

LAB

STATISTICS WITH R PROGRAMMING FOR VISUALIZATION

COURSE CODE: ITA0435

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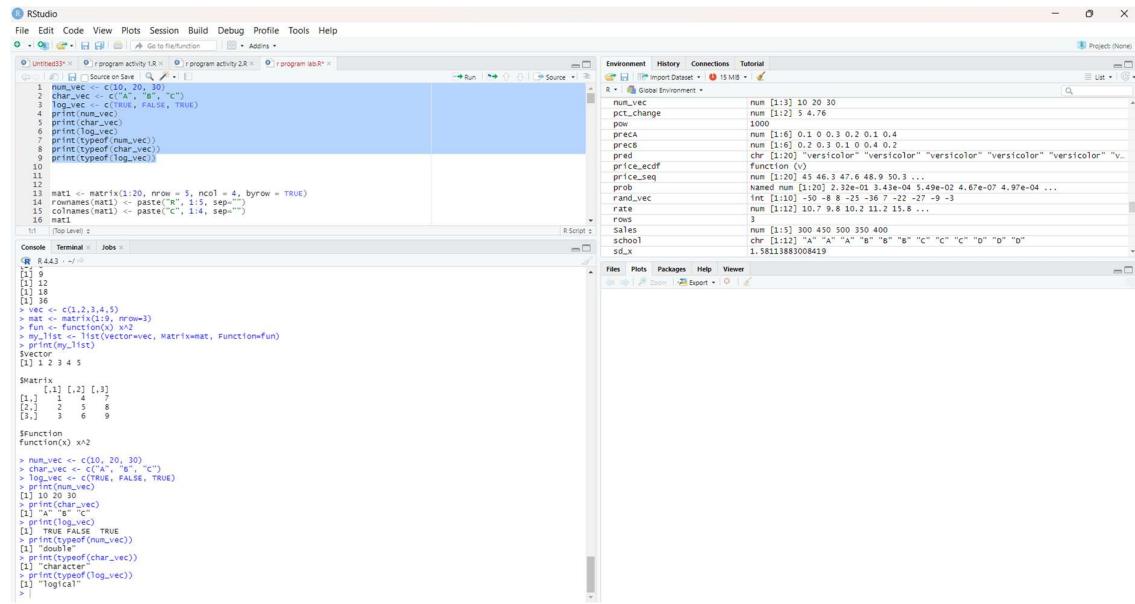
REG NO:192324226

1. Create numeric, character, and logical vectors and display type and content.

CODE:

```
num_vec <- c(10, 20, 30)
char_vec <- c("A", "B", "C")
log_vec <- c(TRUE, FALSE, TRUE)
print(num_vec)
print(char_vec)
print(log_vec)
print(typeof(num_vec))
print(typeof(char_vec))
print(typeof(log_vec))
```

OUTPUT:



The screenshot shows the RStudio interface with the following details:

- Code Editor:** Displays the R script with the code provided above.
- Console:** Shows the output of the code:

```
[1] 9
[1] 12
[1] 18
[1] 16
> vec <- c(1,2,3,4,5)
> mat <- matrix(vec, nrow=3)
> fun <- function(x) x*2
> my_list <- lapply(vec, Matrix=mat, Function=fun)
> print(my_list)
[[1]] 
[1] 2 3 4 5
$Matrix
[,1] [,2] [,3]
[1,]    2    4    7
[2,]    3    6   10
[3,]    4    8   13
$function
function(x) x*2
```
- Environment:** Shows the following objects and their values:

Object	Type	Value
num_vec	numeric	[1:3] 10 20 30
pop_change	numeric	[1:2] 5 7.76
pop	numeric	1000
precA	numeric	[1:6] 0.1 0 0.3 0.2 0.1 0.4
precB	numeric	[1:6] 0.2 0.3 0.1 0.4 0.2
pred	character	chr [1:6] "versicolor" "versicolor" "versicolor" "versicolor" "versicolor" "versicolor"
price_ecdf	function	<function () ...>
price_seq	function	<function () ...>
prob	named numeric	[1:20] 45 46.3 47.6 48.9 50.3 ...
rate	matrix	mat [1:20, 1:2] -9.8 -23 -3.4 -22 -27 -9 -3
rows	integer	3
sales	numeric	[1:5] 300 450 500 350 400
school	character	[1:12] "A" "A" "B" "B" "C" "C" "D" "D"
sd_X	double	1.58113883098419

2. Create labeled matrices (5×4 , 3×3 , 2×2) filled by row/column.

CODE:

```
mat1 <- matrix(1:20, nrow = 5, ncol = 4, byrow = TRUE)
rownames(mat1) <- paste("R", 1:5, sep="")
colnames(mat1) <- paste("C", 1:4, sep="")
```

```

mat1

mat2 <- matrix(1:9, nrow = 3, ncol = 3)

rownames(mat2) <- paste("R", 1:3, sep="")

colnames(mat2) <- paste("C", 1:3, sep="")

mat2

mat3 <- matrix(1:4, nrow = 2, ncol = 2, byrow = TRUE)

rownames(mat3) <- c("Row1", "Row2")

colnames(mat3) <- c("Col1", "Col2")

mat3

```

OUTPUT:

The screenshot shows the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help, and a Project pane labeled '(None)'. The left sidebar has tabs for Source on Save, Run, and Source. The main area has tabs for R script, Environment, History, Connections, and Tutorial. The Environment pane lists variables: mat1, mat2, mat3, model, model_humidity, model_wind, monthly_avg, mu, n, nrow, output, population_data, prec_max, rating_surface. The Console pane shows the R code and its execution results.

```

R> mat1 <- matrix(1:20, nrow = 5, ncol = 4, byrow = TRUE)
R> rownames(mat1) <- paste("R", 1:5, sep="")
R> colnames(mat1) <- paste("C", 1:4, sep="")
R> mat2 <- matrix(1:9, nrow = 3, ncol = 3)
R> rownames(mat2) <- paste("R", 1:3, sep="")
R> colnames(mat2) <- paste("C", 1:3, sep="")
R> mat3 <- matrix(1:4, nrow = 2, ncol = 2, byrow = TRUE)
R> rownames(mat3) <- c("Row1", "Row2")
R> colnames(mat3) <- c("Col1", "Col2")
R> mat3

```

```

[1] 10 20 30
[1] 1 2 3 4
[1] TRUE FALSE TRUE
[1] "double"
[1] "print"
[1] "log"
[1] "matrix"
[1] "log"
[1] "matrix"
[1] 1 2 3 4
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```

3. Write an R program to create and display a 3D array with specified rows, columns, and tables.

CODE:

```

rows <- 3

cols <- 3

tables <- 2

arr <- array(1:(rows * cols * tables),

            dim = c(rows, cols, tables))

print(arr)

```

OUTPUT:

The screenshot shows the RStudio interface. In the top-left, there are three tabs: "program activity 1.R", "program activity 2.R", and "r program labA.R". The "r program labA.R" tab is active, displaying the following R code:

```

28
29 rows <- 3
30 cols <- 3
31 tables <- 2
32 arr <- array(1:(rows * cols * tables),
33             dim = c(rows, cols, tables))
34 print(arr)
35
36
37
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40
41 data_vec <- 1:12
42 arr <- array(data_vec,
43               dim = c(1:3, 1:3, 1:2))
44

```

In the bottom-left "Console" tab, the output of the code is shown:

```

R 4.4.3 -->
R> 17 18 19 20
R> mat2 <- matrix(c(1:9, nrow = 3, ncol = 3)
R> rownames(mat2) <- paste("R", 1:3, sep = "")
R> colnames(mat2) <- paste("C", 1:3, sep = "")
R> mat2
     C1 C2 C3
R1  1  4  7
R2  2  5  8
R3  3  6  9
R> mat3 <- matrix(1:14, nrow = 2, ncol = 2, byrow = TRUE)
R> rownames(mat3) <- c("Row1", "Row2")
R> colnames(mat3) <- c("Col1", "Col2")
R> mat3
     Col1 Col2
Row1  1   2
Row2  3   4
> rows <- 3
> cols <- 3
> tables <- 2
> arr <- array(1:(rows * cols * tables),
+               dim = c(rows, cols, tables))
> print(arr)
, , 1
     [,1] [,2] [,3]
[1,]    1    4    7
[2,]    2    5    8
[3,]    3    6    9
, , 2
     [,1] [,2] [,3]
[1,]    1    4    7
[2,]   10   13   16
[3,]   11   14   17
[4,]   12   15   18
> |

```

4. Create arrays from vectors with dimension names, print specific elements.

CODE:

```

data_vec <- 1:12

arr <- array(data_vec,
             dim = c(2, 3, 2),
             dimnames = list(
               Row = c("R1", "R2"),
               Column = c("C1", "C2", "C3"),
               Table = c("T1", "T2"))
             )
print(arr)

print(arr["R1", "C2", "T1"])

print(arr["R2", "C3", "T2"])

```

OUTPUT:

The screenshot shows the RStudio interface with the following details:

- File Bar:** File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help.
- Source Editor:** Contains R code for creating a matrix from vectors and printing its rows and columns.
- Console:** Displays the output of the R code, including the resulting matrix and its transpose.
- Environment Tab:** Shows the global environment with various objects like arr, att_seq, average_values, b, browser, c, data, diag_elements, and div.
- Global Environment:** Shows the same objects listed under the environment tab.
- Help:** Standard RStudio help menu.
- Viewer:** Shows the raw text of the R code.

5. Create and manipulate factor variables (e.g., women's dataset heights, random LETTERS sample).

CODE:

```
data(women)

height_group <- factor(
  ifelse(women$height < 65, "Short",
        ifelse(women$height <= 70, "Medium", "Tall"))
)

print(height_group)
levels(height_group)

set.seed(1)

letters_sample <- sample(LETTERS[1:5], 10, replace = TRUE)

letters_factor <- factor(letters_sample)

print(letters_factor)
levels(letters_factor)
table(letters_factor)
```

OUTPUT:

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Untitled3 > /r/program activity LP > /r/program activity 2.R > /r/program activity R >

```

59 height_group <- factor(
60   ifelse(womenheight < 65, "short",
61   ifelse(womenheight >= 70, "Medium", "Tall"))
62 )
63 print(height_group)
64 levels(height_group)
65 set.seed(123)
66 letters_sample <- sample(LETTERS[1:5], 10, replace = TRUE)
67 letters_factor <- factor(letters_sample)
68 print(letters_factor)
69 levels(letters_factor)
70 table(letters_factor)
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