

Program 4A-matrix Program 1

#Elements are arranged sequentially by row.

```
M <- matrix(c(2:13), nrow = 4, byrow = TRUE)
```

```
Print(M)
```

#Elements are arranged sequentially by column.

```
N <- matrix(c(2:13), nrow = 4, byrow = FALSE)
```

```
Print(N)
```

#Define the column and row names.

```
Rownames <- c("row1", "row2", "row3", "row4")
```

```
Colnames <- c("col1", "col2", "col3")
```

```
P <- matrix(c(2:13), nrow = 4, byrow = TRUE, dimnames = list(rownames, colnames)) Print(P)
```

Output:

```
[1] [2] [3]
```

```
[1] 2 3 4
```

```
[2] 5 6 7
```

```
[3] 8 9 10
```

```
[4] 11 12 13
```

```
[1] [2] [3]
```

```
[1] 2 6 10
```

```
[2] 3 7 11
```

```
[3] 4 8 12
```

```
[4] 5 9 13
```

Col1 col? Col3

Row1 2 3 4

Row2 5 6 7

Row3 8 9 10

Row4 11 12 13

Program 2

```
Matrix1 <- matrix(c(-5, -10, 20, 15, 0, 3), nrow = 2)
```

```
Print(matrix1)
```

```
Matrix2 <- matrix(c(10, -5, 5, 5, 3, -3), nrow = 2)
```

```
Print(matrix2)
```

```
Result <- matrix1 + matrix2
```

```
Cat("Result of addition\n") Print(result)
```

```
Result <- matrix1 - matrix2
```

```
Cat("Result of subtraction\n")
```

```
Print(result)
```

Output:

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

```
[1] -5 20 0
```

```
[2,] -10 15 3
```

```
[1] [2] [3]
```

```
[1,] 10 5 3
```

```
[2.] -5 5 -3
```

Result of addition

```
[,1] [,2] [,3]  
[1,] 5 25 3  
[2,]-15 20 0
```

Result of subtraction

```
[,1] [,2] [,3]  
[1,] -15 15-3  
[2,] -5 10 6
```

Program 1

```
Vector1 <- c(100, 200, 300)  
Vector2 <- c(400, 500, 600, 700, 800, 900)  
Result <- array(c(vector1, vector2), dim = c(3, 3, 2))  
Print(result)
```

Output:

```
1  
[,1] [,2] [,3]  
[1,] 100 400 700  
[2,] 200 500 800  
[3,] 300 600 900
```

```
2  
[1] [,2] [,3]  
[1,] 100 400 700  
[2] 200 500 800
```

[3,] 300 600 900

Program 2

```
Vector1 <- c(1, 2, 3)
```

```
Vector2 <- c(4, 5, 6, 7, 8, 9) 8,9)
```

```
Column.names <- c("A", "B", "C")
```

```
Row.names <- c("X1", "X2", "X3")
```

```
Matrix.names <- c("Mat1", "Mat2")
```

```
Result <- array(c(vector1, vector2), dim = c(3, 3, 2),
```

```
Dimnames = list(row.names, column.names, matrix.names))
```

```
Print(result)
```

Output:

Mat1

ABC

X1 147

X2 2 5 8

X3 3 6 9

Mat2

ABC

X1 147

X2 2 5 8

X3 3 6 9

C-R Factors Program 1

```
Data <- c("Toyota", "Honda", "Ford", "Honda", "BMW", "Ford", "Toyota", "BMW", "Honda")
Print(data)
Print(is.factor(data))
Factor_data <- factor(data)
Print(factor_data)
Print(is.factor(factor_data))
```

Output:

```
[1] "Toyota" "Honda" "Ford" "Honda" "BMW" "Ford" "Toyota" "BMW" "Honda"
[1] FALSE
[1] Toyota Honda Ford Honda BMW Ford Toyota BMW Honda
Levels: BMW Ford Honda Toyota
[1] TRUE
```

Program 2

```
Height <- c(160, 150, 165, 170, 155, 168, 145)
Weight <- c(59, 53, 60, 73, 58, 65, 49)
Gender <- c("female", "male", "other", "female", "male", "other", "female")
Input_data <- data.frame(height, weight, gender)
Print(input_data)
Print(is.factor(input_data$gender))
Print(input_data$gender)
```

Output:

```
Height weight gender
1 160 59 female
2 150 53 male
```

3 165 60 other

4 170 73 female

5 155 58 male

6 168 65 other

7 145 49 female

[1] FALSE

[1] female male other female male other female

Levels: female male other