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R Version: 4.0.3

R Studio Version: 1.1.463 Operation

System: Windows 10 OS Exercise No. 3

`> rm(list = ls())`

rm() function is used for remove data in R environment.

Matrix:

Matrix is 2 dimensional data structure in R programming. Matrix is a similar collection of data types for ex. Numeric, character, float, double etc.

Vector: Vector is a basic data type structure in R programming.

For creating a vector in R programming, R provide c() function.

Syntax: `vector_name <- c("value1", "value2",.....,"value_n")`

Where, vector_name is used to define name of the vector.

c() is used to create a function for passing values or arguments.

Value may be integer, string, float values etc.

Example: `demo <- c (10,20,30,40)`

Que 1 Create 2 matrix of 3*3 from two vectors

Command: Matrix 1

`> V1 <- c(10,11,12)`

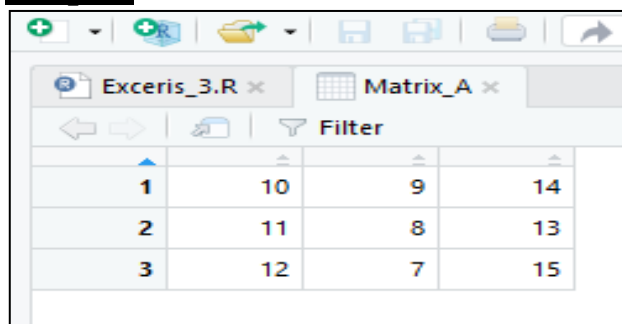
`>V2 <- c(9,8,7,14,13,15)`

`>Matrix_A <- data.frame(V1,V2)`

`>Matrix_A=array(c(V1,V2),dim = c(3,3))`

`>View(Matrix_A)`

Output:



	V1	V2
1	10	9
2	11	8
3	12	7

Create .csv file:

`write.csv(Matrix_A,"NewMatrix_A.csv")`

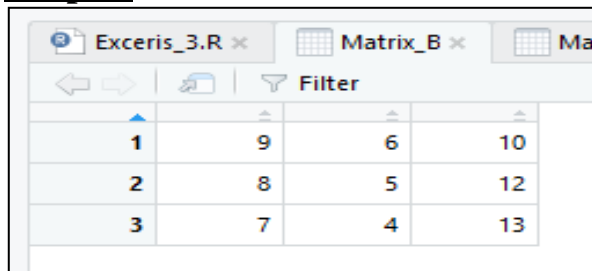
`NewMatrix_A <- read.csv("NewMatrix_A.csv")`

`print(NewMatrix_A)`

Command: Matrix 1

```
> A1 <- c(9,8,7)
> A2 <- c(6,5,4,10,12,13)
> Matrix_B <- data.frame(A1,A2)
> Matrix_B=array(c(A1,A2),dim = c(3,3))
> View(Matrix_B)
```

Output:



1	9	8	7
2	6	5	4
3	10	12	13

Create .csv file:

```
write.csv(Matrix_B,"NewMatrix_B.csv")
NewMatrix_B <- read.csv("NewMatrix_B.csv")
print(NewMatrix_B)
```

Que 2 Display Addition of 2 matrix

Using plus (+) sign to calculate addition of two matrix

Command:

```
> Matrix_A + Matrix_B
```

Output:

```
[,1] [,2] [,3]
[1,] 19 15 24
[2,] 19 13 25
[3,] 19 11 28
```

Que 3 Display Subtraction of 2 matrix

Using minus (-) sign to calculate Subtraction of two matrix

Command:

> Matrix_A - Matrix_B

Output:

```
      [,1] [,2] [,3]  
[1,]    1    3    4  
[2,]    3    3    1  
[3,]    5    3    2
```

Que 4 Display Multiplication of 2 matrix

Using %*% this operator to calculate Multiplication of two matrix. This operator satisfied their condition that the number of columns in the first matrix is equal to the number of rows in second

> Matrix_A %*% Matrix_B

Output:

```
      [,1] [,2] [,3]  
[1,]  260  161  390  
[2,]  254  158  375  
[3,]  269  167  399
```

Que 5 Display Transpose of Matrix

Transpose of matrix is use to convert rows into columns and columns into rows into matrix.

Use **t ()** function to convert transpose matrix.

Syntax: t(x)

Where x is data frame or matrix name

Matrix 1

```
> t(Matrix_A)
```

Output:

```
      [,1] [,2] [,3]  
[1,]   9   8   7  
[2,]   6   5   4  
[3,]  10  12  13
```

Matrix 2

```
> t(Matrix_B)
```

Output:

```
      [,1] [,2] [,3]  
[1,]  10  11  12  
[2,]   9   8   7  
[3,]  14  13  15
```

Que 6 Display Inverse of Matrix

Inverse: Changing in the opposite way in relation to something else.

Function **solve()** is used to display inverse of matrix

Matrix 1

```
>Inverse_A <- solve(Matrix_A)
```

```
>print(Inverse_A)
```

Output:

	[,1]	[,2]	[,3]
[1,]	-0.5087719	0.6491228	-0.0877193
[2,]	0.1578947	0.3157895	-0.4210526
[3,]	0.3333333	-0.6666667	0.3333333

Matrix 2 Output:

```
> Inverse_B <- solve(Matrix_B)
```

```
print(Inverse_B)
```

Output:

	[,1]	[,2]	[,3]
[1,]	5.666667	-12.66667	7.333333
[2,]	-6.666667	15.66667	-9.333333
[3,]	-1.000000	2.00000	-1.000000

Que 7 Display even number from Matrix

Using for loop and if statement it display even number.

For loop: A for loop is used to iterate over a vector in R programming.

Syntax: `for (variable in vector) {
 statements
}`

Where, variable is value during in the loop.

Vector is sequence.

If Statement: It is used for test expression which is true or false.

Syntax: `if(Condition/Expression)
{
 statements
}`

Matrix 1: Command:

```
> for (val in Matrix_A)
{
+   if(val %% 2 == 0)
+   {
+       print(val)
+   }
+ }
```

Output:

```
[1] 8
[1] 6
[1] 4
[1] 10
[1] 12
```

Matrix 2: Command:

```
> for (val in Matrix_B) {
+   if(val %% 2 == 0){
+       print(val)
+   }
+ }
```

Output:

```
[1] 10
[1] 12
[1] 8
[1] 14
```

Que 8 Display sum of matrix element.

Display sum of matrix element using for loop and sum variable.

Print() function is display output of a program

Matrix 1**Command:**

```
> sum=0  
> for (val in Matrix_A) {  
+   sum=sum+val  
+ }  
> print(sum)
```

Output:

```
[1] 99
```

Matrix 2**Command:**

```
> sum=0  
> for (val in Matrix_B) {  
+   sum=sum+val  
+ }  
> print(sum)
```

Output:

```
[1] 74
```