Assignment

1. Create the vectors:
    a. (1, 2, 3, . . . , 19, 20)
    b. (20, 19, . . . , 2, 1)
    c. (1, 2, 3, . . . , 19, 20, 19, 18, . . . , 2, 1)
    d. (4, 6, 3) and assign it to the name tmp.
    e. (4, 6, 3, 4, 6, 3, . . . , 4, 6, 3) where there are 10 occurrences of 4.
    f. (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.
    g. (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.

2. Create a following matrix in R

$$\begin{pmatrix} 0 & 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 & 5 \\ 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \end{pmatrix}$$

3. Write a R program to take input from the user (name and age) and display the values.

4. Write a R program to create a Dataframes which contain details of 5 employees and display summary of the data.

5. Create two different 2 by 2 matrices named A and B. A should contain the values 1 - 4 and B the values 5-8. Try out the following commands and by looking at the results see if you can figure out what is going on.
    - A
    - A * B
    - A / B
    - C = A %x% B
    - D = A + B
    - E = A − B
    - A == B

6. Create a 4*3 Matrix containing 12 numbers
    - What is the length and the mode of the matrix
    - Extract all values from matrix that are larger than 6.
    - Shift places of column 1 and 3
    - Add a vector with three zeros as a fifth row to the matrix
    - Replace all values the first two columns in your matrix with "NA
    - Replace all values in the matrix with 0 and convert it to a vector

7. Data frames

- Write a R program to create a data frame from four given vectors.
- Write a R program to get the structure of a given data frame
- Write a R program to get the statistical summary and nature of the data of a given data frame.
- Write a R program to extract specific column from a data frame using column name
- Write a R program to extract first two rows from a given data frame.
- Write a R program to extract 3rd and 5th rows with 1st and 3rd columns from a given data frame
- Write a R program to add a new column in a given data frame.
- Write a R program to add new row(s) to an existing data frame.
- Write a R program to drop column(s) by name from a given data frame.
- Write a R program to drop row(s) by number from a given data frame
- Write a R program to sort a given data frame by multiple column(s).
- Write a R program to create inner, outer, left, right join(merge) from given two data frames.
- Write a R program to replace NA values with 3 in a given data frame.
- Write a R program to change a column name of a given data frame.
- Write a R program to change more than one column name of a given data frame.
- Write a R program to select some random rows from a given data frame.
- Write a R program to reorder an given data frame by column name
- Write a R program to compare two data frames to find the row(s) in first data frame that are not present in second data frame.
- Write a R program to find elements which are present in two given data frame.
- Write a R program to find elements come only once that are common to both given data frames.
- Create a dataframe then export it in .csv, .txt, .xlsx file.
- Write a R program to count the number of NA values in a data frame column.
- Write a R program to call the (built-in) dataset airquality. Remove the variables 'Solar.R' and 'Wind' and display the data frame

8. Create two vectors, vec1 and vec2, with at least 5 elements each and Perform element-wise addition, subtraction, multiplication, and division of vec1 and vec2

9. Create a vector named numbers with 10 random integers between 1 and 100
10. Create a vector named grades containing random scores between 0 and 100 for a class of 10 students.
- Find the highest and lowest grades in the grades vector.

- Create a new vector pass_fail based on the condition that any grade below 60 is a fail (0) and above or equal to 60 is a pass (1)

11. Create a vector named original_vec with at least 8 elements.
   - Extract the 3rd through 6th elements of original_vec and store them in a new vector called subset_vec.
   - Append two more elements to original_vec.
   - Calculate the mean of original_vec.

12. Create a vector named ages with 10 random ages between 20 and 60.
   - Find the maximum and minimum ages in the ages vector.
   - Create a new vector seniors with ages above 50

13. Create a vector named original_vec with at least 10 elements.
   - Extract the first, third, and fifth elements of original_vec and store them in a new vector called subset_vec.
   - Sort original_vec in descending order.

14. Create a random 4x4 matrix named random_mat.
   - Write a function row_mean that takes a matrix as input and returns a vector containing the mean of each row.
   - Use the row_mean function to find the row means of random_mat

15. Create a 5x5 matrix named student_grades with random grades between 0 and 100.
   - Find the highest grade in the matrix along with its row and column index.
   - Create a new matrix pass_fail based on the condition that any grade below 60 is a fail (0) and above or equal to 60 is a pass (1)

16. Create a 3x3 matrix named mat1 with elements 1 to 9.
   - Define a 2x4 matrix mat2 with all elements set to 0.
   - What is the difference between cbind() and rbind() functions when creating matrices?

17. Create a data frame named students with columns: Name, Age, Grade, and Gender, containing information for at least 5 students.
   - Display the first 3 rows of the students data frame.
   - Calculate the average age of the students.

18. Extract the Grade column from the students data frame.
   - Select the rows where the Grade is greater than or equal to 85.
   - Create a new data frame called female_students containing only the female students.

19. Create a dataframe named my_data with columns: Name, Age, City, and Salary containing information for at least 5 individuals.

- Display the first 5 rows of my_data.
- Calculate the average salary in my_data.
- Extract the Age column from my_data.
- Select the rows where the Age is greater than 30.
- Create a new dataframe named high_earners containing only individuals with a salary above $50,000.
- Add a new column named Education to my_data, indicating the highest level of education for each individual.
- Rename the column City to Residence.
- Remove the Salary column from my_data.
- Find the maximum and minimum ages in the dataframe.
- Calculate the mean salary of individuals with more than 5 years of experience.
- Determine the number of individuals from each city.

20. Load the inbuilt iris dataset and display its first 6 rows.
- Filter the dataset to include only rows where Sepal.Width is greater than 3.
- Calculate the mean Petal.Length for each species.

21 Load the mtcars dataset and display its first 5 rows.
- Create a new column named Miles_per_Gallon by converting mpg to kilometers per liter (1 mile = 1.60934 kilometers).
- Find the car with the highest horsepower.

22 Load the ChickWeight dataset and display the first few rows.
- How many rows and columns does the dataset have?
- What are the unique values in the Diet column?
- Calculate the average weight of all chicks in the dataset.
- Find the maximum and minimum weight of chicks.
- Calculate the total number of observations for each Diet type.
- Create a new dataframe high_weight containing chicks with weight greater than 100.
- Extract the rows where Diet is equal to 1 and Time is greater than 10.
- Find the average weight of chicks for each Diet type and Time point.
- Calculate the average weight for each combination of Diet and Time.
- Find the chick with the highest weight in each Diet group.
- Determine the total weight gain for each chick.