**MANAV RACHNA UNIVERSITY, FARIDABAD**

**Department of Computer Science & Technology**

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| **Course: B. Tech** | **Semester: VI** |
|  | **Subject: R Programming** |
| **BT Level Covered: BT1, BT2, BT3**  **BT1- Knowledge; BT2-Comprehension; BT3-Applications** |  |
| **Course Outcome (CO): CO1**  **CO1:** Define the basics of R programming concepts and Business Analytics |  |

**Workshop/Lab: 2**

**Lab:** Introduction to basic structure of R programming (variables assignment, data types,

vector, data frame decision making)

**Variables and Assignment:**

1. Assign the value of 44 to x
2. Assign the value of 20 to y
3. Make z the value of x – y, and display z.
4. Calculate the square root of 2345, and perform a log2 transformation on the result.
5. Calculate the 10-based logarithm of 100, and multiply the result with the cosine of π.

**Introduction to Vector:**

1. Create the vectors:
   1. (1*;* 2*;* 3*; : : : ;* 19*;* 20)
   2. (20*;* 19*; : : : ;* 2*;* 1)
   3. (1*;* 2*;* 3*; : : : ;* 19*;* 20*;* 19*;* 18*; : : : ;* 2*;* 1)
   4. (4*;* 6*;* 3) and assign it to the name tmp.

For parts (e), (f) and (g) look at the help for the function rep.

* 1. (4*;* 6*;* 3*;* 4*;* 6*;* 3*; : : : ;* 4*;* 6*;* 3) where there are 10 occurrences of 4.
  2. (4*;* 6*;* 3*;* 4*;* 6*;* 3*; : : : ;* 4*;* 6*;* 3*;* 4) where there are 11 occurrences of 4, 10 occurrences of 6 and 10 occurrences of 3.
  3. (4*;* 4*; : : : ;* 4*;* 6*;* 6*; : : : ;* 6*;* 3*;* 3*; : : : ;* 3) where there are 10 occurrences of 4, 20 occurrences of 6 and 30 occurrences of 3.

1. Create a vector of the values of *ex* cos(*x*) at *x* = 3*;* 3*:*1*;* 3*:*2*; : : : ;* 6.
2. Use the function paste to create the following character vectors of length 30:
   1. ("label 1", "label 2", ....., "label 30").

Note that there is a single space between label and the number following.

* 1. ("fn1", "fn2", ..., "fn30").

In this case, there is no space between fn and the number following.

1. Execute the following lines which create two vectors of random integers which are chosen with replace-ment from the integers 0, 1, *: : :* , 999. Both vectors have length 250.

set.seed(50)

xVec <- sample(0:999, 250, replace=T)

yVec <- sample(0:999, 250, replace=T)

Suppose x = (*x*1*; x*2*; : : : ; xn*) denotes the vector xVec and y = (*y*1*; y*2*; : : : ; yn*) denotes the vector yVec.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (a) | Create the vector (*y*2 *x*1*; : : : ; yn* *xn−*1). | | | | | | | |  |  |
| (b) | Create the vector ( | | sin(*y*1) sin(*y*2) | | | |  | sin(*yn−*1) | ). |  |
|  |  | *;* |  | *; : : : ;* |  |  |
| cos(*x*2) | | cos(*x*3) | cos(*xn*) |  |
| (c) | Create the vector (*x*1 + 2*x*2 *x*3*; x*2 + 2*x*3 *x*4*; : : : ; xn−*2 + 2*xn−*1 *xn*). | | | | | | | | |  |
| (d) | *n−*1 | *e−xi*+1 | | | | |  |  |  |  |
| Calculate |  | | . |  |  |  |  |  |  |
|  | |  |  |  |  |  |  |
|  |  | *xi* + 10 | | | | |  |  |  |  |

∑

*i*=1

1. This question uses the vectors xVec and yVec created in the previous question and the functions sort, order, mean, sqrt, sum and abs.
   1. Pick out the values in yVec which are *>* 600.
   2. What are the index positions in yVec of the values which are *>* 600?
   3. What are the values in xVec which correspond to the values in yVec which are *>* 600? (By corre-spond, we mean at the same index positions.)
   4. Create the vector ( *jx*1 x¯*j*1*=*2*;* *jx*2 x¯*j*1*=*2*; : : : ;* *jxn* x¯*j*1*=*2) where x¯ denotes the mean of the vector x = (*x*1*; x*2*; : : : ; xn*).
   5. How many values in yVec are within 200 of the maximum value of the terms in yVec?
   6. How many numbers in xVec are divisible by 2? (Note that the modulo operator is denoted %%.)
   7. Sort the numbers in the vector xVec in the order of increasing values in yVec.
   8. Pick out the elements in yVec at index positions 1*;* 4*;* 7*;* 10*;* 13*; : : : :*
2. By using the function cumprod or otherwise, calculate

1+2/3+(24/35)+(246/357)…………………..