# The University of British Columbia
## Irving K. Barber Faculty of Science
*DATA 101*

Assignment 1

Please submit your assignment as an R script file named with your last name, student number, assignment number and with the suffix R. For example, if Joe Smith, student number 87654321 hands in Assignment 2, he would name the file `Smith87654321A2.R`.

Within your answer file, include answers with your R code preceded by the `#` sign. For example, to answer the 5th question on an assignment which is "Perform the calculation $2 + 2$", you would type

```
# Question 5
2 + 2 #coding
# 4 (your answer her )
```

**Due Date:** September 25, 2020

In each question below, type the required lines of R code, together with the answer to the question.

1. Perform the following calculations and write out the results

   (a) $11 \times 11$. (1 point)

   ```
   11*11

   ## [1] 121
   ```

   (b) $11 \times 111$. (1 point)

   ```
   11*111

   ## [1] 1221
   ```

   (c) $11 \times 1111$. (1 point)

   ```
   11*1111

   ## [1] 12221
   ```

   (d) $11 \times 11111$. (1 point)

   ```
   11*11111

   ## [1] 122221
   ```

   (e) Based on the pattern you see in calculations above, what would you predict to be the product of 11 and 11111111111111111111? (1 point)

   ```
   # 12222222222222222221
   ```

   (f) Using `options(digits=15)`, attempt to perform the calculation in the previous part in R. Who is right - you or R? (1 point)

   ```
   options(digits=15)
   11*11111111111111111111

   ## [1] 122222222222222223360
   ```

```
# My answer is correct
```

2. The data in the `rivers` object are measured in miles.

(a) Use the fact that 1 mile is equal to 1760 yards to create an object called `riversYards` which contains the river lengths measured in yards. (2 points)
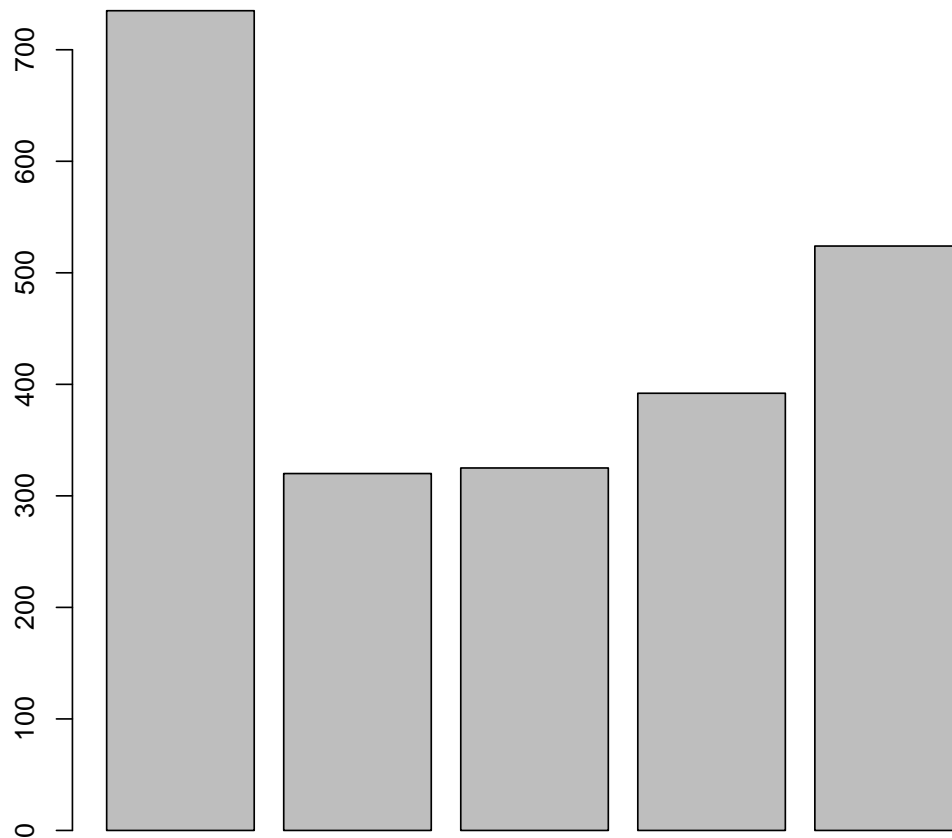
```
RiversYards <- rivers*1760
```

(b) Extract the first 10 observations in `RiversYards` as a simple list of numbers. (2 points)

```
RiversYards[1:10]
```

```
##  [1] 1293600  563200  572000  689920  922240  792000 2567840  237600
##  [9]  818400 1056000
```

(c) Display the first 5 observations in `rivers` as a bar plot. Have the observations in `rivers` been recorded in decreasing order? (2 points)
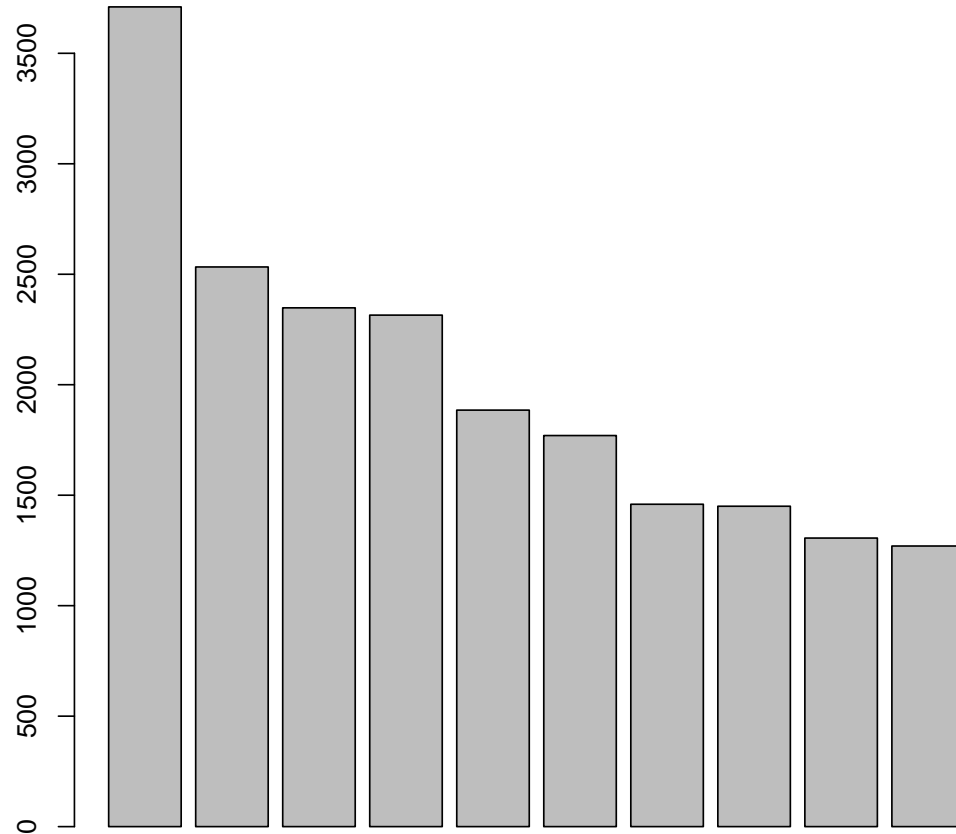
```
barplot(rivers[1:5])
```

```
# It is clear that the observations in \verb!rivers! were not
#recorded in decreasing order.
```

(d) Use the command

```
Rivers <- sort(rivers, decreasing = TRUE)
barplot(Rivers[1:10])
```



```
length(Rivers[Rivers>2000])
```

```
## [1] 4
```

to sort the observations in decreasing order. Now obtain a bar plot of the first 10 observations. How many rivers in North America are longer than 2000 miles? (2 points)

3. The function `F2C` from the first lecture was created by assigning a function object to `F2C` as in

```
F2C <- function(x) (x - 32)*5/9
```

(a) Create called `C2F` that converts Celsius temperatures to Fahrenheit temperatures, using the fact that you can convert from $x$ degrees Fahrenheit to Celsius degrees using the formula (2 points)

$$F = 1.8 * x + 32.$$

```
C2F <-  function(x) 1.8*x + 32
```

(b) Use your function to find the Fahrenheit equivalent to 150 degrees Celsius. (2 points)

```
C2F(150)

## [1] 302
```

(c) Create a vector called `Ctemps` which contains the values $-40$, 0, 30, and 100, and write down the output) from (2 points)

```
Ctemps<- c( -40,0,30,100)
C2F(Ctemps)

## [1] -40  32  86 212
```

4. Based on the idea of question 3(a), write a new function called inch2cm which converts measurements in inches to measurements in centimeters. (4 points)

```
inch2cm <- function(x) 2.54*x
```