**ITA0448 Statistics and R Programming**

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**1) Perform Matrix Addition & Subtraction in R**

> a=c(1,2,3,4,5,6,7,8,9)

> b=c(9,8,7,6,5,4,3,2,1)

> x=a+b

> print(x)

[1] 10 10 10 10 10 10 10 10 10

> y=a-b

[1] -8 -6 -4 -2 0 2 4 6 8

**2) Perform Scalar multiplication and matrix multiplication in R**

> a = matrix(1:4,2,2)

> 3 \* a

[,1] [,2]

[1,] 3 9

[2,] 6 12

> c(1:2) %\*% a

[,1] [,2]

[1,] 5 11

> c(1:2) %\*% t(a)

[,1] [,2]

[1,] 7 10

> solve(a)

[,1] [,2]

[1,] -2 1.5

[2,] 1 -0.5

**3) Find Transpose of matrix in R.**

> a<-c(2,3,4)

> b<-c(2,4,5)

> c<-c(6,5,4)

> x<-rbind(a,b,c)

> print(x)

[,1] [,2] [,3]

a 2 3 4

b 2 4 5

c 6 5 4

> t<-t(x)

> print(t)

a b c

[1,] 2 2 6

[2,] 3 4 5

[3,] 4 5 4

**4) Perform the operation of combining matrices in R using cbind() and rbind() functions.**

> a<-c(1,2,3)

> b<-c(5,6,7)

> c<-c(8,7,6)

> cbind(a,b,c)

a b c

[1,] 1 5 8

[2,] 2 6 7

[3,] 3 7 6

> rbind(a,b,c)

[,1] [,2] [,3]

a 1 2 3

b 5 6 7

c 8 7 6

**5) Deconstruct a matrix in R**

a<-matrix(c(11, 13, 15, 12, 14, 16),nrow =2, ncol =3, byrow = TRUE)

print(a)

[,1] [,2] [,3]

[1,] 11 13 15

[2,] 12 14 16

[3,] 11 13 15

**6) Perform array manipulation in R .**

a=c(1:8,nrow=2)

> print(a)

nrow

1 2 3 4 5 6 7 8 2

**7) Perform calculations across array elements in an array using the apply() function.**

> vector1 <- c(1, 2, 3)

> vector2 <- c(10, 15, 3, 11, 16, 12)

> result <- array(c(vector1, vector2), dim = c(3, 3, 2))

> print(result)

1

[,1] [,2] [,3]

[1,] 1 10 11

[2,] 2 15 16

[3,] 3 3 12

2

[,1] [,2] [,3]

[1,] 1 10 11

[2,] 2 15 16

[3,] 3 3 12

**8) Demonstrate Factor data structure in R.**

> Name = c("Amiya", "Raj", "Asish")

> Language = c("R", "Python", "Java")

> Age = c(22, 25, 45)

> df = data.frame(Name, Language, Age)

> print(df)

Name Language Age

1 Amiya R 22

2 Raj Python 25

3 Asish Java 45

**9) Create a data frame and print the structure of the data frame in R.**

emp\_id = c (1:5),

emp\_name = c("Rick","Dan","Michelle","Ryan","Gary"),

salary = c(623.3,515.2,611.0,729.0,843.25),

start\_date = as.Date(c("2012-01-01", "2013-09-23", "2014-11-15", "2014-05-11",

"2015-03-27")),

stringsAsFactors = FALSE

)

>

> print(emp.data)

emp\_id emp\_name salary start\_date

1 1 Rick 623.30 2012-01-01

2 2 Dan 515.20 2013-09-23

3 3 Michelle 611.00 2014-11-15

4 4 Ryan 729.00 2014-05-11

5 5 Gary 843.25 2015-03-27

**10) Demonstrate the creation of S3 class in R.**

> x<-c("female", "male", "male", "female")

> class(x)

[1] "character"

**11) Demonstrate the creation of S4 class in R.**

setClass("Employee\_Info", slots=list(name="character", age="numeric", role="character"))

>

> employee1 <- new("Employee\_Info", name = "Peter", age = 21, role = "Developer")

> employee1@name # prints "Peter"

[1] "Peter"

> employee1@role # prints "Developer"

[1] "Developer"

**12) Demonstrate the creation of Reference class in R by defining a class called students with fields – Name, Age , GPA. Also illustrate how the fields of the object can be accessed using the $ operator. Modify the Name field by reassigning the name to Paul.**

> movieList <- list(name = "Iron man", leadActor = "Robert Downey Jr")

>

> class(movieList) <- "movie"

>

> print(movieList)

$name

[1] "Iron man"

$leadActor

[1] "Robert Downey Jr"

attr(,"class")

[1] "movie"

**13.Write The Commands To Perform Basic Arithmetic In R.**

> a=c(1,2,3,4,5,6,7,8,9)

> b=c(9,8,7,6,5,4,3,2,1)

> x=a+b

> print(x)

[1] 10 10 10 10 10 10 10 10 10

> y=a-b

[1] -8 -6 -4 -2 0 2 4 6 8

> v=a\*b

> print(v)

[1] 9 16 21 24 25 24 21 16 9

> z=a/b

> print(z)

[1] 0.1111111 0.2500000 0.4285714 0.6666667 1.0000000 1.5000000 2.3333333

[8] 4.0000000 9.0000000

**14. Display a String on R Console.**

> c<-c("fro","ram")

> print(c)

[1] "fro" "ram"

> cat("c is",c,"\n")

c is fro ram

**15. Write R script to calculate the area of Rectangle.**

> height <- 2

> width <- 3

> area <- height \* width

> area

[1] 6

>