## COMM 581 - Assignment #1
## Data visualization and basic coding in R

**Name**: __Gurpal Bisra____________ **Total: 10 marks**
**Due date: Sept. 12, 2015 (11pm)**

**Background:**

You are choosing a house to buy in a new town. You gather some data about houses that are up for sale in the neighborhood that you are interested in. For this assignment, you will import this dataset into RStudio and examine the data to see what your house choices are.

The dataset for this assignment is called "Real_Estate_Sales_Data.csv" and is accompanied by a script file to open in RStudio called "2016-09-06_Assignment_01_script.R". The script file includes code to run, as well as comments to help you use R to find answers to the questions.

Answers to questions can be written in numeric form if the answer is simply a number (2 decimal places). If the question requires more interpretation, please answer using complete sentences.

Instructions and questions (questions to be answered are in bold)

1. Save the script file and the data file in the same folder somewhere on your computer – remember where this is!
2. Open the data file in Excel to check the variable names, if there are blanks that need to be replaced with "NA", commas in numbers to be removed, etc.
3. Open the script file in RStudio.
4. Import the dataset using the read.csv command
5. **a. How many rows of data are there? What does this represent? (1 mark)**

   The data frame contains 521 rows, or observations, of data. For instance, each row contains a home's 12 characteristics including its sale price, square footage, and number of bedrooms and bathrooms.

   **b. How many columns of data are there? What does this represent? (1 mark)**

   The data frame contains 13 columns of data where the first column is an identifier column. Each column represents one of 12 variables which characterize a house on the market. For example, the column "bedrooms" specifies the number of bedrooms contained in a home.

6. Look at the structure of the data using the str command. **Do these variable types make sense for these data? What might you want to change? (1 mark)**

   The variable types of integer make senses for the columns row.ID, bedrooms, bathrooms, and year.built. Likewise, the variable type of factor logically describes the columns air.conditioning, highway, and pool.

   However, I would change some variable types to numeric because they can take on decimal values. For instance, sale.price, square.feet, and lot.size will likely be values containing decimal places when describing a home. Similarly, I feel some integer variable types might be better described as factor variables. For example, the values for architectural.style seem to be ordinal values describing the visual aesthetics of homes. Likewise, the data for and construction quality should be ordinal to meet standards for safe homes.

7. Change the variable bedrooms to a factor and view the structure of the data. **How many levels does the variable bedrooms have? (0.5 marks)**

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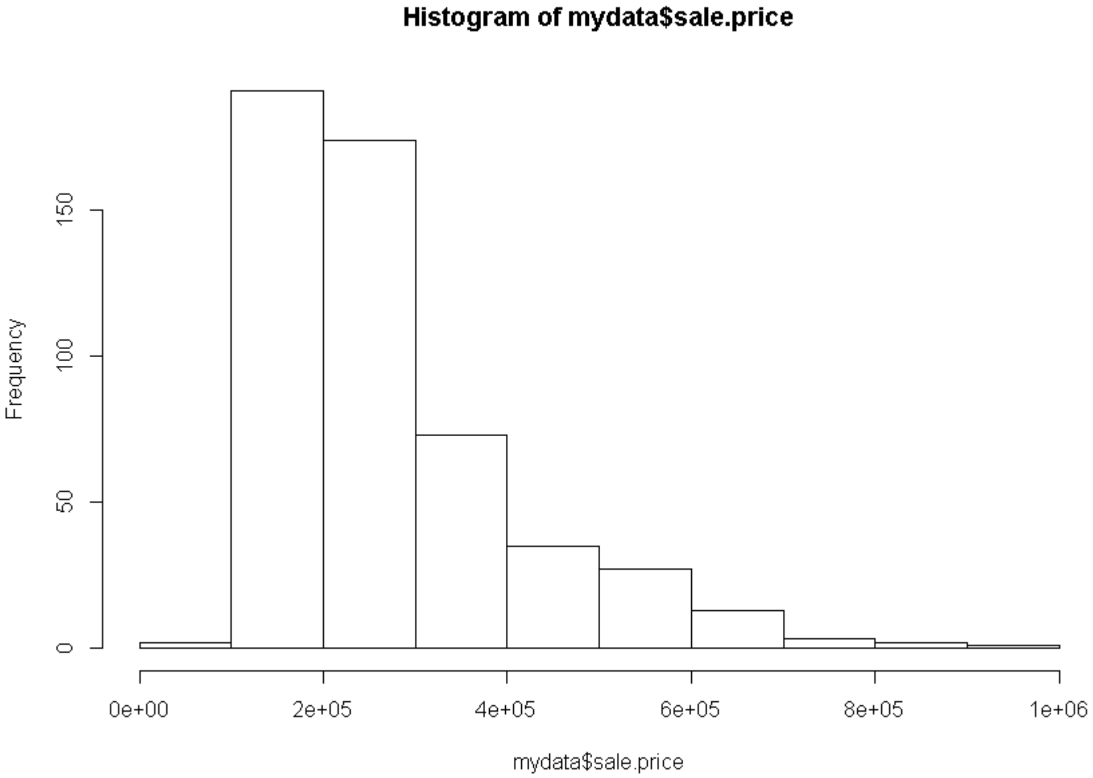
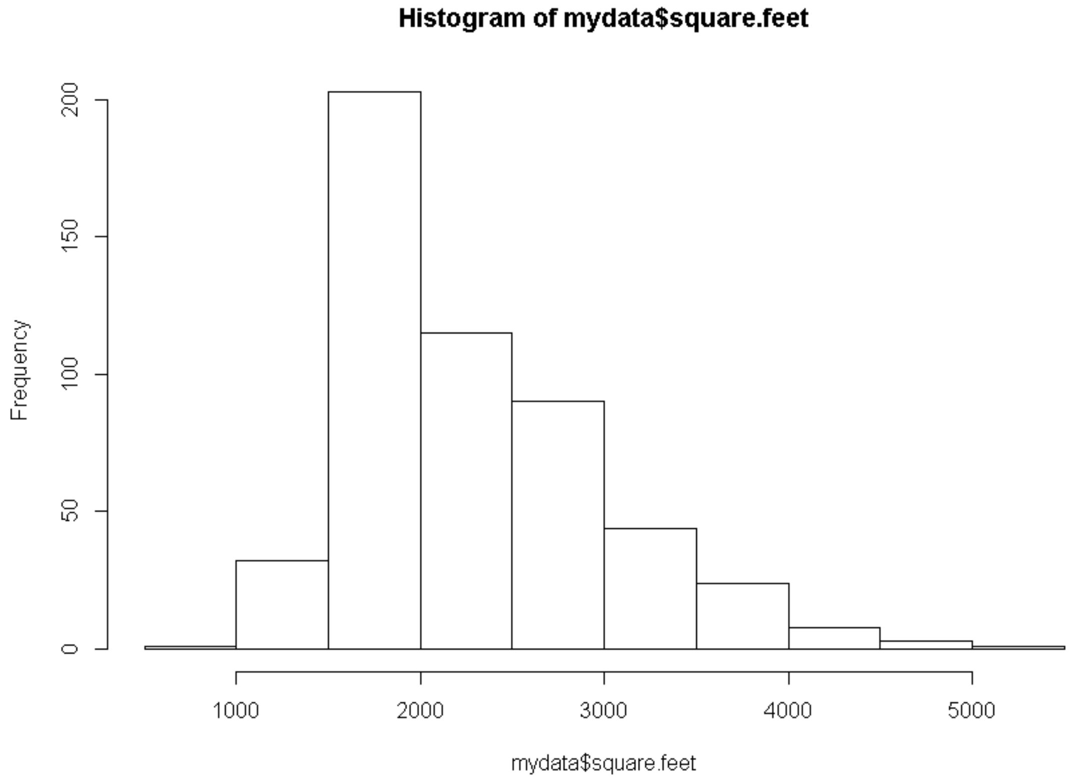
8. Use commands in R to find the following values: **(1.5 marks)**

|  | **Sale Price** | **Square footage** |
|---|---|---|
| **Mean** | 277412.70 | 2260.88 |
| **Median** | 229900 | 2061 |
| **Range (min, max)** | (84000, 920000) | (980, 5032) |
| **S.D.** | 137616.10 | 711.73 |
| **Variance** | 18938197015 | 506553.70 |

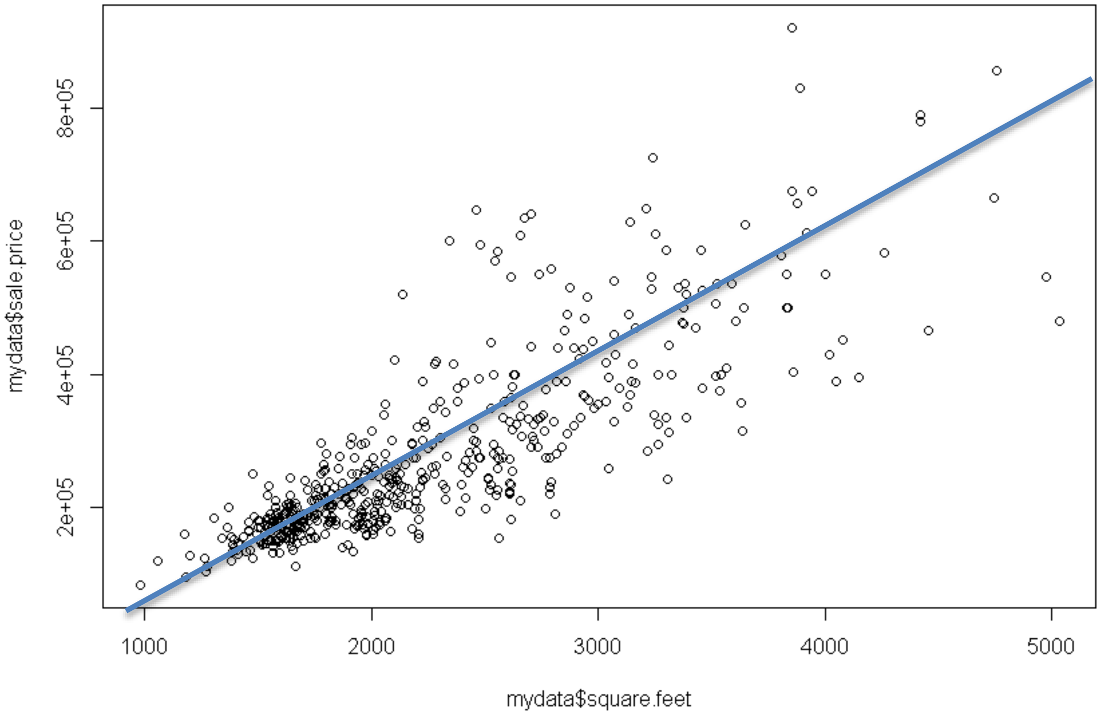
**9.** Create histograms for price and square footage. Export them as .jpg files. Insert these into a Word document. **Do these distributions look normal? Why or why not? (1 mark)**





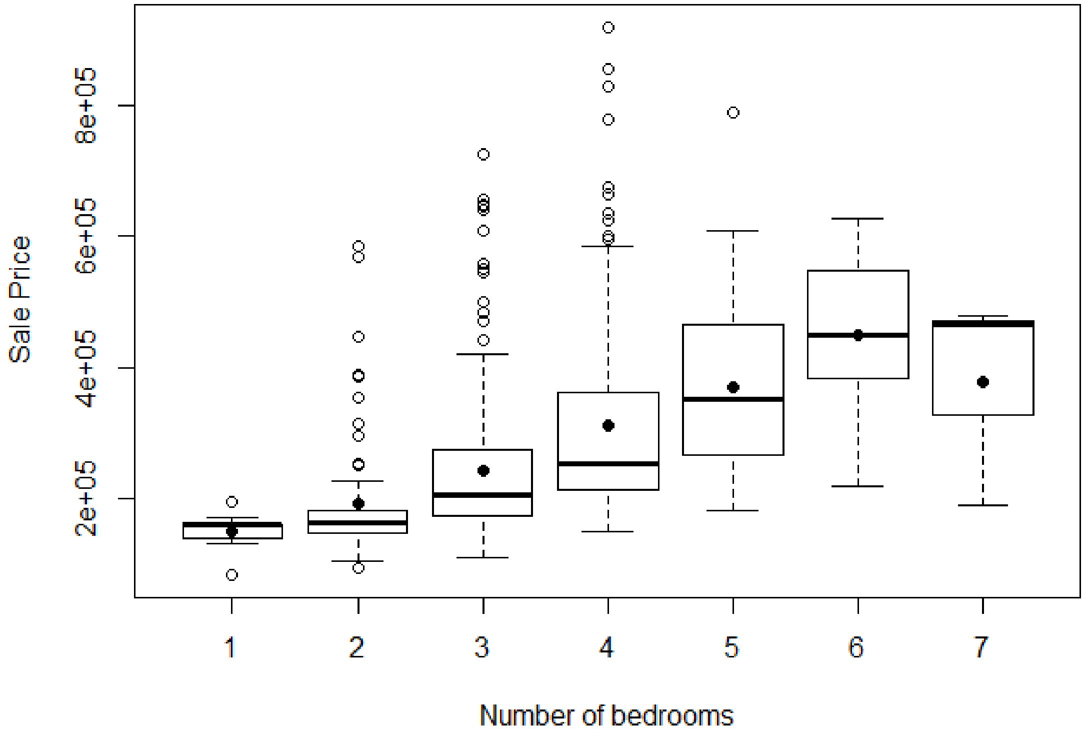
Both histograms, of mydata$sale.price and mydata$square.feet, do not appear to have a normal distribution. Instead, the histograms appears to be right-skewed (i.e. positive skewness) instead of being symmetric. This may occur because the data is left-bound by zero since there are no negative sale.prices or square.feet.

10. Create a scatterplot of the relationship between square footage and price. Copy and paste into a word document. **Does it look like there is a relationship between these two variables? Does the relationship look linear? Draw a line or curve that you think would fit the data on top of the graph (you can use shapes in Word). (1.5 marks)**



There appears to be relationship between the sale price and square feet for homes. The relationship appears linear only for small values of square feet. For example, if one were trying to perform regression analysis and fit a line of best fit to the data, a medium value for R-squared would result.

11. Create a boxplot of the relationship between sale price and number of bedrooms, including the filled circles for means. Insert into your Word document. **Which of these categories has the mean almost equal to the median? What does this indicate about the distribution of price for that number of bedrooms? (1 mark)**

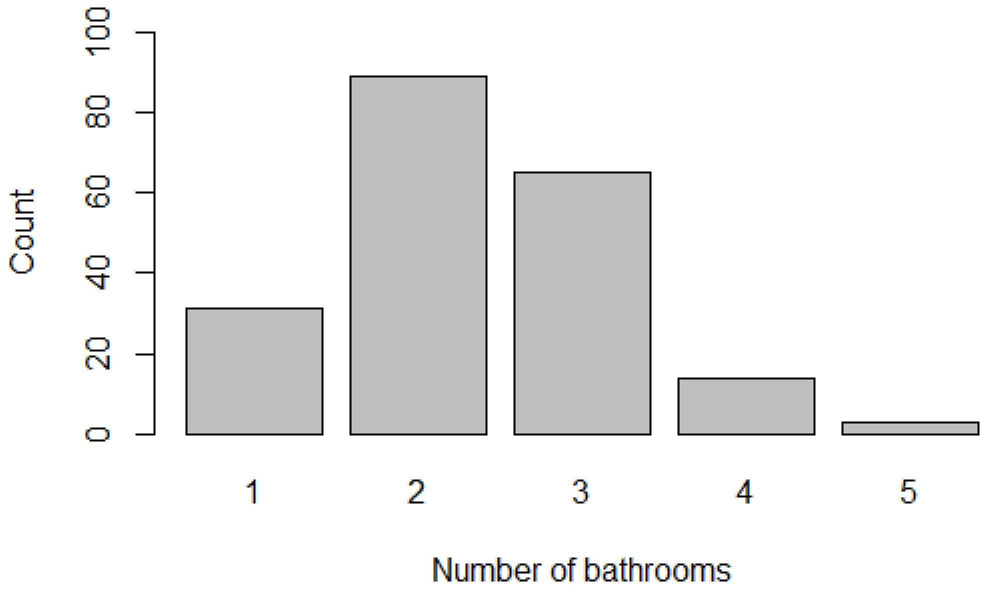


The mean is almost equal to the median for the category which has 6 bedrooms. This indicates that the distribution of the price of houses with 6 bedrooms is approximately normally distributed around the mean value.

12. Use the table command to find out how many options there are for the different number of bedrooms. You are looking for a 3-bedroom house, **how many options do you have? (0.5 marks)**

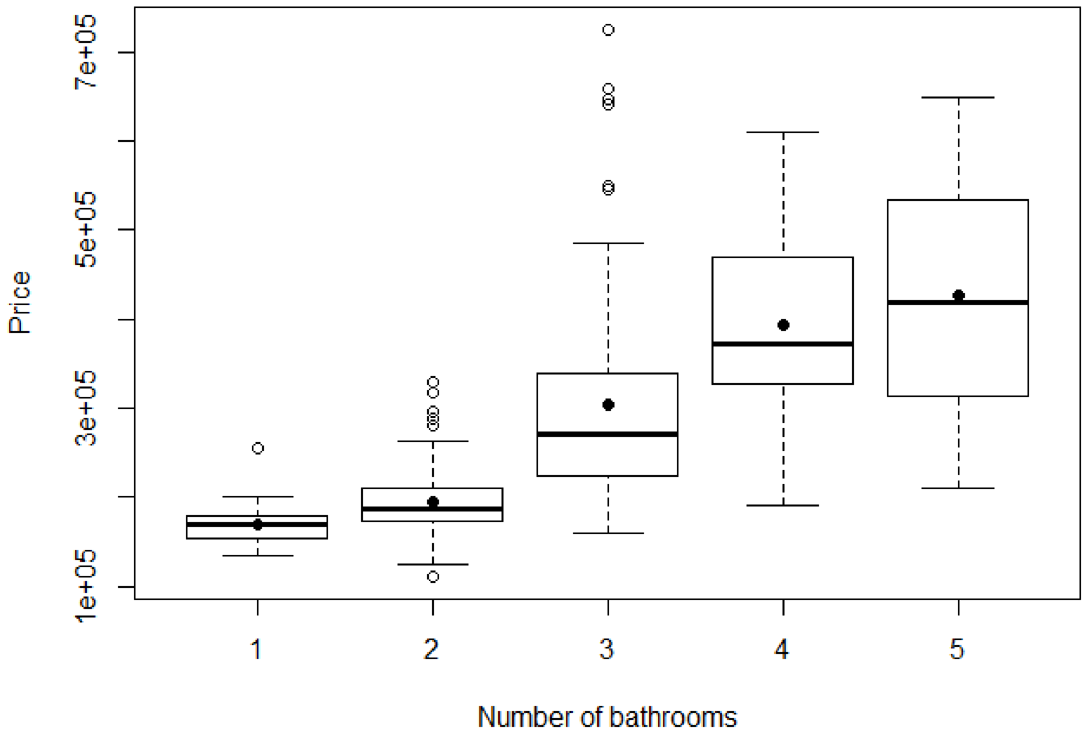
For a 3-bedroom house, there are 202 options.

13. Use the subset command to create a dataset that has only the houses you are interested in (3 bedrooms). Create a barplot to show the number of choices you have in each bathroom category. Insert this barplot into your Word document. You are also looking for at least two bathrooms. **How many choices do you have? (0.5 marks)**



When seeking a home with 3-bedrooms and at least 2 bathrooms, there are 171 choices (i.e. 89 + 65 + 14 + 3).

14. Compare sale price to your bathroom options. Consider the houses that meet your criteria: 3 bedrooms, and at least 2 bathrooms. **For which number of bathrooms is price the least variable? How many houses are in this category? (0.5 marks)**



For houses which meet my criteria, of 3 bedrooms and at least 2 bathrooms, the price is least variable when there are 2 bathrooms. For example, the interquartile range is smallest despite the fact there are outliers. In particular, there are 89 houses in this category.