CME 4403
Lab 1 Worksheet - Due Date: 5th October 23:59

Write down answer the space below the question. Please replace the file name with your name before submitting to the Classroom.

1. a) Define a variable **name** that contains a person name "John".

(Answer) (Output)

```
> name <- "John"
```

```
name
[1] "John"
```

b) Define a variable **measure** that contains the value 5.7

```
> measure <- 5.7
```

```
measure
[1] 5.7
```

c) Define a variable **fault** that shows the execution status of a process as TRUE

```
> fault <- TRUE
```

```
fault
[1] TRUE
```

2. a) Define a character vector **name_vector** that contains 5 names: John, Asli, Can, Berk, Cansu.

```
> name_vector <- c ("John", "Asli", "Can", "Berk", "Cansu")
```

```
name_vector
[1] "John"  "Asli"  "Can"   "Berk"  "Cansu"
```

b) Define a numeric vector **num_vector** that contains 5 integer values: 3, -2, 4, -1, 5.

```
> num_vector <- c (3, -2, 4, -1, 5)
```

```
num_vector
[1]  3 -2  4 -1  5
```

c) Define a Boolean vector **bool_vector** that contains: TRUE, FALSE, TRUE, FALSE, TRUE.

```
> bool_vector <- c (TRUE, FALSE, TRUE, FALSE, TRUE)
```

```
bool_vector
[1]  TRUE FALSE  TRUE FALSE  TRUE
```

d) Define a numeric vector **rand_num** that contains 30 numbers between 3 and 100 with equal intervals (Hint: use the seq() function).

```
> rand_num <- seq(from = 3, to = 100, length = 30)
                                        rand_num
                                        [1]   3.000000   6.344828   9.689655  13.034483  16.379310
                                        [6]  19.724138  23.068966  26.413793  29.758621  33.103448
                                        [11] 36.448276  39.793103  43.137931  46.482759  49.827586
                                        [16] 53.172414  56.517241  59.862069  63.206897  66.551724
                                        [21] 69.896552  73.241379  76.586207  79.931034  83.275862
                                        [26] 86.620690  89.965517  93.310345  96.655172 100.000000
```

3. a) Print **second** and **third** elements of **name_vector.**

```
> name_vector[c(2,3)]
                                                    [1] "Asli" "Can"
```

b) Print **num_vector** elements which are bigger than 3.

```
> num_vector[num_vector > 3]
                                                    [1] 4 5
```

c) Print people names that are indicated as TRUE in **bool_vector**.

```
> name_vector[bool_vector]
                                                    [1] "John"  "Can"   "Cansu"
```

d) Print the summation of **num_vector** (Hint: use the sum() function).

```
> sum(num_vector)
                                                     [1] 9
```

e) Create a new vector (**pos_num**) that only contains positive values in **num_vector**.

```
> pos_num <- num_vector[num_vector > 0]
                                                    pos_num
                                                    [1] 3 4 5
```

4. a) Create a new list for specifying person data: **person_list.** The initial list should contain 3 entiries: “John”, 27, “Computer Engineer”.

```
> person_list <- list("John", 27, "Computer Engineer")
```

```
person_list
[[1]]
[1] "John"

[[2]]
[1] 27

[[3]]
[1] "Computer Engineer"
```

b) Assign the name of each element in **person_list**: “name”, “age”, “occupation”

```
> names(person_list) = c("name", "age", "occupation")
person_list
$name
[1] "John"

$age
[1] 27

$occupation
[1] "Computer Engineer"
```

c) Add a new element to the current **person_list**: name: “salary” value: 5000

```
> person_list <- c(person_list, salary=5000)
person_list
$name
[1] "John"

$age
[1] 27

$occupation
[1] "Computer Engineer"

$salary
[1] 5000
```

d) Print the name and salary of this person separately.

```
> person_list$name
[1] "John"
> person_list$salary
[1] 5000
```

5. Create a matrix and apply the following operations on:
   a) Create a matrix called **weather_matrix** by using ***seq*** command that creates 15 numbers from 5 to 30 with equal intervals. **weather_matrix** should contain 5 rows and 3 columns, fill the matrix by rows.

```
> weather_matrix <- matrix(seq(from = 5, to = 30, length = 15), byrow = TRUE, nrow = 5)
                                                    weather_matrix
                                                          [,1]     [,2]     [,3]
                                                    [1,]  5.00000  6.785714  8.571429
                                                    [2,] 10.35714 12.142857 13.928571
                                                    [3,] 15.71429 17.500000 19.285714
                                                    [4,] 21.07143 22.857143 24.642857
                                                    [5,] 26.42857 28.214286 30.000000
```

   b) Set the row (day1, day2, day3, day4, day5) and column (s1, s2, s3) names of **weather_matrix.**

```
> rownames(weather_matrix) <- c("day1","day2","day3","day4","day5")
> colnames(weather_matrix) <- c("s1","s2","s3")
                                                    weather_matrix
                                                                 s1       s2       s3
                                                    day1  5.00000  6.785714  8.571429
                                                    day2 10.35714 12.142857 13.928571
                                                    day3 15.71429 17.500000 19.285714
                                                    day4 21.07143 22.857143 24.642857
                                                    day5 26.42857 28.214286 30.000000
```

   c) Compute the summation of samples (rowSums) and find which day has the highest amount of temperature.

```
> df <- rowSums(weather_matrix)
                                          df
                                                day1    day2    day3    day4    day5
                                          20.35714 36.42857 52.50000 68.57143 84.64286
> which(df == max(df), arr.ind = TRUE)
                                          day5
```

   d) Choose day4 and day5 and their s2 and s3 samples, save them in a **subB** object.

```
> subB <- weather_matrix[4:5,2:3]
```

```
subB
           s2       s3
day4 22.85714 24.64286
day5 28.21429 30.00000
```

6. Use built-in data.frame: “mtcars”

   a) What are the dimensions of mtcars?

```
> dim(mtcars)
[1] 32 11
```

   b) Select the cars from **mtcars** that has 6 or smaller cylinder size, and then assign it to a new object called as **smallc**.

```
> smallc <- subset(mtcars , subset=cyl <= 6)
```

   c) How many cars are in the **smallc** object?

```
> nrow (smallc)
[1] 18
```

   d) What is the average horse power (hp) of all cars in **smallc**?

```
> mean(smallc[,4])
[1] 98.05556
```

   e) Get the cars that have 5 gears in **smallc**. What are the names of those cars?

```
> row.names(subset(smallc , subset=gear == 5))
[1] "Porsche 914-2" "Lotus Europa"  "Ferrari Dino"
```

7. Write a loop block to check which numbers are even / odd within a given vector **inp_vec** that contains 5, 2, 7, 6, 3, 19, 23, 78, 145, 3, 4, 6, 9, 12, 67. Print a message that indicates the number type such as “6 is even” (the number itself and its type: even/odd).

```
> inp_vec <- c(5, 2, 7, 6, 3, 19, 23, 78, 145, 3, 4, 6, 9, 12, 67)

> for(i in 1:length(inp_vec)) {
        if(inp_vec[i] %%2==0) {
            cat (inp_vec[i],"is even", "\n")
        } else {
            cat (inp_vec[i],"is odd", "\n")
        }
    }
```

```
5 is odd
2 is even
7 is odd
6 is even
3 is odd
19 is odd
23 is odd
78 is even
145 is odd
3 is odd
4 is even
6 is even
9 is odd
12 is even
67 is odd
```

8. Create 3 vectors: **name** ("Ali","Cenk","Mete"), **age** (26,32,29), **salary** (2700, 3200, 4900). Then combine these vectors in a data.frame (**company**). Find the name of the employee who gets the highest salary in that company by writing a loop structure.

```
> name <- c("Ali", "Cenk", "Mete")
> age <- c(26,32,29)
> salary <- c(2700,3200,4900)

> company <- data.frame(name, age, salary)

> highest <- -1
> for(i in 1:length(company)) {
            if(company[i,]$salary > highest){
                  highest <- company[i,]$salary
                  z <- company[i,]
             }
      }

> if(length(company) != 0){
            print(z$name)
   }
```

```
[1] Mete
```