A231 STIS3023 Programming for Data Science

ASSIGNMENT 1

INSTRUCTIONS

Write R codes for the following tasks. Make sure your code is properly organized and commented for readability. Save the file (.R extension) which named as A1_XXXXXX (where XXXXXX is your matric number). Submit the file to online learning.

TASKS

1. Store the following vector of 15 values 6,9,7,3,6,7,9,6,3,6,6,7,1,9,1. Identify the following elements:
    a. Those equal to 7
    b. Those greater than or equal to 6
    c. Those less than 5 + 2
    d. Those not equal to 6

2. Create a new vector from the one used in (1) by deleting its first three elements. With this new vector, fill a 2 × 2 × 3 array. Examine the array for the following entries:
    a. Those less than or equal to 6 divided by 2, plus 4
    b. Those less than or equal to 6 divided by 2, plus 4, *after* increasing every element in the array by 2

3. Identify specific locations of elements equal to 0 in the 10 × 10 identity matrix.

4. Store the vector 7,1,7,10,5,9,10,3,10,8 as vec4. Identify the elements greater than 5 OR equal to 2.

5. Store the vector 8,8,4,4,5,1,5,6,6,8 as vec5. Identify the elements less than or equal to 6 AND not equal to 4.

6. Identify the elements that satisfy (4) in vec4 AND satisfy (5) in vec5.

7. Store a vector called vec7 that is equal to the element-wise sum of vec4 and vec5. Determine the following:
    a. The elements of vec7 greater than or equal to 14 but not equal to 15
    b. The elements of the vector obtained via an element-wise division of vec7 by vec4 that are greater than 4 OR less than or equal to 2

8. Store this vector of 10 values 7,5,6,1,2,10,8,3,8,2 named as vec8. Then, do the following:
    a. Extract the elements greater than or equal to 5, storing the result as vec8a.
    b. Display the vector containing those elements from vec8 that remain after omitting all elements that are greater than or equal to 5.

9. Use vec8a to construct a 2 × 3 matrix called matrix9, filled in a row-wise fashion. Then, replace any elements that are equal to 8 with the *squared* value of the element in row 1, column 2 of matrix9 itself.

10. Create a 3 × 2 × 3 array called array10 using the following vector of 18 values: 10,5,1,4,7,4,3,3,1,3,4,3,1,7,8,3,7,3. Then, replace all elements in array10 that are less than 3 OR greater than or equal to 7 with the value 100.

11. Store the following vector 13563, -14156, -14319, 16981, 12921, 11979, 9568, 8833, -12968, 8133 named as vec11. Then return the elements of vec11, excluding those that result in negative infinity when raised to a power of 75.

12. Store the following 3 × 4 matrix as the object matrix12:

$$\begin{bmatrix} 77875.40 & 27551.45 & 23764.30 & -36478.88 \\ -35466.25 & -73333.85 & 36599.69 & -70585.69 \\ -39803.81 & 55976.34 & 76694.82 & 47032.00 \end{bmatrix}$$

    a. Return the values in matrix12 that are NOT NaN when matrix12 is raised to a power of 67 and infinity is added to the result.
    b. Identify those values in matrix12 that are either negative infinity OR finite when you raise matrix12 to a power of 67.

13. Create a function named CelsiusToFahrenheitConverter that will convert temperatures from Celsius to Fahrenheit. This function should accept only one argument (a temperature in Celsius).

14. Create a function named ListCreator that will generate a list from three vectors containing character, logical, and numeric types. These vectors will be passed as arguments to the function.

15. Create a function named CoerceToLogic that will produce a logical vector based on a numeric vector passed as an argument.

16. Create a function named Result4Operations that will generate a vector containing the results of addition, subtraction, multiplication, and division of two numbers passed as arguments.

17. Create a function named ResultMultiplications that will generate a vector containing multiplications of numbers from one to nine with a number passed as an argument. Additionally, the function should produce the vector in descending order.

18. Store the following matrix:

$$\begin{bmatrix} 34 & 0 & 1 \\ 23 & 1 & 2 \\ 33 & 1 & 1 \\ 42 & 0 & 1 \\ 41 & 0 & 2 \end{bmatrix}$$

    a. Extract the first column of the matrix and assign it as the first component of a list named list18. The extracted column forms a matrix (5 x 1) within the list and is named matrix18a.
    b. Extract the second column of the matrix and coerce it into a logical value vector. Insert this logical vector as the second component of list18, named logical18.
    c. Extract and convert the third column to character vector in which 1 equal to YES while 2 equals to NO. Insert the resulting character vector as the third component of list18, named character18.

19. Store vec8, matrix9 and array10 as components in list19 with their own names.

20. Store list19 as fourth component of list18.

    a. Create new matrix named as matrix20a that its first row should contains elements extracted from third to fifth rows of list18 first component, and its second row should contain elements extracted from the first row of matrix9 located in fourth component of list18.
    b. Replace all elements in array10 located in fourth component of list18 that are equal to 100 with the value 10.