Homework 1

MTH 3270 Data Science

Due Mon., Feb. 3

Read These Chapters of the Book	**Then Do These Exercises**
Appendix B	Problems 1-4 (below), B.1, B.2, B.3, B.5, B.6, B.9
1	Just read this chapter

1 Please answer the following questions.

a) Try the commands `pi`, `round(pi)`, `round(pi, digits = 4)`, and `trunc(pi)`, `ceiling(pi)`, `floor(pi)`. What are the results?

b) Try the commands `sqrt(16)`, `16^0.5`. Are the results the same?

c) Write a command that computes 4^3.

d) Try the commands `log10(1000)`, `log(1000)`. Then try the command `log2(64)`. What are the results? (Make sure you understand the different logarithmic functions.)

e) Look at the help file for `log()` by typing:

```
? log
```

Read the first few lines. Does the text match your observations from the previous question?

2 Use the following command to create a character vector representing a supermarket `queue` with Steve first in line:

```
queue <- c("Steve", "Russell", "Alison", "Liam")
```

Write R commands involving square brackets `[ ]` and the assignment operator `<-` to update the supermarket `queue` successively as follows:

1. Barry arrives (and gets in the last position of the line).
2. Steve is served (and so he leaves).
3. Pam arrives and talks her way to the front of the line (with just one item).
4. Barry gets impatient and leaves.

3 Create the following objects.

```
w <- 6
x <- 7
y <- 8
z <- 9
```

a) Write a command that lists the objects in your Workspace.

b) Write a command that removes `x` from the Workspace.

c) Write a command that removes *all* the objects from your Workspace.

4 R coerces `TRUE` and `FALSE` to 1 and 0 in arithmetic expressions, and so summing the elements of a `"logical"` vector counts the number of `TRUE`s.

Consider the vector:

```
x <- c(3, 2, 0, 1, 4, 5, 9, 0, 6, 7, 2, 8)
```

a) What is the result of the following command?

```
x == 0
```

b) Write a command involving `sum()` and the `"logical"` vector `x == 0` that counts the number of elements of `x` that are equal to 0.

c) Write a command that determines the *proportion* of elements of `x` that are equal to 0. **Hint**: The function `length()` may be useful.

5 Create the following data frame:

```
numVec <- c(2, 4, 6)
charVec <- c("a", "b", "c")
myData <- data.frame(x1 = numVec, x2 = charVec)
```

a) The following commands do the same thing:

```
myData$x1
myData[["x1"]]
myData[[1]]
```

What do they do?

b) What kind of object (*vector*, *list*, or *data frame*) is returned by the commands in part *a*? Use `is.vector()`, `is.list()`, and `is.data.frame()`.

If they return a *vector*, is it a numeric vector or `"character"`? Use `is.numeric()` and `is.character()`.

c) What does the following command do?

```
myData[2, ]
```

d) Most objects in R belong to a ***class*** of objects. Type:

```
class(myData)
```

What class of object is `myData`?

e) A ***generic*** function is one that accepts different classes of objects and does something different depending on the class of the object passed to it. The function `summary()` is *generic*. What happens when you pass it a data frame?

```
summary(myData)
```