Assignment 01

3/09/2022

Introduction

Prerequisite :All the tutorials till last lab session and the hands on session on 28-08-2022(This will help you in submission of your R markdown file)

Note- Please submit your solutions as a markdown file in pdf/html format. The file should contain both code and the output of your work.

The submission file should be named as **<Roll Number _ Assignment 01>**

1.Calculate the square root of 12345 and perform a log2 transformation on the result

2. Create the vector (20,21,22,23,...37,38,39,40,39,38,37,...,23,22,21,20) in R.

3. Create the vector (5, 9, 2, 5, 9, 2, . . . , 5, 9,2, 5) where there are 13 occurrences of 5, 12 occurrences of 9 and 12 occurrences of 2 in R.

4. TopCoder is one of the original platforms for competitive programming online,Write the R code for the numbers 33 to 99, print "Top" if the number is a multiple of 3, "Coder" if the number is a multiple of 9, "TopCoder" if the number is a multiple of both 3 and 9, and simply print the number otherwise

5. Create a R script that will print 'This is a Matrix' if the variable matrix_sample is a matrix, otherwise print "This is not a Matrix". Hint: check out help(is.matrix).

6. We have a collection of balls in a ball pit.Now our ball pit is filled with balls of different colours such as blue,red,yellow,green,violet,black and white.

a. Enter the list of colours into a vector called ball_colour.

b.Display the fourth element in the vector and Enter some numerical weight data into a vector called ball_weight.

c.Join the two vectors into a data frame called ball_desc containing 2 columns and 4 rows. Describe the first column as colour and the second one as weight.

7. Consider the two vectors sampvec1 and sampvec2 given below:

```
set.seed(99)

sampvec1 <- sample(0:100, 25)
sampvec2 <- sample(0:99, 25)

sampvec1
sampvec2
```

a. Determines the index of the minimum of the *sampvec*1 and maximum of *sampvec*2 vector.

b. Find out the values in *sampvec*1 which are greater than 44.

c. How many numbers in *sampvec*2 are divisible by 7?

d. Sort the numbers in the vector *sampvec*1 in the order of decreasing values in the *sampvec*2.

8.Assume that you are interested in Rectangular Prisms, and have measured the height ,weight and breadth of 4 rectangular prisms. Using these value we make three vectors Length,Width and Height as follows: Length <- c(8.2,16,15,9)

Width <- c(5,7,10,6)

Height <- c(15.8,3,5,4)

a. The volume of a rectangular prism is length x width x height. Make a vector with the volumes of the 4 rectangular prism.

b. Compute the mean, median and standard deviation of the rectangular prism volumes.

c. Compute the mean of volume for the rectangular prism if Length less than 10 ,elase print "Length greater than 10".

9. Write a function which takes a single argument which is a matrix. The function should return a matrix which is the same as the function argument but every odd number is tripled and even number doubled on the given matrix.

```
##      [,1] [,2] [,3] [,4]
## [1,]   -5    0    5   10
## [2,]   -4    1    6   11
## [3,]   -3    2    7   12
## [4,]   -2    3    8   13
## [5,]   -1    4    9   14
```

10. For this exercise we'll use the built-in dataset state.x77. df <- as.data.frame(state.x77)

head(df)

a. Find out how many states have an income of less than 5000 and Find out which is the state with the lowest income.

b. Create a data frame with the datasets state.area, state.division, state.name, state.region and add the data frame column-wise to state.x77

c. Add a variable to the data frame which should categorize the level of illiteracy: 0-1 : low, 1-2: average, 2-10: high.

d. Find out which state has area greater than 21,000, with low literacy rate and income.

11. We have a vector vec containing the number 23,78,42,63,90,15. Create a for loop that, given a numeric vector, prints out one number per line, with its square and cube alongside.

a. Show how to use a while loop to achieve the same result.

b. Show how to achieve the same result without the use of an explicit loop.

12. Calculate the following by writing code snippets:

- $$\sum_{i=1}^{90}(i^3 + 4i^2 - 8i)$$
- $$\sum_{i=1}^{35}(\frac{2^i}{i^2} + \frac{3^i}{i^3})$$