

# STA 521 Homework 1 – Due on Monday August 31, 11:59 PM on Sakai"

Your homework must be submitted in R Markdown format. We will not (indeed, cannot) grade homeworks in other formats. Your responses must be supported by both textual explanations and the code you generate to produce your result. (Just examining your various objects in the “Environment” section of RStudio is insufficient – you must use scripted commands.)

Objectives: To understand RStudio, Markdown, and practice with variables in R.

1. The data set at <http://www.stats.uwo.ca/faculty/braun/data/rnf6080.dat> records hourly rainfall at a certain location in Canada, every day from 1960 to 1980.
  - a. First, we need to load the data set into R using the command `read.table()`. Use the help function to learn what arguments this function takes. Once you have the necessary input, load the data set into R and make it a data frame called `rain.df`.
  - b. How many rows and columns does `rain.df` have? (If there are not 5070 rows and 27 columns, something is wrong; check the previous part to see what might have gone wrong in the previous part.)
  - c. What are the names of the columns of `rain.df`?
  - d. What is the value of row 5, column 7 of `rain.df`?
  - e. Display the second row of `rain.df` in its entirety.
  - f. Explain what this command does:

```
names(rain.df) <- c("year", "month", "day", seq(0,23))
```

by running it on your data and examining the object. (You may find the display functions `head()` and `tail()` useful here.) Is it clear now what the last 24 columns represent?

- g. Create a new column in the data frame called `daily`, which is the sum of the rightmost 24 columns. With this column, create a histogram of the values in this column, which are supposed to be daily rainfall values. What is wrong with this picture?
    - h. Create a new data frame `rain.df.fixed` that takes the original and fixes it for the apparent flaw you have discovered. Having done this, produce a new histogram with the corrected data and explain why this is more reasonable.
2. 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]
```

3. Working with functions and operators.

- a. 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.
- b. 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)`.