Assignment 2

Part I – R Basics

1. Syntax and class-typing.
    a. For each of the following commands, either explain why they should be errors, or explain the non-erroneous result.

```
vector1 <- c("5", "12", "7", "32")
max(vector1)
sort(vector1)
sum(vector1)
```

    b. For the next series of commands, either explain their results, or why they should produce errors.

```
vector2 <- c("5",7,12)
vector2[2] + vector2[3]
```

```
dataframe3 <- data.frame(z1="5",z2=7,z3=12)
dataframe3[1,2] + dataframe3[1,3]
```

```
list4 <- list(z1="6", z2=42, z3="49", z4=126)
list4[[2]]+list4[[4]]
list4[2]+list4[4]
```

2. `mtcars`, another dataset under the `datasets` library in R, was extracted from the 1974 Motor Trend US magazine, and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles (1973–74 models). **Note:** Although both are about cars, `mtcars` is a different dataset than the `mpg` dataset we worked with in the class.

    a. What is the type of `mtcars`? Also is it a data frame?
    b. How many rows and columns does `mtcars` have?
    c. What are the names of the columns of `mtcars`?
    d. What is the value of row 5, column 7 of `mtcars`? What does the value signify?
    e. Display the second row of `mtcars` in its entirety.
    f. Explain what this command does by running it on your data and examining the object.

```
mydata<- mtcars
names(mydata) <- c("mileage","cylinder",seq(0,8))
```

    g. In engines, engine size is evaluated by the total volume of its cylinders and it is referred to as *displacement*. The larger the displacement (hence the engine size), the more power the engine is likely to produce. To compare engines that are in different sizes we look at the engine power (*hp*) it generates (in horse power) for unit discplacement (in liter).
    In the dataset, engine power is under *hp* column and engine displacement is under *disp* column.

However the challenge is that in the dataset displacement (disp) is given in cubic inches. You first need to convert it to liter. To do that, first calculate the displacement in liter by considering that 1 cubic inch is roughly 0.0163871 liters.

h. Next, assign these values to a variable called *disp_l* and add this vector as a column to your data (mydata)

3. Working with functions and operators. The colon operator will create a sequence of integers in order. It is a special case of the function `seq()` which you saw earlier in this assignment. Using the help command `?seq` to learn about the function, design an expression that will give you the sequence of numbers from 1 to 10000 in increments of 372. Design another that will give you a sequence between 1 and 10000 that is exactly 50 numbers in length.
   The function `rep()` repeats a vector some number of times. Explain the difference between `rep(1:3, times=3)` and `rep(1:3, each=3)`.

Part II – Descriptive Stats

Yet another dataset for cars! `MASS` library has a dataset called `Cars93` for 93 cars with model year 1993. Load the dataset following the instructions below.

```
library(MASS)
data(Cars93)
```

Begin by examining the data frame with the command `View(Cars93)` to understand the underlying object. You will need to use functions and other commands to extract elements for this assignment.

1. True or False: Your instructor likes cars. A lot!
2. Obtain a `summary()` of the full data structure. Can you tell from this how many rows are in the data? If so, say how; if not, use another method to obtain the number of rows.
3. What is the mean and median price of a car with a rear-wheel drive train? Which one is a better measure for centrality? What is the standard deviation for a similar car?
4. What is the minimum horsepower of all cars with capacity for 7 passengers? With a capacity of at least 6 passengers?