Module 1 Homework

Problem 1 (32 points) Choose the answers in the following questions:
(a) What is the class of the object defined be `vec <-c(5,TRUE)` ?
• Numeric
• Integer
• Matrix
• Logical

(b) Suppose I have vectors `x <- 1:4` and `y <- 1:2`. What is the result of the expression `x + y`?
• A numeric vector with the values 1, 2, 5, 7
• A numeric vector with the values 2, 4, 2, 4
• **An integer vector with the values 2, 4, 4, 6**
• An error

(c) What is returned by the R command `c(1,2) %*% t(c(1,2))` ?
• The number 5
• A one by two matrix
• A two by two matrix
• An error is returned because the dimensions mismatch

(d) Suppose I define the following function in R:

```
f <- function(x) {
  g <- function(y) {
    y+z
   }
  z<-4
  x+g(x)
}
```

If I then run in R the following statements

```
z<-15
f(3)
```

What value is returned?
• 16
•7
• 10
•4

Problem 2 (10 points)

Use R to calculate $\sum_{x=1}^{1000} x^2 = 1^2 + 2^2 + \cdots + 1000^2$

Please hand in your R commands and the results you produce by running those commands.

Question 3 (18 points)

This exercise is to make sure all of you understand how to create a vector in R and do simple operations. **All parts should be done using "R"** obviously.

Consider a group of 10 randomly selected people of **different** ages.

a) Create a vector named "age" to represent this. You can pick any **reasonable** age (whole numbers only please) for each person.

b) Multiply each person's age by 12 (to convert into months). (the answer should be a vector, hope you know this)

c) Find the sum of ages of all these people.

d) Find the age of the youngest person.

e) Find the age of the oldest person.

f) Find the square root of the age of each person. (Not sure what this means, but who cares?) (this also should be a vector)

Question 4 (40 points)

Write an R script that does all of the following:

g) Create a vector X of length 30, with the k^{th} element in X = 3k, for k=1…30. Print out the values of X.

h) Create a vector Y of length 30, with all elements in Y equal to 0. Print out the values of Y.

i) Using a "for" loop, reassigns the value of the k-th element in Y, for k = 1…30. When k < 20, the k^{th} element of Y is reassigned as the sine

of (2k). When the $k \geq 20$, the k^{th} element of Y is reassigned as the value of integral $\int_0^k \sqrt{t}dt$. (You may want to use $value at the end of the line to get the integration with R clean out unwanted values)

Please run the script and hand in your R execution results. The R script file should be submitted separately as part of the "hw1.r" file.