No. of Printed Pages : 5

MST–015

M. SC. (APPLIED STATISTICS)
(MSCAST)
Term-End Examination
December, 2024
MST–015 : INTRODUCTION TO R SOFTWARE

Time : 2 Hours *Maximum Marks : 25*

Note : *(i) Question No. **1** is compulsory.*

*(ii) Attempt any **two** questions out of the remaining Question Nos. **2** to **4**.*

(iii) Use of scientific calculator (non-programmable) is allowed.

(iv) Symbols have their usual meanings.

1. Answer the following : 5×1=5

   (a) What is the use of assignment operator ? Write any ***two*** assignment operators available in R.

   (b) Is there any difference between the usage of **help( )** and **help.search( )** functions for help ?

   (c) Write the output of the following statement :

   sum(C (1:5, NA, NA, NA, 6:10))

(d) Which of the following user defined function names are inappropriate and why ?

(i) **tan**

(ii) **length**

(e) Write an assignment statement equivalent to the following equation in R :

$$\text{Area} = \pi r^2 + \pi r l$$

2. (a) Write a R command to obtain the frequency table and create a strip chart of the following data by controlling overplotting and using the **rep( )** function : 3

5 5 5 5 5 4 4 4 4 3 3 3 2 2 1

(b) Write a R command that generates the following sequence of time : 2

"2021–08–10"

"2022–08–10"

"2023–08–10"

(c) Write step-by-step execution of the following loop : 5

```
data ← head (USArrests)
i←1
repeat {
   data [, i]← data [, i]/mean (data [, i])
   if (i= =3) break
   i←i + 1
}
```

3. (a) Write the name of the different types of **if** statements available in R. Also, write the general syntax of each one of them and explain how they are executed. 3

(b) Write R code to compute the coefficients of skewness and kurtosis β_1 and β_2 of the data x_1, x_2, x_3, x_4 and x_5 using user defined functions. Also, give the printing command for printing β_1 and β_2 using the **cat( )** function. 3

(c) Write step-by-step execution of the following code : 4

```
y ← –5
p ← 1
if (y > = 0) {
    while (y > 0) {
        p ← p*y; cat("p=", p, "\n")
        y ← y – 1; cat("y=", y, "\n")}
} else {
    while (y > 0) {
        p ← p/y; cat("p=", p, "\n")
        y ← y + 1; cat("y=", y, "\n")
}
cat ("p =", p, "\n")
```

4. (a) Create two matrices A and B with the following elements : 4

$$A = \begin{pmatrix} 2 & 1 & 1 \\ 1 & -2 & 2 \\ 9 & 0 & 3 \end{pmatrix}$$

and $$B = \begin{pmatrix} 1 & -2 & -1 \\ -2 & 2 & -3 \\ -1 & -3 & 4 \end{pmatrix}$$

Combine the two matrices row-wise and assign it to another matrix named **C**. Then write R commands to do the following tasks :

(i) Obtain the vectors of column sums and row sums of matrix **C**.

(ii) Extract the even number rows of **C**.

(iii) Drop the odd number columns of **C**.

(iv) Extract the elements of matrix **A** from **C**.

(b) Find the error in the following code : 2

```
x ← matrix (1 : 4, 2, 2)
(x [0, ] + x [1, ]) / 2
```

Also, rewrite the corrected code.

(c) Create a data frame named **Data** consisting of the following data : 4

x	y	z	w
0.03	0.15	0.45	A
0.81	0.86	0.73	A
0.31	0.64	0.89	B
0.38	0.92	0.41	B
0.30	0.30	0.68	C
0.82	0.73	0.30	C

Write R commands to :

(i) rename the columns as **Col1, Col2, Col3** and **Col4**.

(ii) compute the row means and column sums of the data frame.

(iii) sort **Data** according to the **Col2** of it.

(iv) group the data according to the **w** variable.

× × × × × × ×