PROBABILITY & STATISTICS – LAB 1

B.Tech. Computer Science and Engineering (Cybersecurity)

Name: Anish Sudhan Nair	Roll No.: K041
Batch: K2/A2	Date of performance: 23/12/2021

Aim: To be introduced to the R language and the basic syntax including data types, matrix operations and such.

Question 1: Write an R program to create three vectors – numeric, character and logical data types. Display the content of the vectors and their type.

```
name="Anish Sudhan Nair - K041"
print("Name of student: ")
name
v1<-c(1,2,3)
v2<-c("a","n","i","s","h")
v3<-c(T,F)
print("Vector v1: ")
v1
print("The type of v1 vector: ")
typeof(v1)
print("The class of v1 vector: ")
class(v1)
print("Vector v2: ")
v2
print("The type of v1 vector: ")
typeof(v2)
print("Vector v3: ")
v3
print("The type of v1 vector: ")
typeof(v3)
```

```
> name="Anish Sudhan Nair - K041"
> print("Name of student: ")
[1] "Name of student: "
> name
[1] "Anish Sudhan Nair - K041"
> v1<-c(1,2,3)
> v2<-c("a","n","i","s","h")
> v3<-c(T,F)
> print("Vector v1: ")
[1] "Vector v1: "
> v1
[1] 1 2 3
> print("The type of v1 vector: ")
[1] "The type of v1 vector: "
> typeof(v1)
[1] "double"
> print("The class of v1 vector: ")
[1] "The class of v1 vector: "
> class(v1)
[1] "numeric"
> print("Vector v2: ")
[1] "Vector v2: "
> v2
[1] "a" "n" "i" "s" "h"
> print("The type of v1 vector: ")
[1] "The type of v1 vector: "
> typeof(v2)
[1] "character"
> print("Vector v3: ")
[1] "Vector v3: "
> v3
[1]  TRUE FALSE
> print("The type of v1 vector: ")
[1] "The type of v1 vector: "
> typeof(v3)
[1] "logical"
>
```

Question 2

Write an R program to create a 4x5 matrix and a 3x2 matrix with labels, and fill the matrix by rows alongside a 2x2 matrix with labels, filling the matrix by columns.

```
name="Anish Sudhan Nair - K041"
print("Name of student: ")
name
print("4x5 matrix: ")
rownames<-c("r1","r2","r3","r4")
colnames<-c("c1","c2","c3","c4","c5")
m<-matrix(1:20, nrow=4, ncol = 5, byrow=T, dimnames=list(rownames, colnames))
m
name="Anish Sudhan Nair - K041"
print("Name of student: ")
name
print("3x2 matrix: ")
rownames<-c("r1","r2","r3")
colnames<-c("c1","c2")
m<-matrix(1:6, nrow=3, ncol = 2, byrow=T, dimnames=list(rownames, colnames))
m
name="Anish Sudhan Nair - K041"
print("Name of student: ")
name
print("2x2 matrix: ")
rownames<-c("r1","r2")
colnames<-c("c1","c2")
m<-matrix(1:4, nrow=2, ncol = 2, byrow=F, dimnames=list(rownames, colnames))
m
```

```
> name="Anish Sudhan Nair - K041"
> print("Name of student: ")
[1] "Name of student: "
> name
[1] "Anish Sudhan Nair - K041"
> print("4x5 matrix: ")
[1] "4x5 matrix: "
> rownames<-c("r1","r2","r3","r4")
> colnames<-c("c1","c2","c3","c4","c5")
> m<-matrix(1:20, nrow=4, ncol = 5, byrow=T, dimnames=list(rownames, colnames))
> m
   c1 c2 c3 c4 c5
r1  1  2  3  4  5
r2  6  7  8  9 10
r3 11 12 13 14 15
r4 16 17 18 19 20
> name="Anish Sudhan Nair - K041"
> print("Name of student: ")
[1] "Name of student: "
> name
[1] "Anish Sudhan Nair - K041"
> print("3x2 matrix: ")
[1] "3x2 matrix: "
> rownames<-c("r1","r2","r3")
> colnames<-c("c1","c2")
> m<-matrix(1:6, nrow=3, ncol = 2, byrow=T, dimnames=list(rownames, colnames))
> m
   c1 c2
r1  1  2
r2  3  4
r3  5  6
> name="Anish Sudhan Nair - K041"
> print("Name of student: ")
[1] "Name of student: "
> name
[1] "Anish Sudhan Nair - K041"
> print("2x2 matrix: ")
[1] "2x2 matrix: "
> rownames<-c("r1","r2")
> colnames<-c("c1","c2")
> m<-matrix(1:4, nrow=2, ncol = 2, byrow=F, dimnames=list(rownames, colnames))
> m
   c1 c2
r1  1  3
r2  2  4
```

Question 3

Write an R program to compute the sum, the mean and the product of a given vector elements.

```
name="Anish Sudhan Nair - K041"
print("Name of student: ")
name
v1<-c(4,2,3)
print("Sum of vector elements: ")
sum(v1)
print("Mean of vector elements: ")
mean(v1)
print("Product of vector elements: ")
prod(v1)
```

```
> name="Anish Sudhan Nair - K041"
> print("Name of student: ")
[1] "Name of student: "
> name
[1] "Anish Sudhan Nair - K041"
> v1<-c(4,2,3)
> print("Sum of vector elements: ")
[1] "Sum of vector elements: "
> sum(v1)
[1] 9
> print("Mean of vector elements: ")
[1] "Mean of vector elements: "
> mean(v1)
[1] 3
> print("Product of vector elements: ")
[1] "Product of vector elements: "
> prod(v1)
[1] 24
>
```

Question 4

Write an R program to compute addition and subtraction of two matrices of dimension nx(n+1).

```
name="Anish Sudhan Nair - K041"
print("Name of student: ")
name
m<-matrix(1:6, nrow=2,ncol=3, byrow=T)
x<-c(14,18,9)
y<-c(10,1,5)
n<-rbind(x,y)
print("Matrix m:")
m
print("Matrix n:")
n
print("Addition of matrices m and n:")
m+n
print("Subtraction of matrices m and n:")
m-n
```

```
> name
[1] "Anish Sudhan Nair - K041"
> m<-matrix(1:6, nrow=2,ncol=3, byrow=T)
> x<-c(14,18,9)
> y<-c(10,1,5)
> n<-rbind(x,y)
> print("Matrix m:")
[1] "Matrix m:"
> m
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]    4    5    6
> print("Matrix n:")
[1] "Matrix n:"
> n
  [,1] [,2] [,3]
x   14   18    9
y   10    1    5
> print("Addition of matrices m and n:")
[1] "Addition of matrices m and n:"
> m+n
  [,1] [,2] [,3]
x   15   20   12
y   14    6   11
> print("Subtraction of matrices m and n:")
[1] "Subtraction of matrices m and n:"
> m-n
  [,1] [,2] [,3]
x  -13  -16   -6
y   -6    4    1
>
```

Question 5

Write an R program to create a list containing a vector, a matrix, and a list; and give names to the elements in the list. Access the second element of the list.

```
name="Anish Sudhan Nair - K041"
print("Name of student: ")
name
m<-matrix(1:6, nrow=2,ncol=3, byrow=T)
print("Matrix m:")
m
a<-list(c(5,12), m, list("a","n","i","s","h"))
names(a)<-c("1st element","2nd element","3rd element")
a
print("Accessing second element:")
a[2]
```

```
> name="Anish Sudhan Nair - K041"
> print("Name of student: ")
[1] "Name of student: "
> name
[1] "Anish Sudhan Nair - K041"
> m<-matrix(1:6, nrow=2,ncol=3, byrow=T)
> print("Matrix m:")
[1] "Matrix m:"
> m
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]    4    5    6
> a<-list(c(5,12), m, list("a","n","i","s","h"))
> names(a)<-c("1st element","2nd element","3rd element")
> a
$`1st element`
[1]  5 12

$`2nd element`
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]    4    5    6

$`3rd element`
$`3rd element`[[1]]
[1] "a"

$`3rd element`[[2]]
[1] "n"

$`3rd element`[[3]]
[1] "i"

$`3rd element`[[4]]
[1] "s"

$`3rd element`[[5]]
[1] "h"


> print("Accessing second element:")
[1] "Accessing second element:"
> a[2]
$`2nd element`
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]    4    5    6
```