National Institute of Electronics and Information Technology, Calicut

Certified AI Professional

Assignment 1
(Total Marks 40)

(Save all programs in a single file with name Day1.R, Use comments with # to give question number as heading for each program & Upload the file as assignment)

1) Use the function paste to create the following character vectors of length 30.
   "label 1", "label 2", ..., "label 30"

Vector

2) Assume that you are interested in cone-shaped structures, and have measured the height and radius of 6 cones. Make vectors with these values as follows:
   R <- c(2.27, 1.98, 1.69, 1.88, 1.64, 2.14)
   H <- c(8.28, 8.04, 9.06, 8.70, 7.58, 8.34)
   a) Make a vector with the volumes of the 6 cones. (Volume=1/3 pi R^2 H)
   b) Round the values to 2 decimal points and store into a vector
   c) Find out the the minimum and maximum volumes
       (hint: use the functions min and max)

3) Create 3 Vectors A,B & C with the following contents.

   A should contain a Random sample of 250 numbers between 0 and 999.
   (hint: use the command *sample(0:999,250))*

   B should contain all numbers from A which are greater than 900
   (hint:use *which* command & subsetting with index vector)

   C should contain all the elements from B in sorted order.
   (hint:use the function *sort()*)

4) Assume that we have registered the height and weight for four people: Heights in cm are 180, 165, 160, 193; weights in kg are 87, 58, 65, 100. Make two vectors, height and weight, with the data. The body mass index (BMI) is defined as (weight in kg/ (height in m) ^{2}).
   a) Make a vector with the BMI values for the four people.
   b) Also make a vector with the weights for those people who have a BMI > 25.
   c) Find the average BMI Value.

5) Create a vector, marks (out of 50) of 10 students. Compute the following.

   (a) Mean of these marks and store into a variable p1
   (b) Median of these marks and store into a variable p2
   Hint: Use the functions mean and median on the vector.

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Factor

6) Prepare a factor variable named category, which stores products categories. Use the function summary to see the count of each item in the variable

List

7) Create a List named student with the following data. Give the names Name, RollNo, Gender & Marks for the items
   a) Name
   b) Roll No
   c) Gender
   d) Marks for 5 subjects.

   From the above list

   a) Compute the average of marks
   b) Store the Roll No and Marks to another list.
   c) Modify the mark for the 5th subject as 100

Matrix

8) Create the matrix

$$\begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}$$

   Check that A^3 = 0 where 0 is a 3 × 3 matrix with every entry equal to 0.

9) Create the following matrix B with 15 rows:

$$\begin{bmatrix} 10 & -10 & 10 \\ 10 & -10 & 10 \\ \cdots & \cdots & \cdots \\ 10 & -10 & 10 \end{bmatrix}$$

   Calculate the 3 × 3 matrix B^TB.

Data Frames

10) Create the following data frame.

```
       Age Height Weight Sex
Alex    25    177     57   F
Lilly   31    163     69   F
Mark    23    190     83   M
```

11) Create another data frame with the following data

```
        Working
Alex        Yes
Lilly        No
Mark         No
```

Add this data frame as new column to the previous one.
a) What class of data is in each column?
b) Calculate the mean of heights of the people
c) Obtain the BMI of all and add it as a new column to the data frame.

Array

12) Create an array having 2X3X3 dimension, populate the numbers from 1 to 20 in the array.

Built in Data Frames

13) From the mtcars data frame, extract the mpg, cyl and hp   to prepare a new data frame.
   b. Combine the first 5 rows and last 5 rows of mtcars to a new data frame

Marks : questions 1-12 carry 3 marks each & question 13 carry 4 marks