

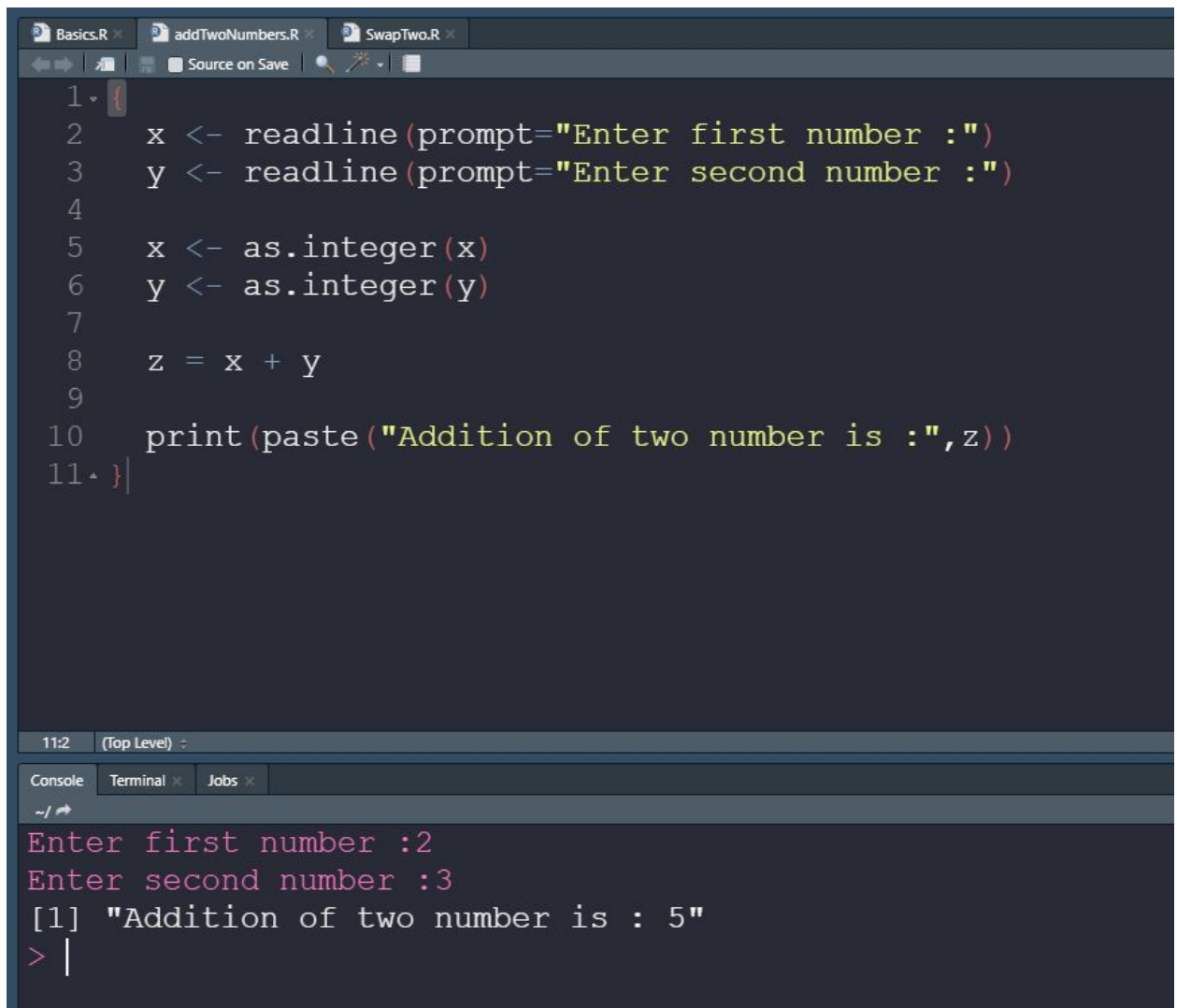
## Experiment No. 1

**Title:** To create basic Data structures and perform various operations on each data structure in R.

Create a CSV file and read & write data in R.

### List of Programs:

1. To add two numbers taken from the user:



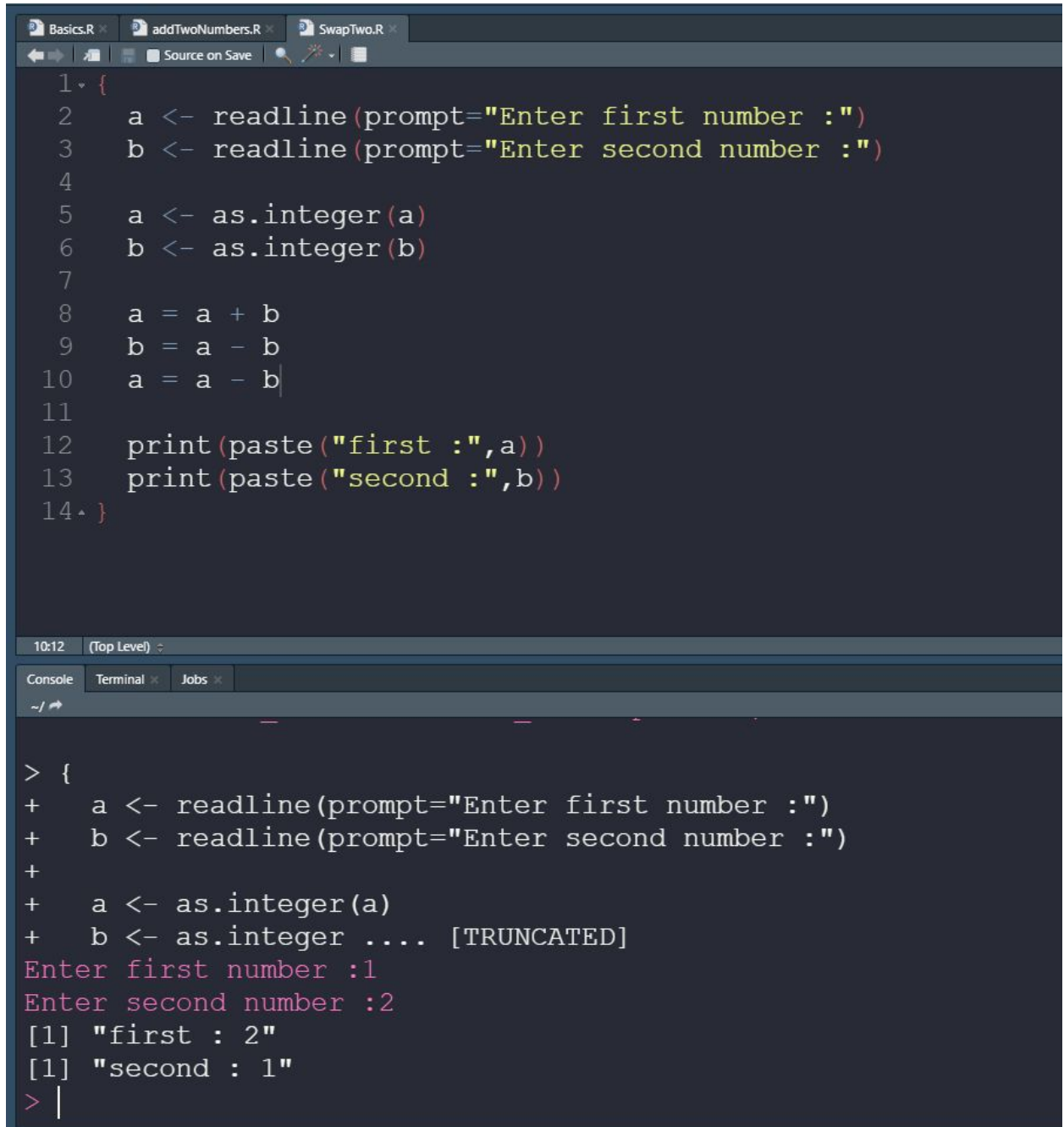
```
1 {  
2   x <- readline(prompt="Enter first number :")  
3   y <- readline(prompt="Enter second number :")  
4  
5   x <- as.integer(x)  
6   y <- as.integer(y)  
7  
8   z = x + y  
9  
10  print(paste("Addition of two number is :",z))  
11 }
```

11:2 (Top Level) -

Console Terminal Jobs

```
~/   
Enter first number :2  
Enter second number :3  
[1] "Addition of two number is : 5"  
> |
```

2. To swap 2 numbers:



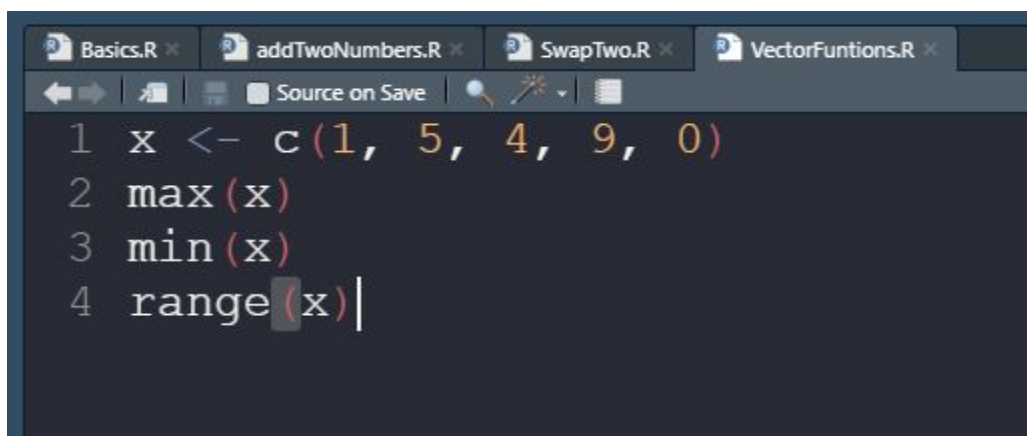
```
1 {  
2   a <- readline(prompt="Enter first number :")  
3   b <- readline(prompt="Enter second number :")  
4  
5   a <- as.integer(a)  
6   b <- as.integer(b)  
7  
8   a = a + b  
9   b = a - b  
10  a = a - b  
11  
12  print(paste("first :",a))  
13  print(paste("second :",b))  
14 }
```

10:12 (Top Level) :

Console Terminal Jobs

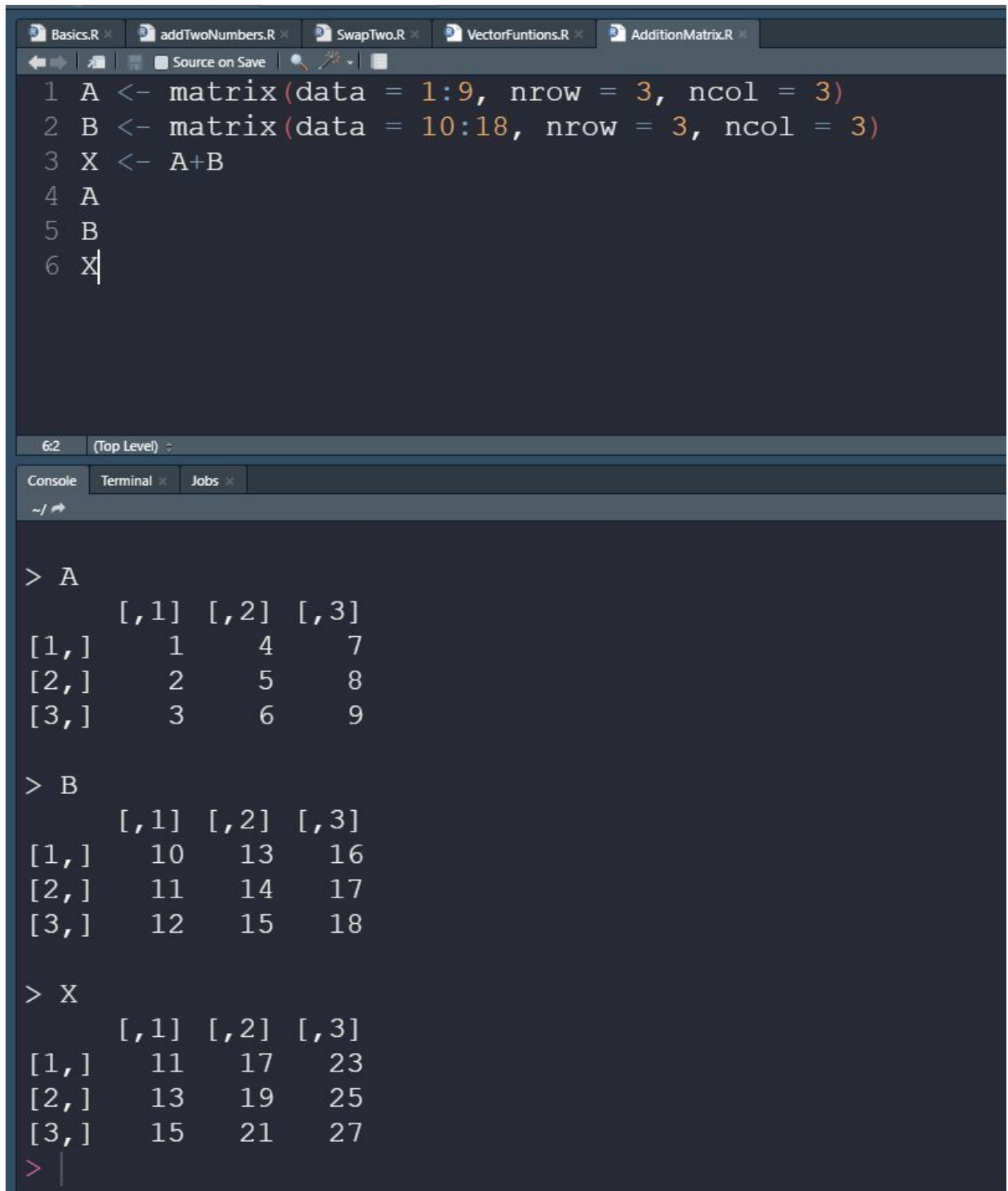
```
> {  
+   a <- readline(prompt="Enter first number :")  
+   b <- readline(prompt="Enter second number :")  
+  
+   a <- as.integer(a)  
+   b <- as.integer .... [TRUNCATED]  
Enter first number :1  
Enter second number :2  
[1] "first : 2"  
[1] "second : 1"  
> |
```

3. To Find Minimum and Maximum element from vector along with their index:



```
1 x <- c(1, 5, 4, 9, 0)  
2 max(x)  
3 min(x)  
4 range(x)|
```

## 4. Add two Matrices:



```
1 A <- matrix(data = 1:9, nrow = 3, ncol = 3)
2 B <- matrix(data = 10:18, nrow = 3, ncol = 3)
3 X <- A+B
4 A
5 B
6 X
```

6:2 (Top Level) ▾

Console Terminal Jobs ▾

~/ ➡

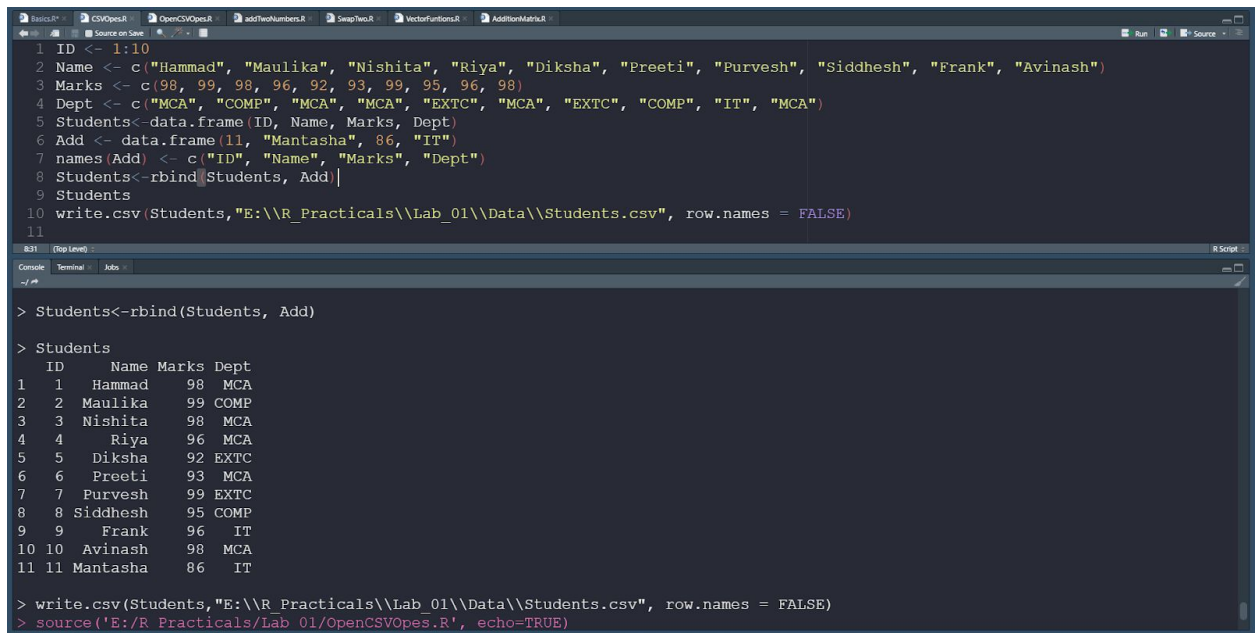
```
> A
      [,1] [,2] [,3]
[1,]    1    4    7
[2,]    2    5    8
[3,]    3    6    9

> B
      [,1] [,2] [,3]
[1,]   10   13   16
[2,]   11   14   17
[3,]   12   15   18

> X
      [,1] [,2] [,3]
[1,]   11   17   23
[2,]   13   19   25
[3,]   15   21   27

> |
```

5. Read, Write CSV file in R Create CSV file for students containing the following fields:  
ID, Name, Marks, Dept.



The screenshot shows the R Studio interface with a script editor and a console. The script editor contains R code to create a data frame of student information and write it to a CSV file. The console shows the execution of the code, including the creation of the 'Students' data frame and the successful writing of the CSV file.

```
1 ID <- 1:10
2 Name <- c("Hammad", "Maulika", "Nishita", "Riya", "Diksha", "Preeti", "Purvesh", "Siddhesh", "Frank", "Avinash")
3 Marks <- c(98, 99, 98, 96, 92, 93, 99, 95, 96, 98)
4 Dept <- c("MCA", "COMP", "MCA", "MCA", "EXTC", "MCA", "EXTC", "COMP", "IT", "MCA")
5 Students<-data.frame(ID, Name, Marks, Dept)
6 Add <- data.frame(11, "Mantasha", 86, "IT")
7 names(Add) <- c("ID", "Name", "Marks", "Dept")
8 Students<-rbind(Students, Add)
9 Students
10 write.csv(Students,"E:\\R_Practicals\\Lab_01\\Data\\Students.csv", row.names = FALSE)
11
```

Console output:

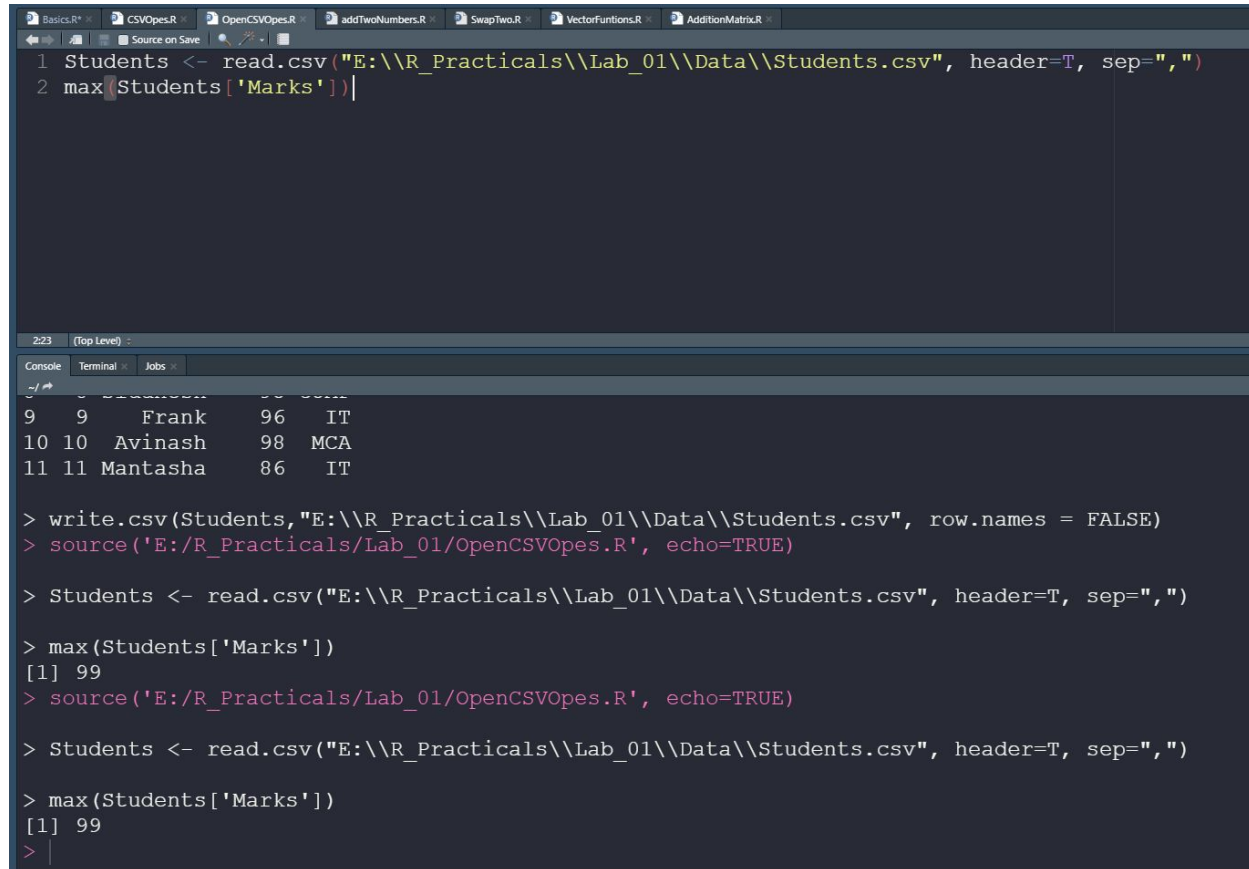
```
> Students<-rbind(Students, Add)

> Students
  ID   Name Marks Dept
1  1 Hammad   98   MCA
2  2 Maulika  99  COMP
3  3 Nishita  98   MCA
4  4 Riya    96   MCA
5  5 Diksha  92  EXTC
6  6 Preeti  93   MCA
7  7 Purvesh 99  EXTC
8  8 Siddhesh 95  COMP
9  9 Frank   96   IT
10 10 Avinash 98   MCA
11 11 Mantasha 86   IT

> write.csv(Students,"E:\\R_Practicals\\Lab_01\\Data\\Students.csv", row.names = FALSE)
> source('E:/R_Practicals/Lab_01/OpenCSVOpes.R', echo=TRUE)
```

Perform the following:

- a. Get the maximum Marks.



The screenshot shows the RStudio IDE interface. The top pane displays R code for reading a CSV file, finding the maximum mark, and writing the data back to a CSV file. The bottom pane shows the console output, which includes a table of student data and the execution of the same R code as in the top pane.

```
1 Students <- read.csv("E:\\R_Practicals\\Lab_01\\Data\\Students.csv", header=T, sep=",")
2 max(Students['Marks'])
```

	id	name	marks	branch
9	9	Frank	96	IT
10	10	Avinash	98	MCA
11	11	Mantasha	86	IT

```
> write.csv(Students,"E:\\R_Practicals\\Lab_01\\Data\\Students.csv", row.names = FALSE)
> source('E:/R_Practicals/Lab_01/OpenCSVOpes.R', echo=TRUE)

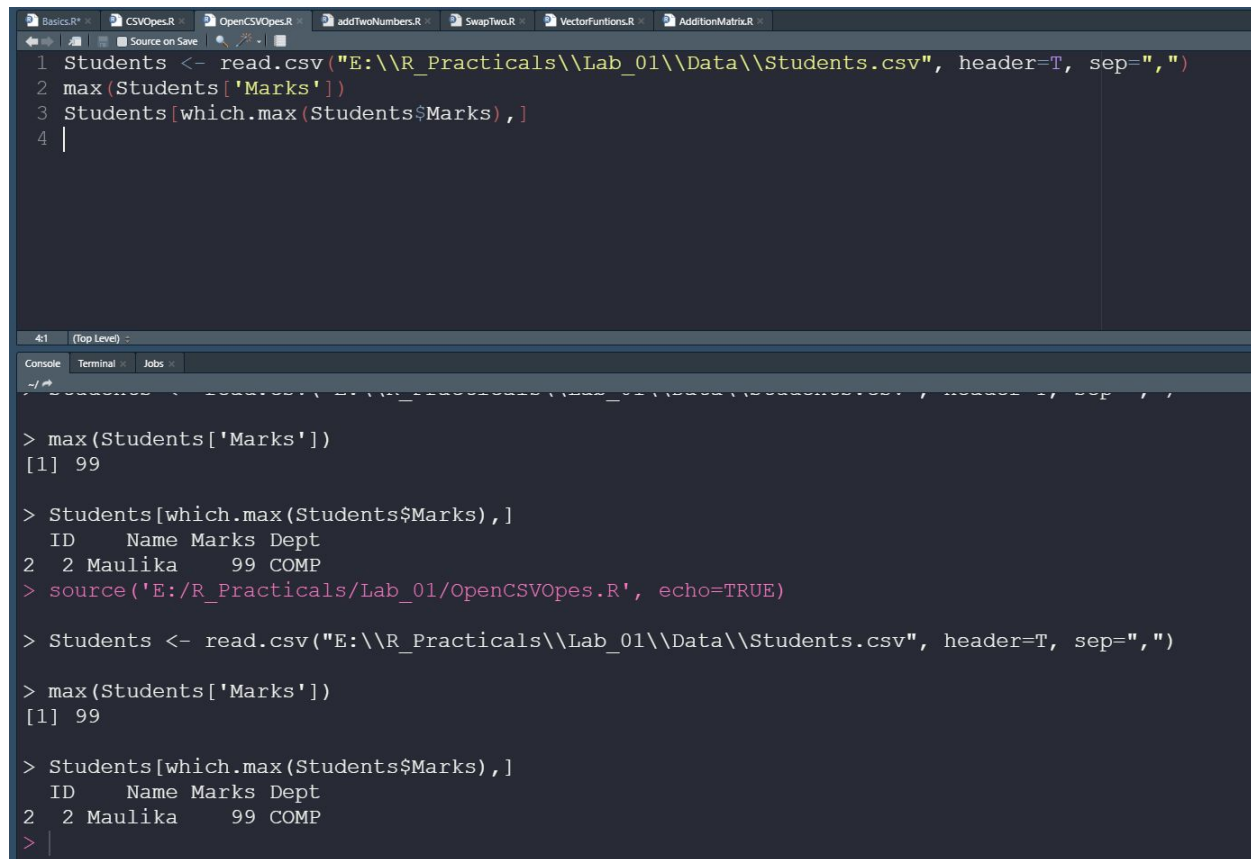
> Students <- read.csv("E:\\R_Practicals\\Lab_01\\Data\\Students.csv", header=T, sep=",")

> max(Students['Marks'])
[1] 99
> source('E:/R_Practicals/Lab_01/OpenCSVOpes.R', echo=TRUE)

> Students <- read.csv("E:\\R_Practicals\\Lab_01\\Data\\Students.csv", header=T, sep=",")

> max(Students['Marks'])
[1] 99
>
```

- c. Get the details of the student with max marks



The screenshot shows the RStudio IDE with a script editor at the top and a console at the bottom. The script editor contains the following R code:

```
1 Students <- read.csv("E:\\R_Practicals\\Lab_01\\Data\\Students.csv", header=T, sep=",")
2 max(Students['Marks'])
3 Students[which.max(Students$Marks),]
4 |
```

The console shows the execution of the code, with the following output:

```
> max(Students['Marks'])
[1] 99

> Students[which.max(Students$Marks),]
  ID   Name Marks Dept
2  2 Maulika   99  COMP

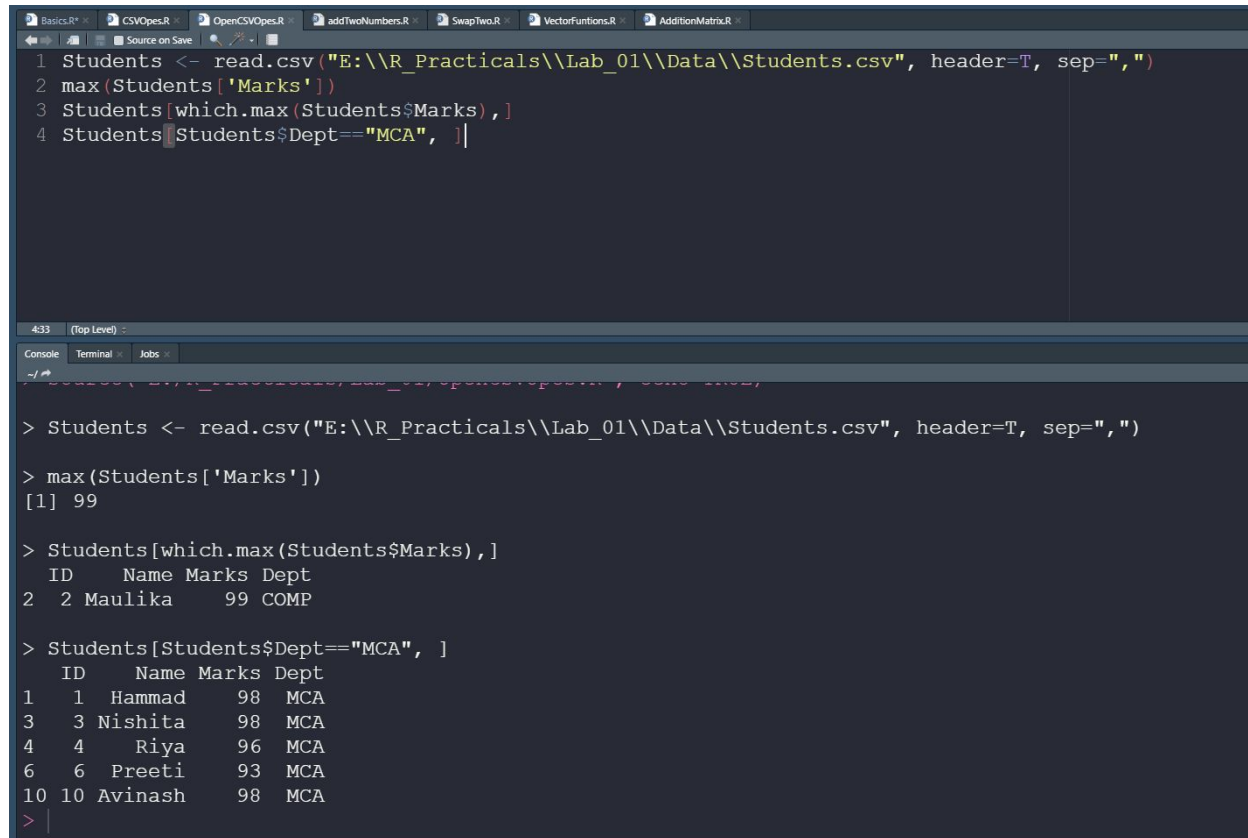
> source('E:/R_Practicals/Lab_01/OpenCSVOpes.R', echo=TRUE)

> Students <- read.csv("E:\\R_Practicals\\Lab_01\\Data\\Students.csv", header=T, sep=",")

> max(Students['Marks'])
[1] 99

> Students[which.max(Students$Marks),]
  ID   Name Marks Dept
2  2 Maulika   99  COMP
> |
```

- e. Get all the students studying in the MCA department.



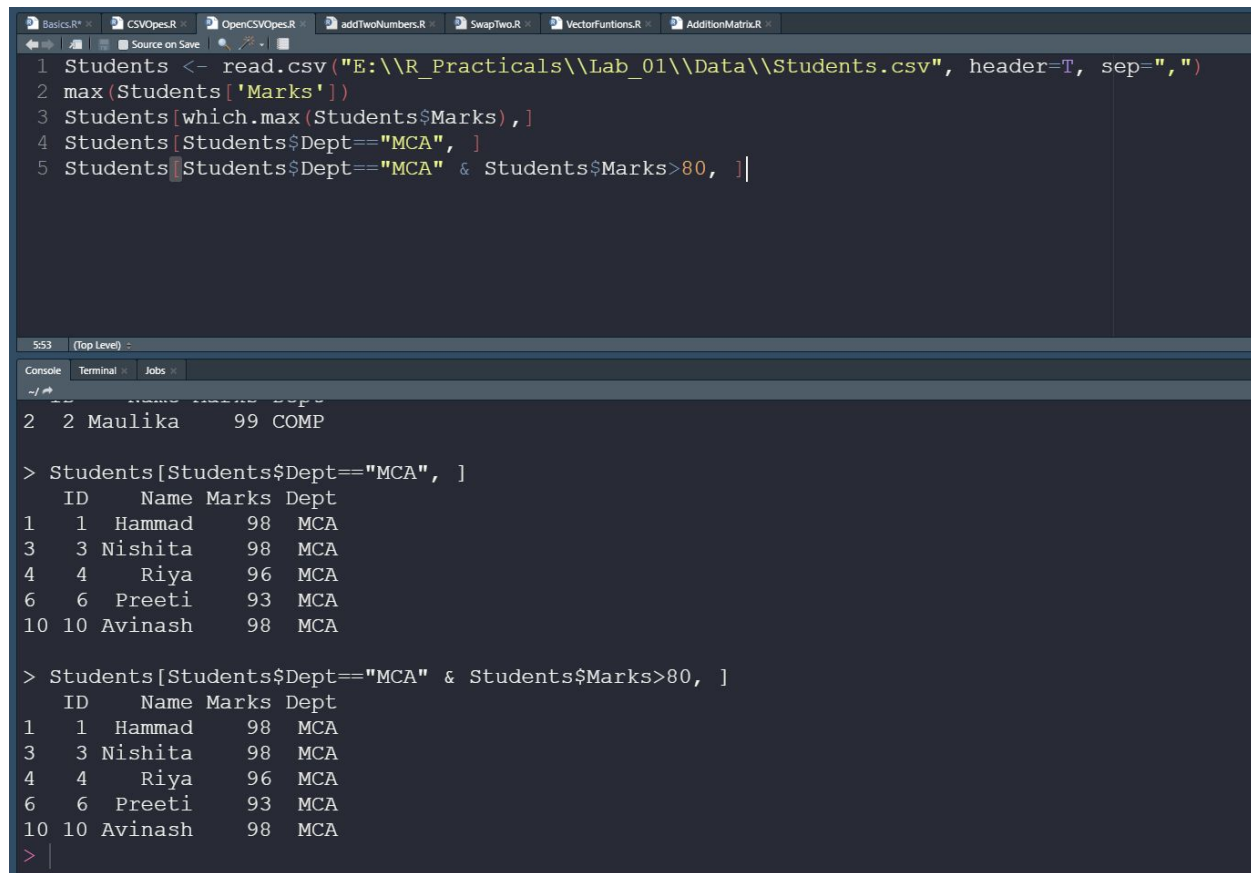
```
1 Students <- read.csv("E:\\R_Practicals\\Lab_01\\Data\\Students.csv", header=T, sep=",")
2 max(Students['Marks'])
3 Students[which.max(Students$Marks),]
4 Students[Students$Dept=="MCA", ]
```

4:33 (Top Level)

Console Terminal Jobs

```
> Students <- read.csv("E:\\R_Practicals\\Lab_01\\Data\\Students.csv", header=T, sep=",")
> max(Students['Marks'])
[1] 99
> Students[which.max(Students$Marks),]
  ID   Name Marks Dept
2  2 Maulika   99  COMP
> Students[Students$Dept=="MCA", ]
  ID   Name Marks Dept
1  1  Hammad   98  MCA
3  3  Nishita   98  MCA
4  4    Riya   96  MCA
6  6  Preeti   93  MCA
10 10 Avinash   98  MCA
>
```

- g. Get the students in the MCA department whose marks are greater than 80.



```
1 Students <- read.csv("E:\\R_Practicals\\Lab_01\\Data\\Students.csv", header=T, sep=",")
2 max(Students['Marks'])
3 Students[which.max(Students$Marks),]
4 Students[Students$Dept=="MCA", ]
5 Students[Students$Dept=="MCA" & Students$Marks>80, ]
```

5:53 (Top Level)

Console

```
2 2 Maulika 99 COMP
```

```
> Students[Students$Dept=="MCA", ]
  ID   Name Marks Dept
1  1  Hammad   98   MCA
3  3 Nishita   98   MCA
4  4   Riya   96   MCA
6  6  Preeti   93   MCA
10 10 Avinash   98   MCA
```

```
> Students[Students$Dept=="MCA" & Students$Marks>80, ]
  ID   Name Marks Dept
1  1  Hammad   98   MCA
3  3 Nishita   98   MCA
4  4   Riya   96   MCA
6  6  Preeti   93   MCA
10 10 Avinash   98   MCA
>
```