Overview

- ✓ R is a programming language and software environment for statistical analysis, graphics representation and reporting.
- ✓ R is open-source/freely available under the GNU General Public License

Evolution of R

- ✓ R was initially written by **Ross Ihaka** and **Robert Gentleman** at the Department of Statistics of the University of Auckland in Auckland, New Zealand in (1993)

Audience

- ✓ Used by statisticians and data miners who are looking forward for developing statistical software using R programming

Prerequisites

- ✓ Any programming language knowledge

Features of R

- ✓ well-developed, simple and effective. Includes,
    - o conditionals, loops, user defined recursive functions and input and output facilities.
- ✓ effective data handling and storage facility.
- ✓ suite of operators for calculations on arrays, lists, vectors and matrices.
- ✓ coherent and integrated collection of tools for data analysis.
- ✓ graphical facilities for data analysis and display.

First Program!

```
# My first program in R Programming
myString <- "Hello, World!"

print ( myString)
```

Comments in R

```
if(FALSE) {
   "This is a demo for multi-line comments and it should be put inside either a single
      OR double quote"
}

myString <- "Hello, World!"
print ( myString)
```

```
# Create a vector.
apple <- c('red','green',"yellow")
print(apple)

# Get the class of the vector.
print(class(apple))
```

```
# Create a list.
list1 <- list(c(2,5,3),21.3,sin)

# Print the list.
print(list1)
```

```
# Create a matrix.
M = matrix( c('a','a','b','c','b','a'), nrow = 2, ncol = 3, byrow = TRUE)
print(M)
```

```r
# Create an array.
a <- array(c('green','yellow'),dim = c(3,3,2))
print(a)
```

```r
# Create the data frame.
BMI <-   data.frame(
   gender = c("Male", "Male","Female"),
   height = c(152, 171.5, 165),
   weight = c(81,93, 78),
   Age = c(42,38,26)
)
print(BMI)
```

Matrix Addition & Subtraction

```r
# Create two 2x3 matrices.
matrix1 <- matrix(c(3, 9, -1, 4, 2, 6), nrow = 2)
print(matrix1)

matrix2 <- matrix(c(5, 2, 0, 9, 3, 4), nrow = 2)
print(matrix2)

# Add the matrices.
result <- matrix1 + matrix2
cat("Result of addition","\n")
print(result)

# Subtract the matrices
result <- matrix1 - matrix2
cat("Result of subtraction","\n")
print(result)
```

R - Loops

Repeat Loop

```
v <- c("Hello","loop")
cnt <- 2

repeat {
   print(v)
   cnt <- cnt+1

   if(cnt > 5) {
      break
   }
}
```

While Loop

```
v <- c("Hello","while loop")
cnt <- 2

while (cnt < 7) {
   print(v)
   cnt = cnt + 1
}
```

For Loop

```
v <- LETTERS[1:4]
for ( i in v) {
   print(i)
}
```

R – Functions

Built-in Function

```
# Create a sequence of numbers from 32 to 44.
print(seq(32,44))

# Find sum of numbers frm 41 to 68.
print(sum(41:68))
```

User-defined Function

```
# Create a function to print squares of numbers in sequence.
new.function <- function(a) {
   for(i in 1:a) {
      b <- i^2
      print(b)
   }
}

# Call the function new.function supplying 6 as an argument.
new.function(6)
```