CSE3020 – Data Visualization (ELA), Winter Semester 2021-2022

Lab Assignment IA1 – Slot L43-L44

By: Jonathan Rufus Samuel (20BCT0332) Dos: 18.01.2022

Lab Assignment – IA1

Note on Software used for following Visualizations: (R-Studio and the R language)

RStudio is an Integrated Development Environment (IDE) for R, a programming language for statistical computing and graphics. R is an integrated suite of software facilities for data manipulation, calculation and graphical display. It includes:

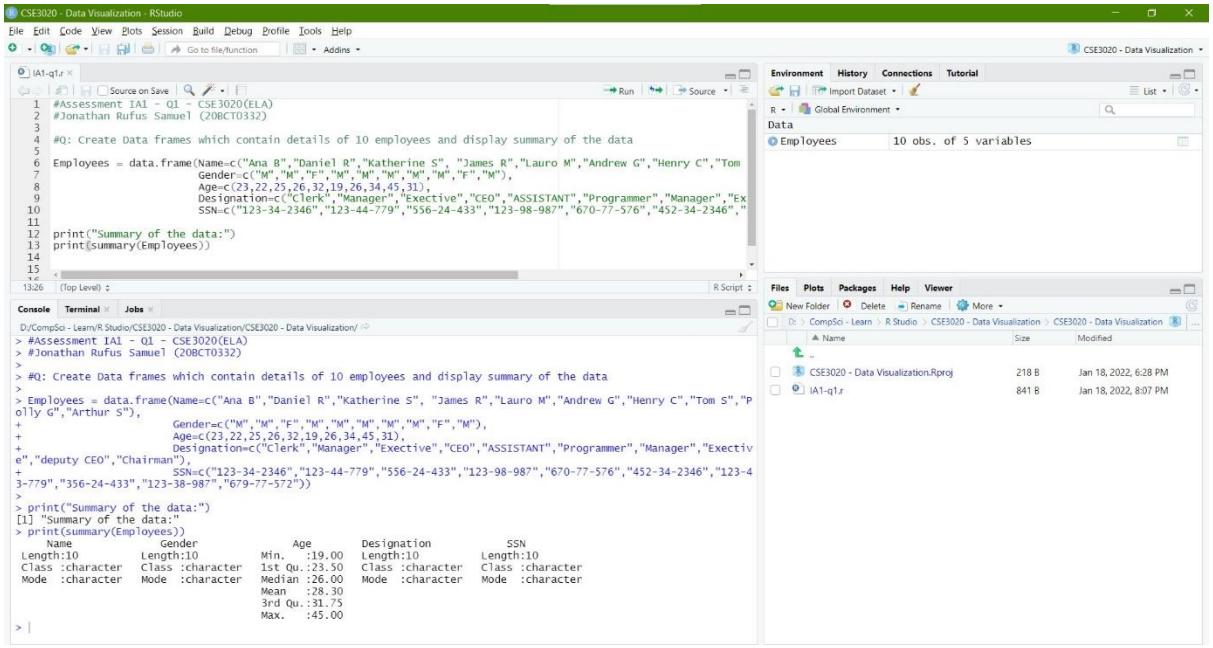
- an effective data handling and storage facility,
- a suite of operators for calculations on arrays, in particular matrices,
- a large, coherent, integrated collection of intermediate tools for data analysis,
- graphical facilities for data analysis and display either on-screen or on hardcopy, and
- a well-developed, simple and effective programming language which includes conditionals, loops, user-defined recursive functions and input and output facilities.

Q1) Create Data frames which contain details of 10 employees and display summary of the data:

Code:

```
#Assessment IA1 - Q1 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q1: Create Data frames which contain details of 10 employees and display summary of the
data

Employees = data.frame(Name=c("Ana B","Daniel R","Katherine S", "James R","Lauro
M","Andrew G","Henry C","Tom S","Polly G","Arthur S"),
                       Gender=c("M","M","F","M","M","M","M","M","F","M"),
                       Age=c(23,22,25,26,32,19,26,34,45,31),

Designation=c("Clerk","Manager","Exective","CEO","ASSISTANT","Programmer","Manager",
"Exective","deputy CEO","Chairman"),
                       SSN=c("123-34-2346","123-44-779","556-24-433","123-98-987","670-77-
576","452-34-2346","123-43-779","356-24-433","123-38-987","679-77-572"))

print("Summary of the data:")
print(summary(Employees))
```

Output:

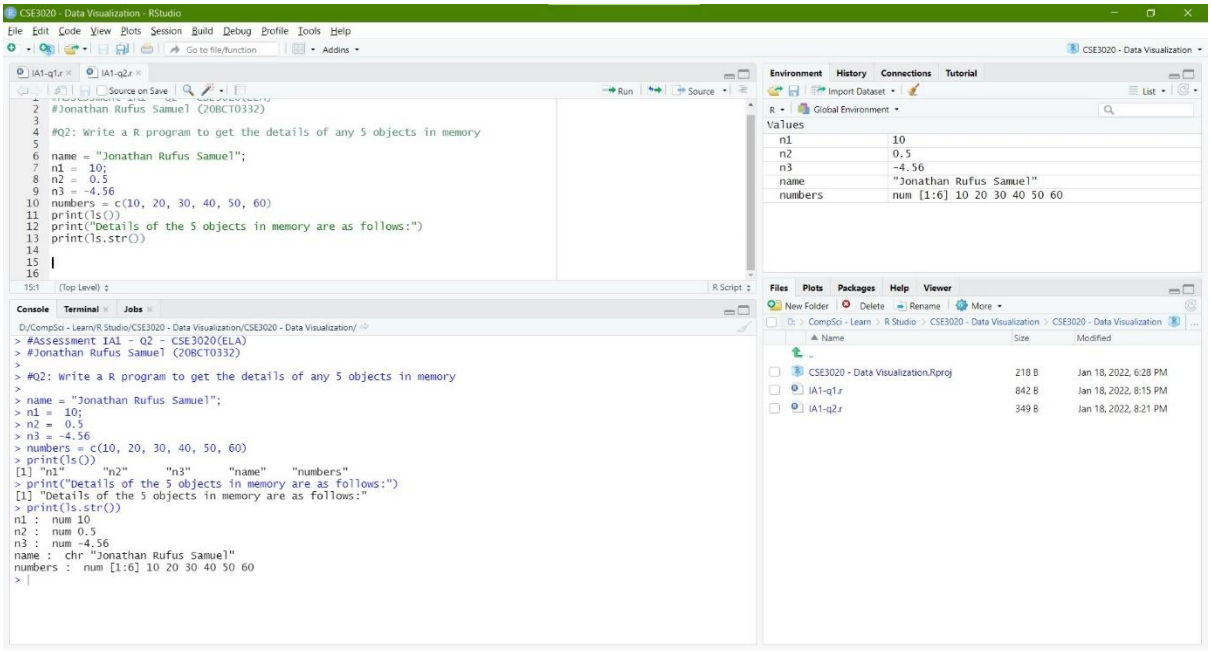


Q2) Write a R program to get the details of any 5 objects in memory:

Code:

```
#Assessment IA1 - Q2 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q2: Write a R program to get the details of any 5 objects in memory

name = "Jonathan Rufus Samuel";
n1 =  10;
n2 =  0.5
n3 = -4.56
numbers = c(10, 20, 30, 40, 50, 60)
print(ls())
print("Details of the 5 objects in memory are as follows:")
print(ls.str())
```

Output:

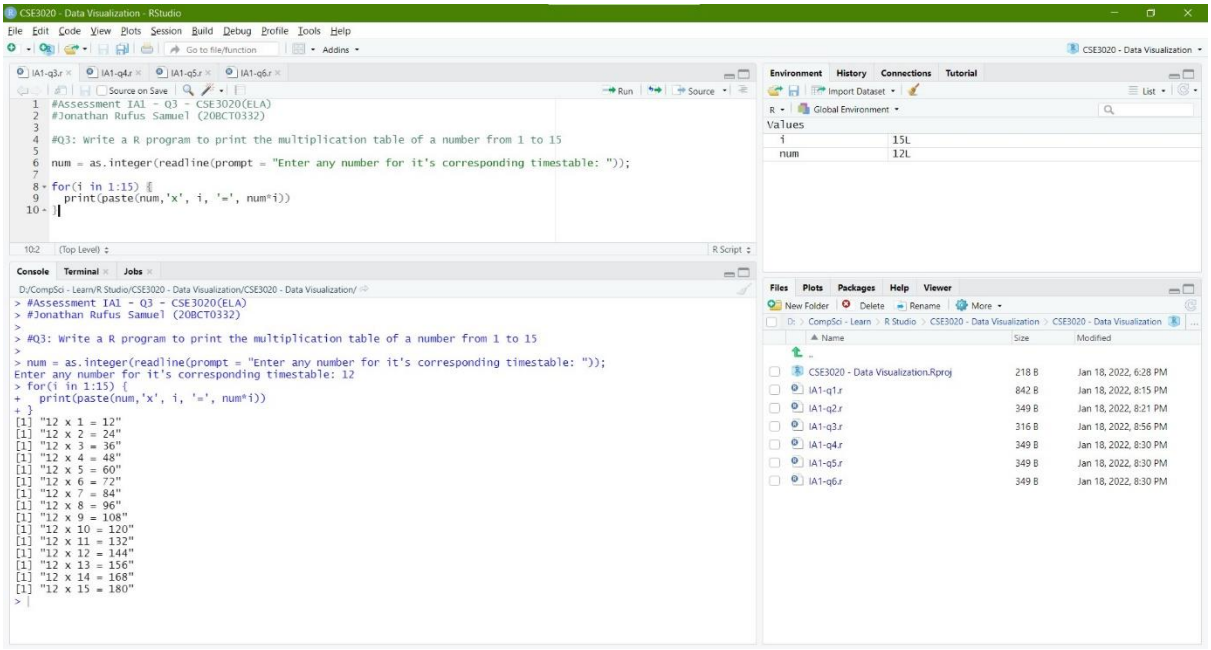


Q3) Write a R program to print the multiplication table of a number from 1 to 15:

Code:

```
#Assessment IA1 - Q3 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q3: Write a R program to print the multiplication table of a number from 1 to 15

num = as.integer(readline(prompt = "Enter any number for it's corresponding timestable: "));

for(i in 1:15) {
  print(paste(num,'x', i, '=', num*i))
}
```

Output:



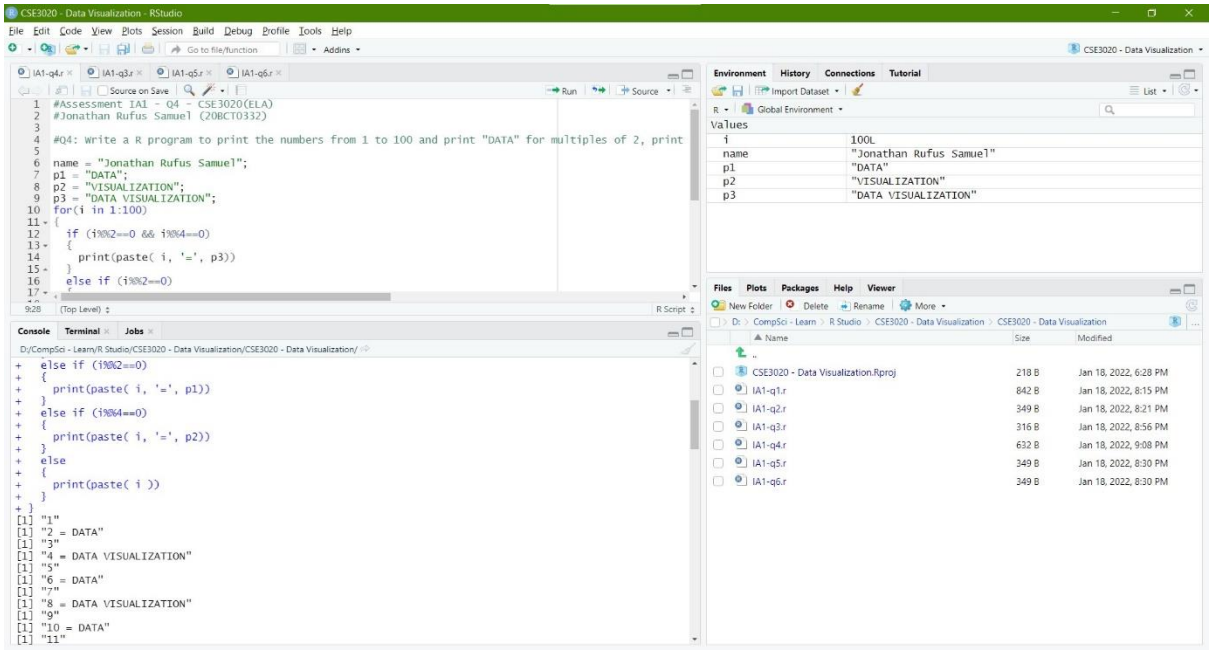
Q4) Write a R program to print the numbers from 1 to 100 and print "DATA" for multiples of 2, print "VISUALIZATION" for multiples of 4, and print "DATA VISUALIZATION" for multiples of both:

Code:

```
#Assessment IA1 - Q4 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q4: Write a R program to print the numbers from 1 to 100 and print "DATA" for multiples of 2, print "VISUALIZATION" for multiples of 4, and print "DATA VISUALIZATION" for multiples of both

name = "Jonathan Rufus Samuel";
p1 = "DATA";
p2 = "VISUALIZATION";
p3 = "DATA VISUALIZATION";
for(i in 1:100)
{
 if (i%%2==0 && i%%4==0)
 {
  print(paste( i, '=', p3))
 }
 else if (i%%2==0)
 {
  print(paste( i, '=', p1))
 }
 else if (i%%4==0)
 {
  print(paste( i, '=', p2))
 }
```

```
  else
  {
    print(paste( i ))
  }
}
```

Output:



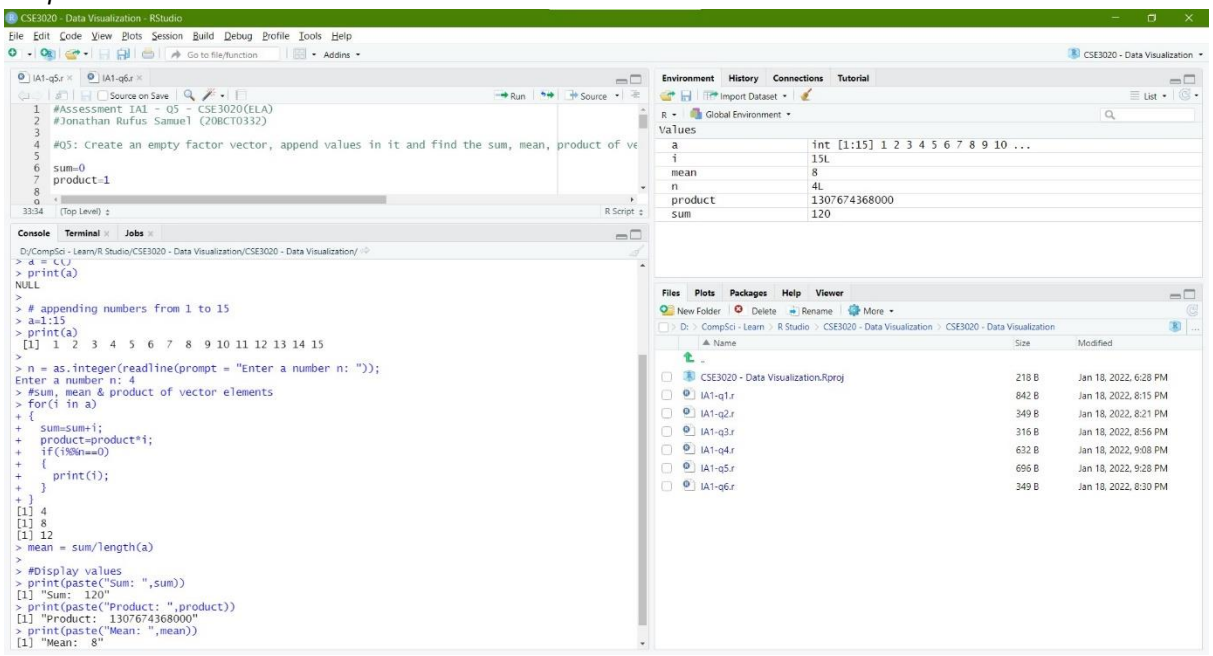
Q5) Create an empty factor vector, append values in it and find the sum, mean, product of vector elements using R. Also extract every nth element of the vector:

Code:

```
#Assessment IA1 - Q5 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q5: Create an empty factor vector, append values in it and find the sum, mean, product of
vector elements using R. Also extract every nth element of the vector:

sum=0
product=1

#New empty factor vector a
a = c()
print(a)

# appending numbers from 1 to 15
a=1:15
```

```
print(a)

n = as.integer(readline(prompt = "Enter a number n: "));

#sum, mean & product of vector elements
for(i in a)
{
 sum=sum+i;
 product=product*i;
 if(i%%n==0)
 {
  print(i);
 }
}
mean = sum/length(a)

#Display values
print(paste("Sum: ",sum))
print(paste("Product: ",product))
print(paste("Mean: ",mean))
```

Output:



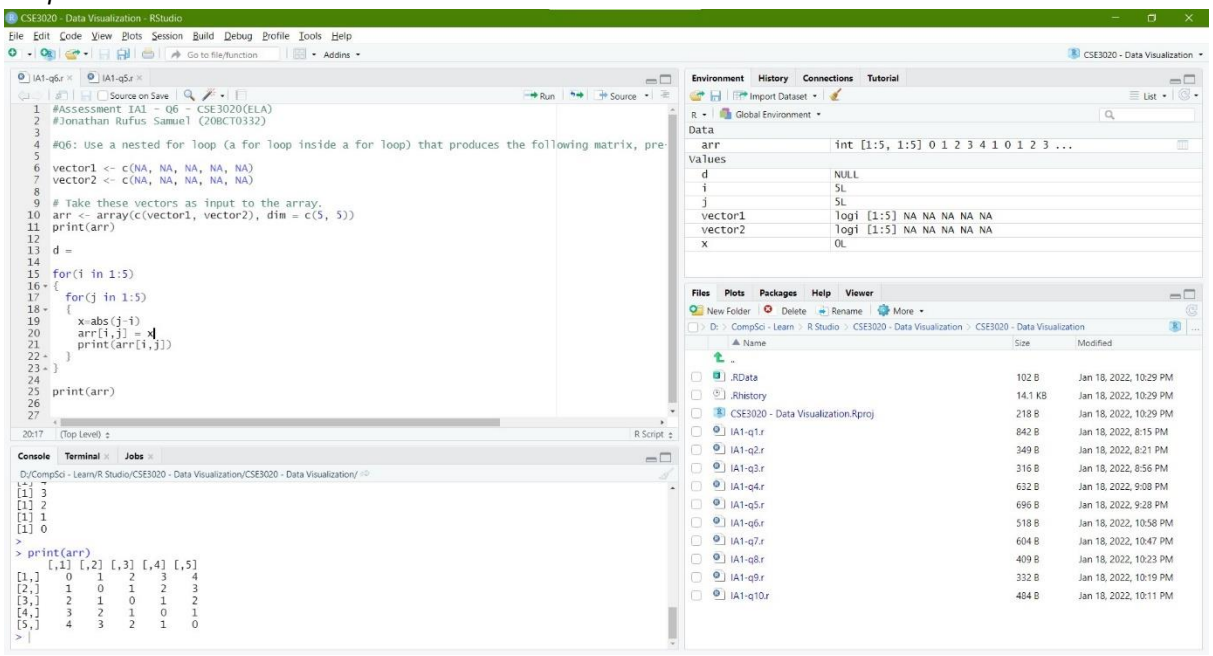
Q6) Use a nested for loop (a for loop inside a for loop) that produces the following matrix, pre-allocate the matrix with NA values:

0 1 2 3 4
1 0 1 2 3
2 1 0 1 2
3 2 1 0 1
4 3 2 1 0

Code:

```
#Assessment IA1 - Q6 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q6: Use a nested for loop (a for loop inside a for loop) that produces the following matrix, pre-allocate the matrix with NA values

vector1 <- c(NA, NA, NA, NA, NA)
vector2 <- c(NA, NA, NA, NA, NA)

# Take these vectors as input to the array.
arr <- array(c(vector1, vector2), dim = c(5, 5))
print(arr)

d =

for(i in 1:5)
{
  for(j in 1:5)
  {
    x=abs(j-i)
    arr[i,j] = x
    print(arr[i,j])
  }
}

print(arr)
```

Output:

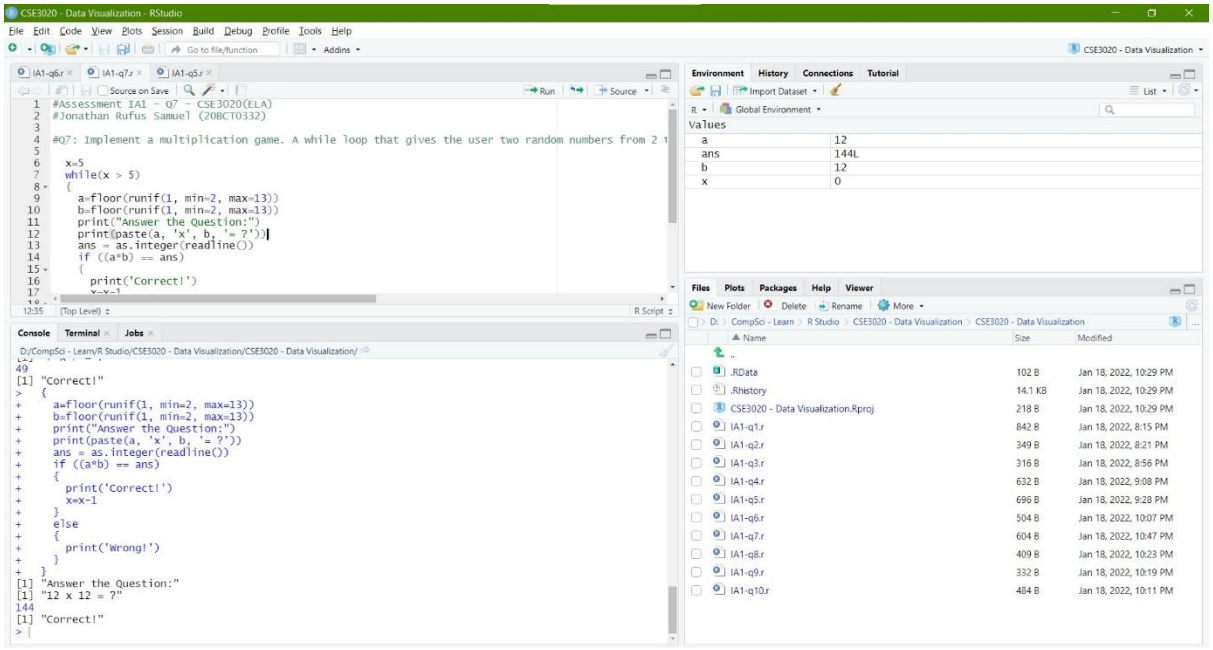


Q7) Implement a multiplication game. A while loop that gives the user two random numbers from 2 to 12 and asks the user to multiply them. Only exit the loop after five correct answers:

Code:

```
#Assessment IA1 - Q7 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q7: Implement a multiplication game. A while loop that gives the user two random
numbers from 2 to 12 and asks the user to multiply them. Only exit the loop after five
correct answers

 x=5
 while(x > 5)
 {
  a=floor(runif(1, min=2, max=13))
  b=floor(runif(1, min=2, max=13))
  print("Answer the Question:")
  print(paste(a, 'x', b, '= ?'))
  ans = as.integer(readline())
  if ((a*b) == ans)
  {
   print('Correct!')
   x=x-1
  }
  else
  {
   print('Wrong!')
  }
 }
```

Output:

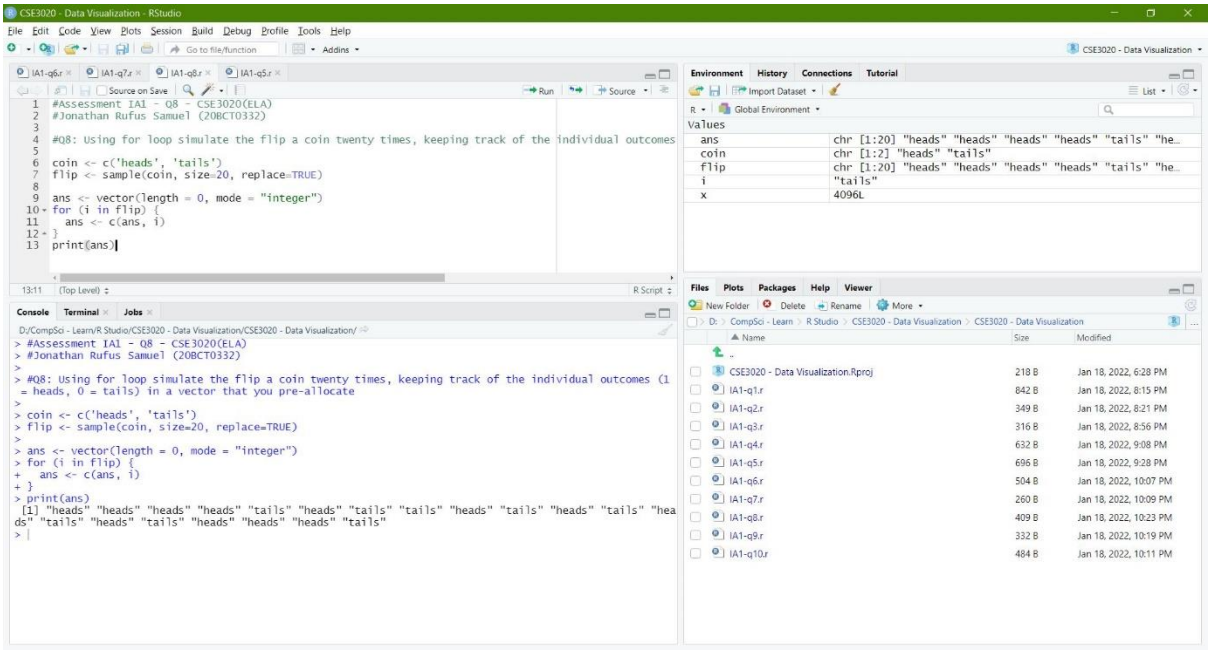


Q8) Using for loop simulate the flip a coin twenty times, keeping track of the individual outcomes (1 = heads, 0 = tails) in a vector that you pre-allocate:

Code:

```
#Assessment IA1 - Q8 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q8: Using for loop simulate the flip a coin twenty times, keeping track of the individual
outcomes (1 = heads, 0 = tails) in a vector that you pre-allocate

coin <- c('heads', 'tails')
flip <- sample(coin, size=20, replace=TRUE)

ans <- vector(length = 0, mode = "integer")
for (i in flip) {
  ans <- c(ans, i)
}
print(ans)
```

Output:

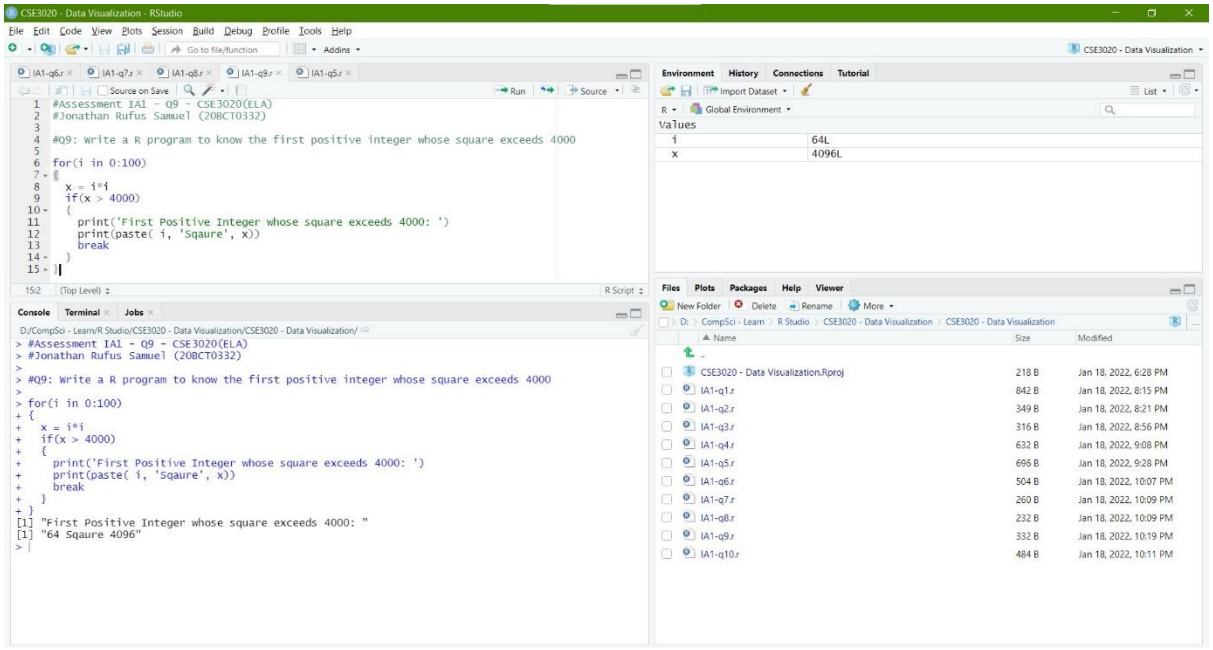


Q9) Write a R program to know the first positive integer whose square exceeds 4000:

Code:

```
#Assessment IA1 - Q9 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q9: Write a R program to know the first positive integer whose square exceeds 4000

for(i in 0:100)
{
 x = i*i
 if(x > 4000)
 {
  print('First Positive Integer whose square exceeds 4000: ')
  print(paste( i, 'Sqaure', x))
  break
 }
}
```

Output:

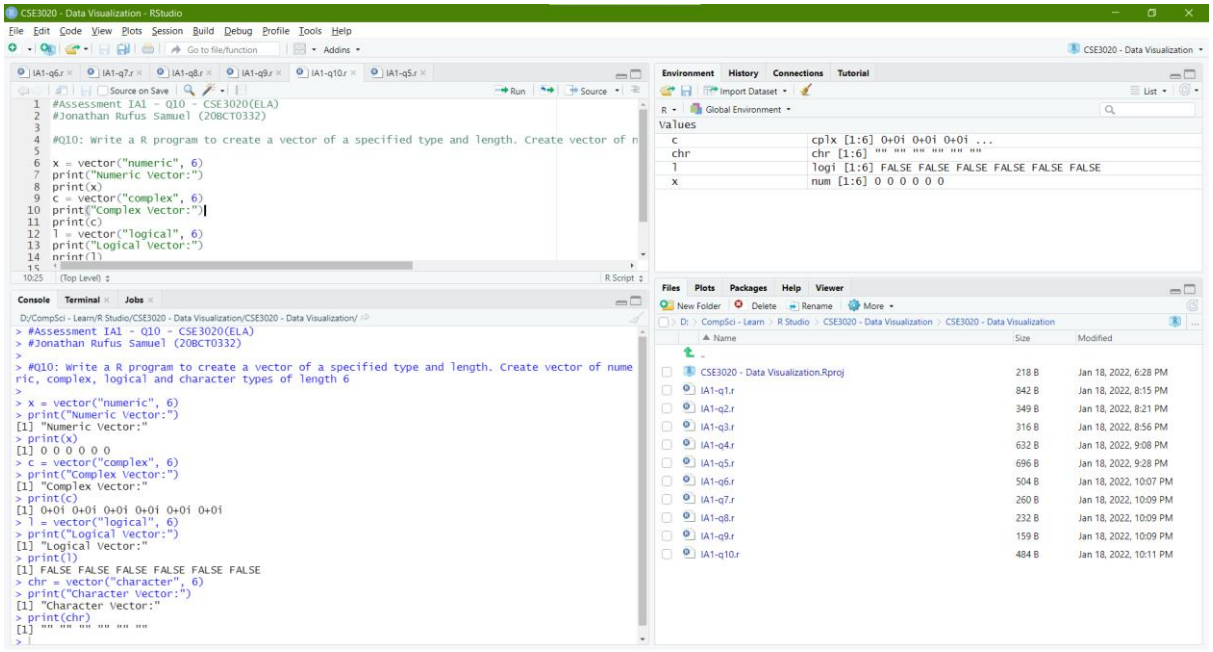


Q10) Write a R program to create a vector of a specified type and length. Create vector of numeric, complex, logical and character types of length 6:

Code:

```
#Assessment IA1 - Q10 - CSE3020(ELA)
#Jonathan Rufus Samuel (20BCT0332)

#Q10: Write a R program to create a vector of a specified type and length. Create vector of numeric, complex, logical and character types of length 6

x = vector("numeric", 6)
print("Numeric Vector:")
print(x)
c = vector("complex", 6)
print("Complex Vector:")
print(c)
l = vector("logical", 6)
print("Logical Vector:")
print(l)
chr = vector("character", 6)
print("Character Vector:")
print(chr)
```

Output:


CSE3020 - Data Visualization - RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
IA1-q6.r IA1-q7.r IA1-q8.r IA1-q9.r IA1-q10.r IA1-q5.r
1 #Assessment IA1 - Q10 - CSE3020(ELA)
2 #Jonathan Rufus Samuel (20BCT0332)
3
4 #Q10: Write a R program to create a vector of a specified type and length. Create vector of n
5
6 x = vector("numeric", 6)
7 print("Numeric Vector:")
8 print(x)
9 c = vector("complex", 6)
10 print("Complex Vector:")
11 print(c)
12 l = vector("logical", 6)
13 print("Logical Vector:")
14 print(l)
Environment History Connections Tutorial
Import Dataset
Global Environment
Values
c cplx [1:6] 0+0i 0+0i 0+0i ...
chr chr [1:6] "" "" "" "" "" ""
l logi [1:6] FALSE FALSE FALSE FALSE FALSE FALSE
x num [1:6] 0 0 0 0 0 0
Console Terminal Jobs
D:/CompSci - Learn/R Studio/CSE3020 - Data Visualization/CSE3020 - Data Visualization/
> #Assessment IA1 - Q10 - CSE3020(ELA)
> #Jonathan Rufus Samuel (20BCT0332)
>
> #Q10: Write a R program to create a vector of a specified type and length. Create vector of nume
ric, complex, logical and character types of length 6
>
> x = vector("numeric", 6)
> print("Numeric Vector:")
[1] "Numeric Vector:"
> print(x)
[1] 0 0 0 0 0 0
> c = vector("complex", 6)
> print("Complex Vector:")
[1] "Complex Vector:"
> print(c)
[1] 0+0i 0+0i 0+0i 0+0i 0+0i 0+0i
> l = vector("logical", 6)
> print("Logical Vector:")
[1] "Logical Vector:"
> print(l)
[1] FALSE FALSE FALSE FALSE FALSE FALSE
> chr = vector("character", 6)
> print("Character Vector:")
[1] "Character Vector:"
> print(chr)
[1] "" "" "" "" "" ""
Files Plots Packages Help Viewer
New Folder Delete Rename More
D: CompSci - Learn R Studio CSE3020 - Data Visualization CSE3020 - Data Visualization
Name Size Modified
CSE3020 - Data Visualization.Rproj 218 B Jan 18, 2022, 6:28 PM
IA1-q1.r 842 B Jan 18, 2022, 8:15 PM
IA1-q2.r 349 B Jan 18, 2022, 8:21 PM
IA1-q3.r 316 B Jan 18, 2022, 8:56 PM
IA1-q4.r 632 B Jan 18, 2022, 9:08 PM
IA1-q5.r 696 B Jan 18, 2022, 9:28 PM
IA1-q6.r 504 B Jan 18, 2022, 10:07 PM
IA1-q7.r 260 B Jan 18, 2022, 10:09 PM
IA1-q8.r 232 B Jan 18, 2022, 10:09 PM
IA1-q9.r 159 B Jan 18, 2022, 10:09 PM
IA1-q10.r 484 B Jan 18, 2022, 10:11 PM

Lab Assignment - 1 (IA1 - DOS -> 18.01.2022) DATE : 16.1.22

By : JONATHAN RUFUS SAMUEL (20BLT0332) - CSE3020 Slot L43 - L44

Handwritten Code for IA1

Q1 :

```
Employees = data.frame(Name = c("a", "b", "c", "d", "e",
"f", "g", "h", "i", "j"), Gender = c("M", "F",
"M", "F", "M", "M", "F", "M", "F", "F"), Age =
c(23, 34, 45, 41, 22, 24, 28, 31, 29, 36),
Designation = c("Clerk", "Manager", "Executive",
"CEO", "Assistant", "Programmer", "Manager", "Executive",
"deputy CEO", "Chairman"), SSN = c("1", "2",
"3", "4", "5", "6", "7", "8", "9", "10")

print(paste("Summary of the data :"))
print(summary(Employees))
```

Q2 :

```
name = "Jonathan Rufus SAMUEL"
n1 = 10
n2 = 0.5
n3 = -4.56
numbers = c(10, 20, 30, 40, 50, 60)
print(ls())
print("Details of 5 objects are as follows :")
print("ls.str")
```

Q3)

```
num = as.integer(readline(prompt = "Enter number for corresponding times table"));
for (i in 1:15)
{
  print(paste(num, "x", i, "=", num*i))
}
```

Q4:

```
name = "Jonathan Rufus Samuel"
p1 = "Data"
p2 = "Visualization"
p3 = "Data Visualization"
for (i in 1:100)
{
  if (i%%2 == 0 && i%%4 == 0) print(paste(i, "=", p3))
else if (i%%2 ==0) print(paste(i, "=", p1))
 else if (i%%4 == 0) print(paste(i, "=" p2))
}else {print(paste(i))}
```

Q5:

```
sum = 0
product = 1
a = c()
a = 1:15
print(a)
m = as.integer(readline(prompt = "Enter a number m"))
for (i in a)
{
  sum = sum + i
  product = product * i
  if (i%%m ==0)
  {
    print(i)
  }
}
```

```
mean = sum / length(a)
print (paste ("Sum: ", sum))
print (paste ("Product: ", product))
print (paste ("Mean: ", mean))
```

Q6:

```
vector1 = c(NA, NA, NA, NA, NA)
vector2 = c (NA, NA, NA, NA, NA)
arr = array (c(vector1, vector2), dim = c (5,5))
print (arr)
for (i in 1:5)
{
    for (j in 1:5)
    {
        x = abs(j-i)
        arr [i, j] = x
    }
}
Print(arr)
```

Q7:

```
x = 5
while (x > 5)
{
    a = fbon (runif (1, min = 2, max = 13))
    b = fbon (runif (1, min = 2, max = 13))
    print ("Answer the given question:")
    print (paste (a, "x", b, "=?"))
    ans = as.integer (readline())
    if ((a*b) == ans)
    {
        print ('Correct!')
        x = x-1
    }
    else { print ('Wrong!') } }
```

Q8:

```
coin = c('heads', 'tails')
flip = sample(coin, size = 20, replace = True)
ans = vector(length = 0, mode = "integer")
for (i in flip)
{ ans = c(ans, i)
}
print(ans)
```

Q9:

```
for (i in 0:100)
{ x = i*i
  if (x > 4000)
  { print('First positive Integer whose square exceeds 4000: ')
    print(paste(i, "Square", x))
  }
}
```

Q10:

```
x= vector("numeric", 6)
print("Numeric Vector:")
print(x)
c = vector("complex", 6)
print("Complex Vector:")
print(c)
I = vector("logical", 6)
print("logical Vector:")
print(I)
chr = vector("character", 6)
print("Character Vector:")
print(chr)
```
