Lab Exercise 2 (Introduction to R)

IT2110 - Probability & Statistics Week 03

Control Statements

Conditional statements and loops exists in R; the same as in other programming languages. Given below are the syntax for conditional statements and loops.

```
# If condition if
(test_expression) {
statement(s)

}


# If…Else condition if
(test_expression) {    statement1
} else {    statement2

}


# Nested If…Else condition if
(test_expression1) {
statement1  } else if
(test_expression2) {
statement2
} else if (test_expression3) {
statement3 } else {    statement4

}
```

```
# while loop while (condition) {
expressions

}
# for loop
for (symbol in sequence) {
expressions
```

```
}
for (i in 1:10){
print(i)

} # this loop runs from i = 1 to 10 and prints the value
```

Importing and Exporting

R can read files on your machine and create data files and graphics. Paths to these files are computed relative to the **working directory**. Paths are specified in the format appropriate for the machine.

R supports basic data types when importing data and other file types can be imported using dedicated packages (e.g.: `xlsx` package for importing Excel 2010 onwards).

`read.table()` can be used to import data from a basic file type and `read.csv()` for importing data from CSV (comma separated values) files. The dataset will be imported as a data frame. The following 2 commands do the same job.

```
> data1 <- read.table(filename, header=TRUE,
sep=",")
> data2 <- read.csv(filename)
```

`write.table()` and `write.csv()` functions can be used to write a data frame to a file.

```
> write.csv(dataframe, file = filename)
```

Functions

Functions are created using the `function()` directive and are stored as R objects just like anything else. In particular, they are R objects of class "function".

```
fun_name <- function(<arguments>) {
statements

}
```

When specifying arguments, the function can be defined with default values for the arguments.

1. Compute the real roots of the quadratic equation in the form of $ax^2 + bx + c = 0$.
2. Without using R, determine the result of the following computation.

```
x <- c(1,2,3)
x[1]/x[2]^3-1+2*x[3]-x[2-1]
```

3. Construct separate plots of $\log(x)$, $\exp(x)$, by using appropriate x values.
4. Consider vector *1: K*, where *K* is a positive integer. Write R command that determines how many elements in the vector are exactly divisible by 3.
5. Write an R expression to determine if two sets, *A* and *B*, represented as integer vectors are disjoint. If not disjoint, print the common elements.
6. Write a loop structure to scan through an integer vector to determine the index of the maximum value.
7. Do the same without using a loop.
8. Compound interest can be computed using the formula,

$$A = P \times \left(1 + \frac{R}{100}\right)^n$$

where P is the original money lent, A is what it amounts to in n years at R percent per year interest. Write a function to calculate the amount of money owed after n years where n changes from 1 to 15 in yearly increments, if the money lent originally is 5000 rupees and the interest rate remains constant throughout the period at 11.5%.

9. Import the file "Death Row.csv" into R and identify the variables.