TMC 204
Statistical Data Analysis with R
R Programming Exercise

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DataTypes:

1. Use R to calculate the following:

I. 31 * 78

Sol: > 31*78

[1] 2418

II. 697 / 41

Sol: > 697 / 41

[1] 17

2. Assign the value of 39 to x

Sol: > x<-39

> x

[1] 39

3. Assign the value of 22 to y

Sol: > y<-22

> y

[1] 22

4. Make z the value of x - y

Sol: > z<- x - y

5. Display the value of z in the console

Sol: > z

[1] 17

6. Calculate the square root of 2345, and perform a log2 transformation on the result.

Sol : > log2(sqrt(2345))

[1] 5.597686

7. Type the following code, which assigns numbers to objects x and y.

x <- 10 y <- 20

I. Calculate the product of x and y.

Sol: > x<-10

> y<-20

> x*y

[1] 200

II. Store the result in a new object called z.

Sol: > z<-x*y

> z

[1] 200

8. Calculate the following quantities:

I. The sum of 100.1, 234.9 and 12.01.

Sol: > 100.1+234.9+12.01

[1] 347.01

II. The square root of 256.

Sol: > sqrt(256)

[1] 16

III. Calculate the 10-based logarithm of 100, and multiply the result with the cosine of π. Hint: see ? log and ? pi.

Sol: > log10(100)*cos(pi)

[1] -2

Built in functions :

1. Calculate the cumulative sum ('running total') of the numbers 2, 3, 4, 5, 6. Hint: use cumsum() Function.

Sol: > sum(2:6)
[1] 20
> cumsum(2:6)
[1] 2 5 9 14 20

2. Print the 1 to10 numbers in reverse order. Hint: use the rev function.

Sol:
> rev(1:10)
[1] 10 9 8 7 6 5 4 3 2 1

3. Calculate the cumulative sum of those numbers, but in reverse order.

Sol: > rev(cumsum(1:10))
[1] 55 45 36 28 21 15 10 6 3 1

4. Find 10 random numbers between 0 and100. (Hint: you can use sample() function)

Sol: > sample(1:100)
[1] 92 86 59 88 19 2 37 23 89 29 18 87 15 30 32 63 14 75
[19] 12 49 72 66 24 20 54 68 48 69 5 99 22 61 83 90 7 94
[37] 81 3 84 43 26 82 80 53 41 27 71 9 38 1 47 10 51 40
[55] 46 44 13 45 100 34 42 79 6 96 4 97 57 28 73 95 91 65
[73] 93 58 39 8 16 17 78 60 36 35 74 85 55 31 76 25 98 70
[91] 33 77 21 56 52 67 50 62 11 64

5. Calculate and Verify the value of x where x = 5, 5*x -> x, x

Sol: > x<-5
> 5*x->x
> x
[1] 25

6. Compute log to the base 10 (log10) of the sqrt of 100. Do not use variables.

Sol: > log10(sqrt(100))
[1] 1

VECTORS EXERCISE

1. Consider two vectors, x, y
x=c(4,6,5,7,10,9,4,15)
y=c(0,10,1,8,2,3,4,1) What is the value of: x*y and x+y
Sol: > x<-c(4,6,5,7,10,9,4,15)
> y<-c(0,10,1,8,2,3,4,1)
> x
[1] 4 6 5 7 10 9 4 15
> y
[1] 0 10 1 8 2 3 4 1
> x*y
[1] 0 60 5 56 20 27 16 15

> x+y
[1] 4 16 6 15 12 12 8 16

2. Consider two vectors, a, b
a=c(1,5,4,3,6)
b=c(3,5,2,1,9) What is the value of: a<=b
Sol:
> a<-c(1,5,4,3,6)
> b<-c(3,5,2,1,9)
> a<=b
[1] TRUE TRUE FALSE FALSE TRUE

3. If x=c(1:12)
What is the value of: dim(x)
What is the value of: length(x)
Sol:
> x<-c(1:12)
> dim(x)
NULL
> length(x)
[1] 12

4. If a=c(12:5) What is the value of: is.numeric(a)
Sol:
> a<-c(12:5)
> typeof(a)
[1] "integer"
> is.numeric(a)
[1] TRUE

5. Consider two vectors, x, y
x=letters [1:10]
y=letters[15:24] What is the value of: x<y
Sol:
> x<-letters[1:10]
> y<-letters[15:24]
> x
[1] "a" "b" "c" "d" "e" "f" "g" "h" "i" "j"

> y
[1] "o" "p" "q" "r" "s" "t" "u" "v" "w" "x"
> x<y
[1] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE

6. If x=c ('blue', 'red', 'green', 'yellow') what is the value of: is.character(x).

Sol:

> x<-c ('blue', 'red', 'green', 'yellow')
> typeof(x)
[1] "character"
> is.character(x)
[1] TRUE

7. If x=c('blue',10,'green',20) What is the value of: is.character(x).

Sol:

> typeof(x)
[1] "character"
> is.character(x)
[1] TRUE

8. Consider two vectors, a, b
a=c(10,2,4,15)
b=c(3,12,4,11) What is the value of: rbind(a,b)

SOL:

> a<-c(10,2,4,15)
> b<-c(3,12,4,11)
> a
[1] 10 2 4 15
> b
[1] 3 12 4 11
> rbind(a,b)
[,1] [,2] [,3] [,4]
a 10 2 4 15
b 3 12 4 11

9. Consider two vectors, a, b
a=c(1,2,4,5,6)
b=c(3,2,4,1,9) What is the value of: cbind(a,b)

Sol:

> a=c(1,2,4,5,6)
> b=c(3,2,4,1,9)
> cbind (a,b)
a b
[1,] 1 3
[2,] 2 2
[3,] 4 4
[4,] 5 1
[5,] 6 9

1. The numbers below are the first ten days of rainfall amounts in 1996.
Read them in to a vector using the c() function 0.1, 0.6, 33.8, 1.9, 9.6,
4.3, 33.7, 0.3, 0.0, 0.1

Sol:

```
> rainfall<-c(0.1, 0.6, 33.8, 1.9, 9.6, 4.3, 33.7, 0.3, 0.0, 0.1)
> rainfall
[1] 0.1 0.6 33.8 1.9 9.6 4.3 33.7 0.3 0.0 0.1
```

2. Inspect Table and answer the following questions:
I. What was the mean rainfall, how about the standard deviation?

Sol:

```
rainfall
[1] 0.1 0.6 33.8 1.9 9.6 4.3 33.7 0.3 0.0 0.1
> mean(rainfall)
[1] 8.44
> sd(rainfall)
[1] 13.66473
```

II. Calculate the cumulative rainfall ('running total') over these ten
days. Confirm that the last value of the vector that this produces is equal to the total sum of the rainfall.

Sol:

```
> rainfall
[1] 0.1 0.6 33.8 1.9 9.6 4.3 33.7 0.3 0.0 0.1
> cumsum(rainfall)
[1] 0.1 0.7 34.5 36.4 46.0 50.3 84.0 84.3 84.3 84.4
> sum(rainfall)==rainfall[10]
[1] FALSE
```

III. Which day saw the highest rainfall? Hint which.max()

Sol:

```
> rainfall
[1] 0.1 0.6 33.8 1.9 9.6 4.3 33.7 0.3 0.0 0.1
> max(rainfall)
[1] 33.8
```

3. Compute the problem sum ((x - mean(x)) ^2). X=10 consecutive numbers

Sol:

```
> x<-c(1:10)
> sum ((x - mean(x)) ^2)
[1] 82.5
```

4. The weights of five people before and after a diet programme are given in the table.

Read the `before' and `after' values into two different vectors called before and after. Use R to evaluate the amount of weight lost for each participant. What is the average amount of weight lost?

Sol:

```
> before
[1] 78 72 78 79 105
> after
[1] 67 65 79 70 93
> weightlost<-before-after
> weightlost
[1] 11 7 -1 9 12
> mean(weightlost)
[1] 7.6
```