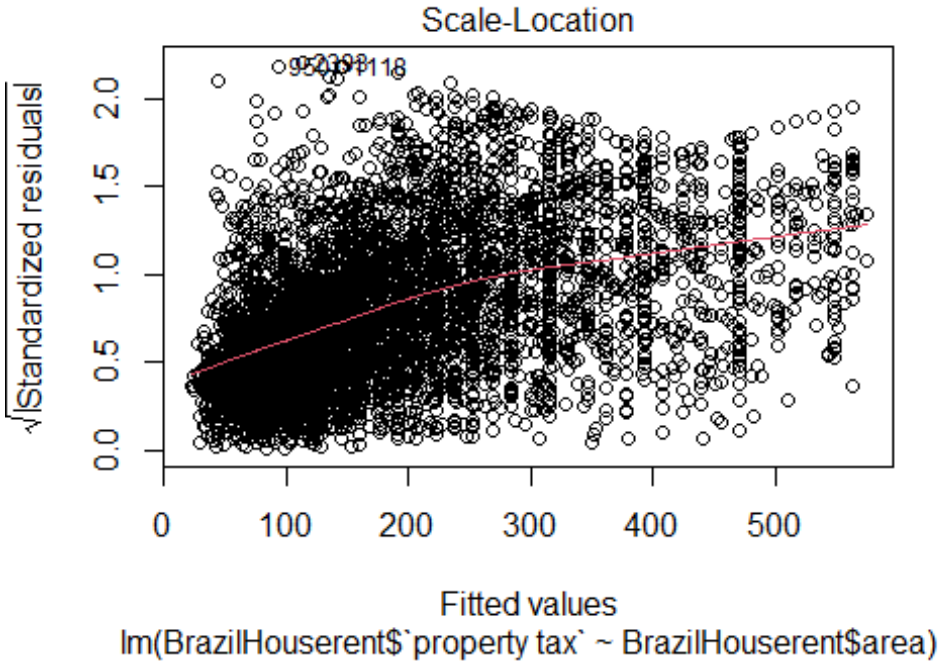
```
ggplot(data = BrazilHouserent)+
  geom_point(mapping =aes(x=area,y=`property tax`) )+
  labs(x="Area(Square Feet)",y="Property Tax")+
  ggtitle("Scatterplot of Property Taxes vs Property Area")
```

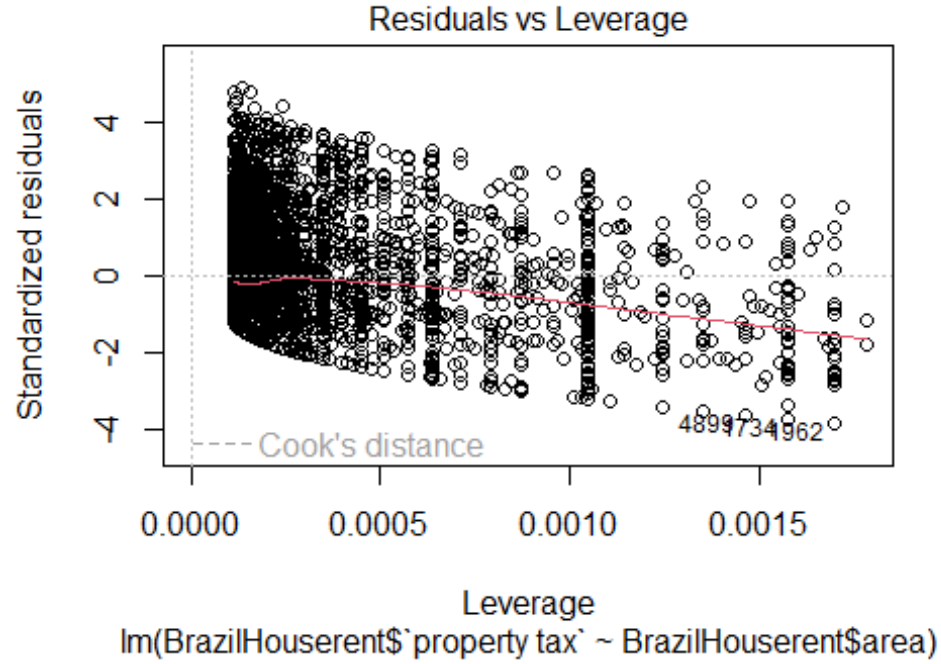



```
lm1=lm(BrazilHouserent$`property tax`~BrazilHouserent$area)
plot(lm1)
```


Residuals vs Fitted
Residuals
500
0
-500
0
100
200
300
400
500
Fitted values
lm(BrazilHouserent$`property tax` ~ BrazilHouserent$area)


Q-Q Residuals
Standardized residuals
4
2
0
-2
-4
-4
-2
0
2
4
Theoretical Quantiles
lm(BrazilHouserent$`property tax` ~ BrazilHouserent$area)



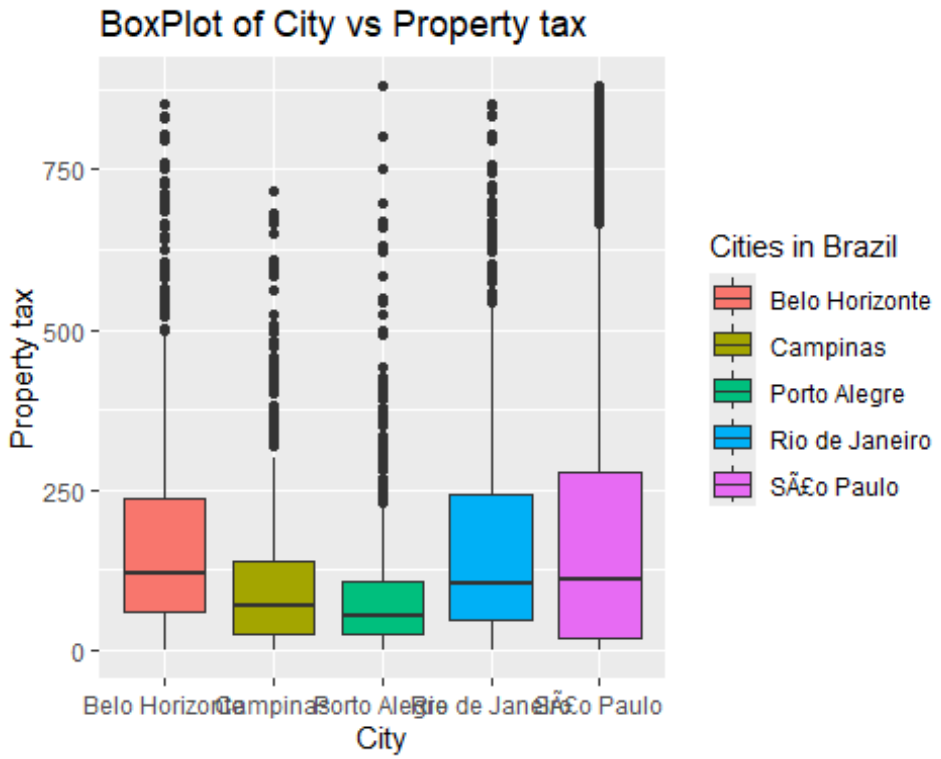



```
crr=cor(BrazilHouserent$area,BrazilHouserent$`property tax`,method =
"spearman")
crr
```

```
## [1] 0.5861278
```

3. Does the location relate to the Property taxes ?

```
ggplot(data = BrazilHouserent)+
  geom_boxplot(mapping =aes(x=city,y=`property tax`,fill=city) )+
  labs(x="City",y="Property tax")+
  ggtitle("BoxPlot of City vs Property tax")+
  scale_fill_discrete(name = "Cities in Brazil")
```




```
summary_by_category <- by(BrazilHouserent$`property tax`,
BrazilHouserent$city, fivenum)
summary_by_category
```

```
## BrazilHouserent$city: Belo Horizonte
## [1]   0  61 119 236 852
## ------------------------------------------------------------
## BrazilHouserent$city: Campinas
## [1]   0.0  25.0  70.0 138.5 715.0
## ------------------------------------------------------------
## BrazilHouserent$city: Porto Alegre
## [1]   0  24  54 106 880
## ------------------------------------------------------------
## BrazilHouserent$city: Rio de Janeiro
## [1]   0.0  46.5 103.0 244.5 853.0
## ------------------------------------------------------------
## BrazilHouserent$city: SÃ£o Paulo
## [1]   0.0  19.0 109.0 276.5 880.0
```

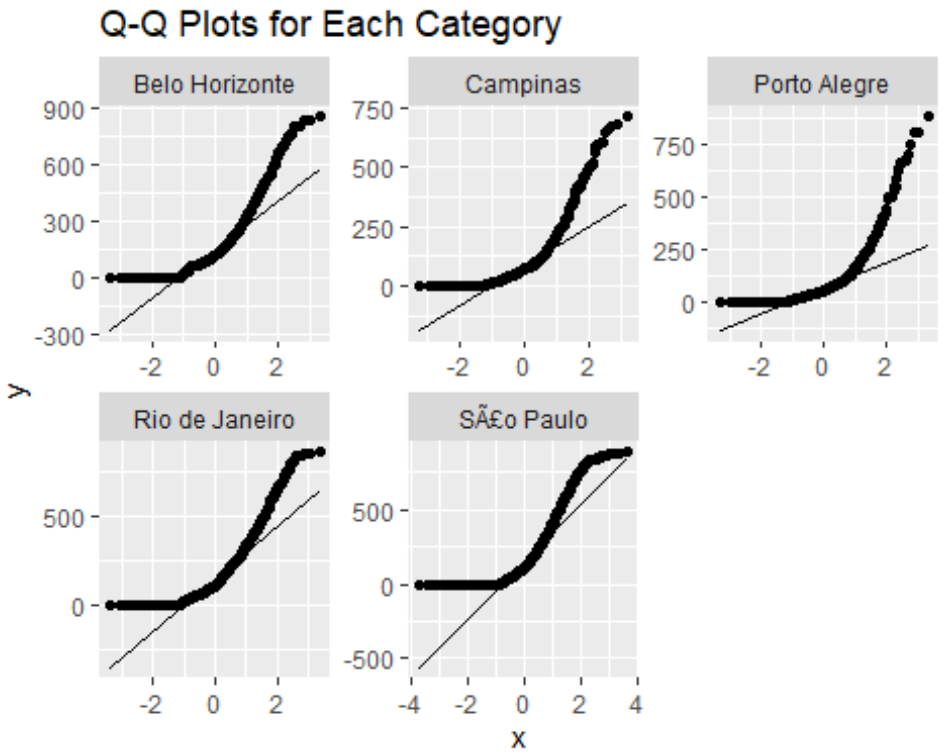
```r
city_tax_summary <- BrazilHouserent %>%
  group_by(city) %>%
  summarize(mean_tax = mean(`property tax`, na.rm = TRUE),
            median_tax = median(`property tax`, na.rm = TRUE),
            max_tax = max(`property tax`, na.rm = TRUE),
            min_tax = min(`property tax`, na.rm = TRUE))

city_tax_summary
```

```
## # A tibble: 5 × 5
##   city           mean_tax median_tax max_tax min_tax
##   <chr>             <dbl>      <dbl>   <dbl>   <dbl>
## 1 Belo Horizonte    169.         119     852       0
## 2 Campinas          109.          70     715       0
## 3 Porto Alegre       90.6         54     880       0
## 4 Rio de Janeiro    166.         103     853       0
## 5 SÃ£o Paulo        183.         109     880       0
```

```r
kruskal.test(BrazilHouserent$`property tax` ~BrazilHouserent$city,
data=BrazilHouserent)
```

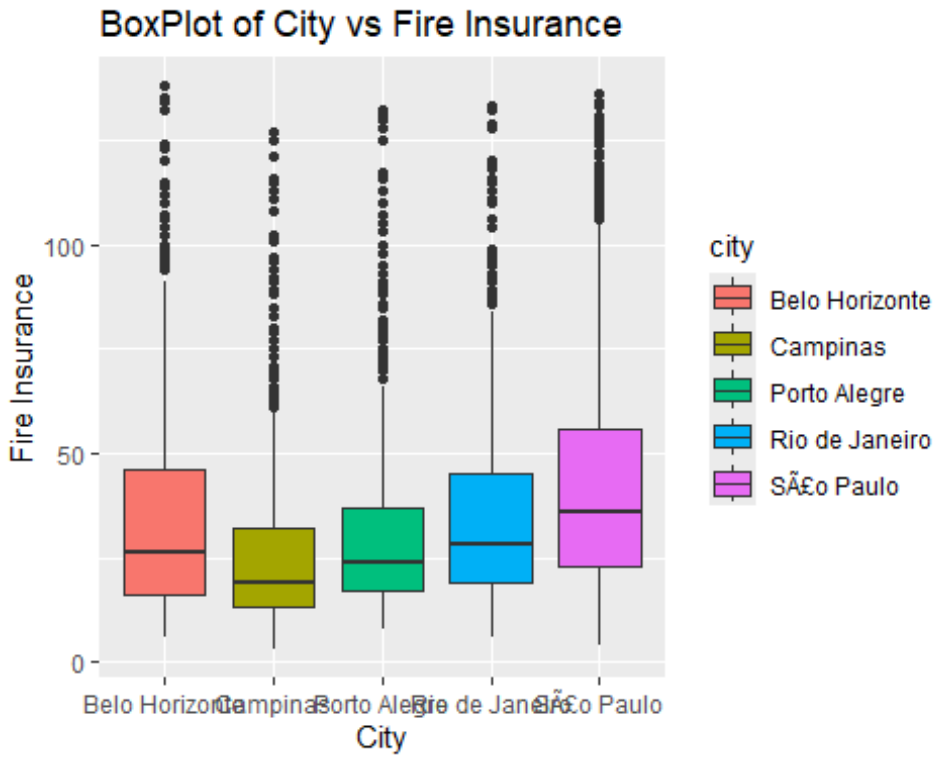
```
##
##  Kruskal-Wallis rank sum test
##
## data:  BrazilHouserent$`property tax` by BrazilHouserent$city
## Kruskal-Wallis chi-squared = 226.15, df = 4, p-value < 2.2e-16
```

```r
ggplot(BrazilHouserent, aes(sample = `property tax`)) +
  geom_qq() +
  facet_wrap(~ city, scales = "free") +
  stat_qq_line() +
  labs(title = "Q-Q Plots for Each Category")
```



4 .Does the fire insurance price relate to the location ?

```
ggplot(data = BrazilHouserent)+
  geom_boxplot(mapping =aes(x=city,y=`fire insurance`,fill=city) )+
  labs(x="City",y="Fire Insurance")+
  ggtitle("BoxPlot of City vs Fire Insurance")+
  scale_fill_discrete(name = "city")
```




```
city_FireInsu_summary <- BrazilHouserent %>%
  group_by(city) %>%
  summarize(mean_Insurance = mean(`fire insurance`, na.rm = TRUE),
            median_Insurance = median(`fire insurance`, na.rm = TRUE),
            max_Insurance = max(`fire insurance`, na.rm = TRUE),
            min_Insurance = min(`fire insurance`, na.rm = TRUE))

city_FireInsu_summary
```

```
## # A tibble: 5 × 5
##   city           mean_Insurance median_Insurance max_Insurance
min_Insurance
##   <chr>                   <dbl>            <dbl>         <dbl>
<dbl>
## 1 Belo Horizonte           35.1               26           138
6
## 2 Campinas                 26.5               19           127
3
## 3 Porto Alegre             30.5               24           132
8
## 4 Rio de Janeiro           34.9               28           133
6
## 5 SÃ£o Paulo               43.4               36           136
4
```

```r
city_counts <- BrazilHouserent %>%
  count(city)
city_counts
```

```
## # A tibble: 5 × 2
##   city               n
##   <chr>          <int>
## 1 Belo Horizonte  1047
## 2 Campinas         796
## 3 Porto Alegre    1127
## 4 Rio de Janeiro  1379
## 5 SÃ£o Paulo      4524
```

```r
kruskal.test(BrazilHouserent$`fire insurance` ~BrazilHouserent$city,
data=BrazilHouserent)
```

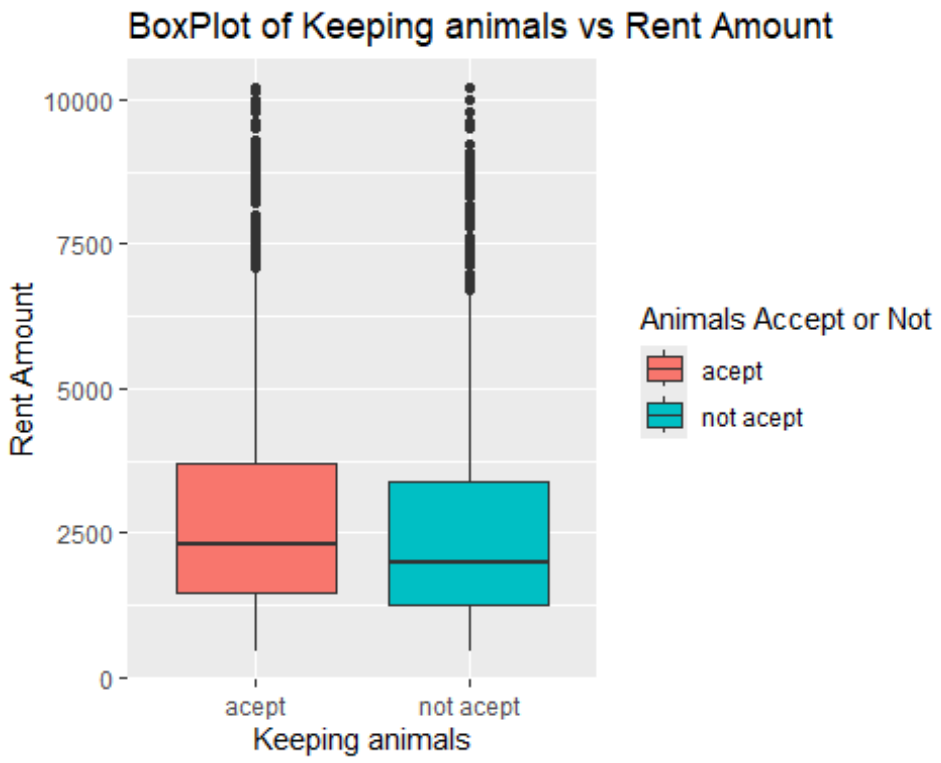
```
##
##  Kruskal-Wallis rank sum test
##
## data:  BrazilHouserent$`fire insurance` by BrazilHouserent$city
## Kruskal-Wallis chi-squared = 732.47, df = 4, p-value < 2.2e-16
```

```r
qchisq(0.95,4,lower.tail = TRUE)
```

```
## [1] 9.487729
```

5 .Does the rent amount relate to the keeping animal?

```r
ggplot(data = BrazilHouserent)+
  geom_boxplot(mapping =aes(x=`keeping animal`,y=`rent amount`,fill=`keeping
animal` ))+
  labs(x="Keeping animals",y="Rent Amount")+
  ggtitle("BoxPlot of Keeping animals vs Rent Amount")+
  scale_fill_discrete(name = "Animals Accept or Not")
```




```
summary_by_category <- by(BrazilHouserent$`rent amount`,
BrazilHouserent$`keeping animal`, fivenum)
summary_by_category
```

```
## BrazilHouserent$`keeping animal`: acept
## [1]   450  1450  2300  3700 10200
## ------------------------------------------------------------
## BrazilHouserent$`keeping animal`: not acept
## [1]   460  1250  2000  3400 10200
```

```
kruskal.test(BrazilHouserent$`rent amount` ~BrazilHouserent$`keeping animal`,
data=BrazilHouserent)
```

```
##
##  Kruskal-Wallis rank sum test
##
## data:  BrazilHouserent$`rent amount` by BrazilHouserent$`keeping animal`
## Kruskal-Wallis chi-squared = 38.714, df = 1, p-value = 4.906e-10
```

```
qchisq(0.95,4,lower.tail = TRUE)
```

```
## [1] 9.487729
```