

# CSE3020 Lab Assessment-1

**Name:** Malhar Dharmadhikari

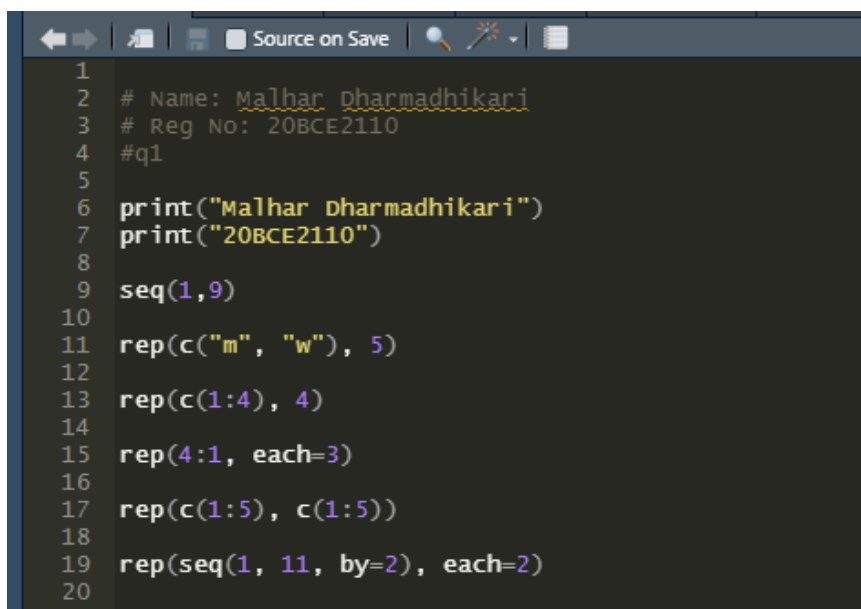
**Reg no:** 20BCE2110

**Course:** CSE3020 ELA

**Slot:** L39+L40

**Date:** 8/2/2022

```
1) print("Malhar Dharmadhikari")
    print("20BCE2110")
    seq(1,9)
    rep(c("m", "w"), 5)
    rep(c(1:4), 4)
    rep(4:1, each=3)
    rep(c(1:5), c(1:5))
    rep(seq(1, 11, by=2), each=2)
```

A screenshot of a code editor window with a dark background. The editor shows the same R code as the previous block, with line numbers 1 through 20 on the left margin. The code is: 1 print("Malhar Dharmadhikari"), 2 print("20BCE2110"), 3 seq(1,9), 4 rep(c("m", "w"), 5), 5 rep(c(1:4), 4), 6 rep(4:1, each=3), 7 rep(c(1:5), c(1:5)), 8 rep(seq(1, 11, by=2), each=2). The editor has a toolbar at the top with icons for undo, redo, save, and search, and a status bar at the bottom that says "Source on Save".

```
1 print("Malhar Dharmadhikari")
2 print("20BCE2110")
3 seq(1,9)
4 rep(c("m", "w"), 5)
5 rep(c(1:4), 4)
6 rep(4:1, each=3)
7 rep(c(1:5), c(1:5))
8 rep(seq(1, 11, by=2), each=2)
9
10
11
12
13
14
15
16
17
18
19
20
```

```
Console Terminal x Jobs x
R 4.1.2 · ~/VIT/Sem4/DataViz/Lab/DA/DA1/ ↗
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
>
> seq(1,9)
[1] 1 2 3 4 5 6 7 8 9
> rep(c("m", "w"), 5)
[1] "m" "w" "m" "w" "m" "w" "m" "w" "m" "w"
> rep(c(1:4), 4)
[1] 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
> rep(4:1, each=3)
[1] 4 4 4 3 3 3 2 2 2 1 1 1
> rep(c(1:5), c(1:5))
[1] 1 2 2 3 3 3 4 4 4 4 5 5 5 5 5
> rep(seq(1, 11, by=2), each=2)
[1] 1 1 3 3 5 5 7 7 9 9 11 11
> |
```

2) `print("Malhar Dharmadhikari")`  
`print("20BCE2110")`

`sqrt(16)`

`log10(1000)`

`log(1000)`

`exp(log(1000))`

`log2(64)`

`?log`

`pi`

`round(pi)`

`round(pi, digits=4)`

`trunc(pi)`

`sin(pi)`

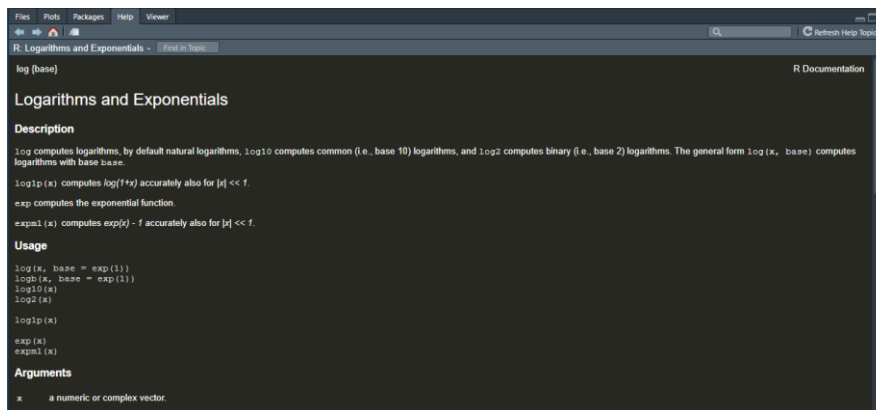
`cos(pi)`

`sin(pi/2)`

`cos(pi/2)`

```
21
22 # Name: Malhar Dharmadhikari
23 # Reg No: 20BCE2110
24 #q2
25
26 print("Malhar Dharmadhikari")
27 print("20BCE2110")
28
29 sqrt(16)
30 sqrt(43.2)
31
32 log10(1000)
33 log(1000)
34 exp(log(1000))
35
36 log2(64)
37
38 ?log
39
40 pi
41 round(pi)
42 round(pi, digits=4)
43 trunc(pi)
44
45 sin(pi)
46 cos(pi)
47 sin(pi/2)
48 cos(pi/2)
49
50
```

```
Console Terminal Jobs
R 4.1.2 · ~/VIT/Sem4/DataViz/Lab/DA/DA1/ ↗
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
>
> sqrt(16)
[1] 4
> sqrt(43.2)
[1] 6.572671
> log10(1000)
[1] 3
> log(1000)
[1] 6.907755
> exp(log(1000))
[1] 1000
> log2(64)
[1] 6
> ?log
> pi
[1] 3.141593
> round(pi)
[1] 3
> round(pi, digits=4)
[1] 3.1416
> trunc(pi)
[1] 3
> sin(pi)
[1] 1.224606e-16
> cos(pi)
[1] -1
> sin(pi/2)
[1] 1
> cos(pi/2)
[1] 6.123032e-17
>
> |
```



```
3) print("Malhar Dharmadhikari")

print("20BCE2110")
```

2+3

```
x = 2+3
```

```
x
```

```
y = c(2,3)
```

```
y
```

```
sum(y)
```

```
v = c(5:40)
```

```
v
```

```
length(v)
```

```
v[10]
```

```
v[-10]
```

```
z = c(3:10)
```

```
z + 5
```

```
2 * z
```

```
w = c(6.9, 2.7, 0, -11.3, 5.5, -7.8, 4.1, 3.2)
```

```
w + z
```

```
w * z
```

```
w / z
```

```
w ^ 2
```

```

48
49
50 # Name: Malhar Dharmadhikari
51 # Reg No: 20BCE2110
52 #q3
53
54 print("Malhar Dharmadhikari")
55 print("20BCE2110")
56
57 2+3
58 x = 2+3
59 x
60
61 y = c(2,3)
62 y
63 sum(y)
64
65 v = c(5:40)
66 v
67 length(v)
68 v[10]
69 v[-10]
70
71 z = c(3:10)
72 z + 5
73 2 * z
74
75 w = c(6.9, 2.7, 0, -11.3, 5.5, -7.8, 4.1, 3.2)
76 w + z
77
78 w * z
79 w / z
80 w ^ 2
81
82

```

```

Console Terminal Jobs
R 4.1.2 ~ /MIT/Sem4/DataViz/Lab/DA/DA1/ ↗
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
> 2+3
[1] 5
> x = 2+3
> x
[1] 5
> y = c(2,3)
> y
[1] 2 3
> sum(y)
[1] 5
> v = c(5:40)
> v
[1] 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
> length(v)
[1] 36
> v[10]
[1] 14
> v[-10]
[1] 5 6 7 8 9 10 11 12 13 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
> z = c(3:10)
> z + 5
[1] 8 9 10 11 12 13 14 15
> 2 * z
[1] 6 8 10 12 14 16 18 20
> w = c(6.9, 2.7, 0, -11.3, 5.5, -7.8, 4.1, 3.2)
> w + z
[1] 9.9 6.7 5.0 -5.3 12.5 0.2 13.1 13.2
> w * z
[1] 20.7 10.8 0.0 -67.8 38.5 -62.4 36.9 32.0
> w / z
[1] 2.3000000 0.6750000 0.0000000 -1.8833333 0.7857143 -0.9750000 0.4555556 0.3200000
> w ^ 2
[1] 47.61 7.29 0.00 127.69 30.25 60.84 16.81 10.24
>
>

```

4)     print("Malhar Dharmadhikari")

       print("20BCE2110")

       4+6

```

x <- 6

y <- 4

z <- x+y

z

ls()

sqrt(16)

rm(x, y)

z <- c(5, 9, 1, 0)

z

```

```

# Name: Malhar Dharmadhikari
# Reg No: 20BCE2110

print("Malhar Dharmadhikari")
print("20BCE2110")

4+6

x <- 6
y <- 4
z <- x+y
z

ls()

sqrt(16)

rm(x, y)

z <- c(5, 9, 1, 0)
z

```

```

R 4.1.2 · ~/VIT/Sem4/DataViz/Lab/DA/DA1/
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
> 4+6
[1] 10
> x <- 6
> y <- 4
> z <- x+y
> z
[1] 10
> ls()
[1] "v" "w" "x" "y" "z"
> sqrt(16)
[1] 4
> rm(x, y)
> z <- c(5, 9, 1, 0)
> 
> z
[1] 5 9 1 0
> 

```

5)

```

print("Malhar Dharmadhikari")

print("20BCE2110")

x <- c(5, 9)

y <- c(1, 10)

z <- c(x, y)

x <- 1:10

seq(1, 9, by=2)

seq(8, 20, length=6)

```

```
1 # Name: Malhar Dharmadhikari
2 # Reg No: 20BCE2110
3
4 print("Malhar Dharmadhikari")
5 print("20BCE2110")
6
7 x <- c(5, 9)
8 y <- c(1, 10)
9 z <- c(x, y)
10
11 # ii
12 x <- 1:10
13
14 seq(1, 9, by=2)
15 seq(8, 20, length=6)
16
17 x <- seq(1, 10)
18
19 rep(0, 100)
20 rep(1: 3, 6)
21 rep(1:3, c(6,6,6))
22 rep(1:3, rep(6,3))
23 |
24
```

```
6) print("Malhar Dharmadhikari")
print("20BCE2110")

x <- c(6, 8, 9)
```



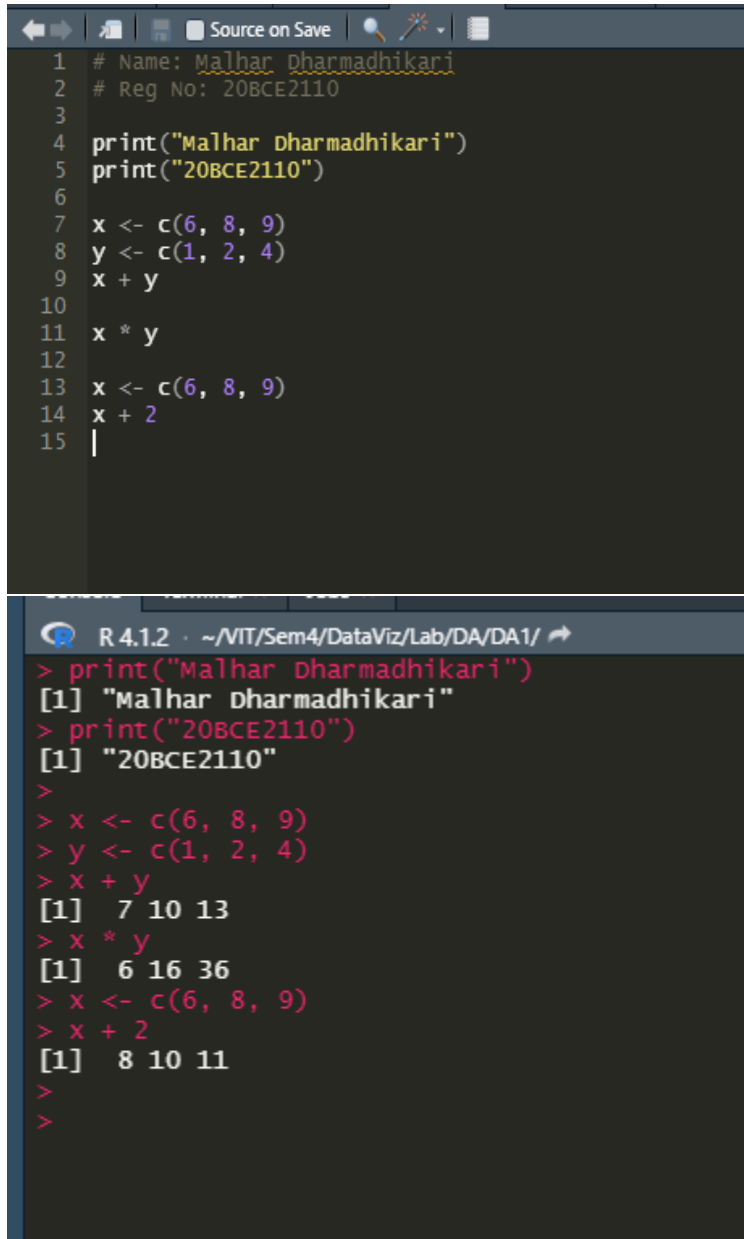
```
y <- c(1, 2, 4)

x + y

x * y

x <- c(6, 8, 9)

x + 2
```



The image shows a screenshot of an R script editor and its console output. The script editor window at the top has a toolbar with icons for back, forward, source on save, search, and a list icon. The script contains the following code:

```
1 # Name: Malhar Dharmadhikari
2 # Reg No: 20BCE2110
3
4 print("Malhar Dharmadhikari")
5 print("20BCE2110")
6
7 x <- c(6, 8, 9)
8 y <- c(1, 2, 4)
9 x + y
10
11 x * y
12
13 x <- c(6, 8, 9)
14 x + 2
15 |
```

The console window at the bottom shows the output of the script, with the R version and path at the top: R 4.1.2 · ~/VIT/Sem4/DataViz/Lab/DA/DA1/ ↗. The output is as follows:

```
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
>
> x <- c(6, 8, 9)
> y <- c(1, 2, 4)
> x + y
[1] 7 10 13
> x * y
[1] 6 16 36
> x <- c(6, 8, 9)
> x + 2
[1] 8 10 11
>
>
```

7) `print("Malhar Dharmadhikari")`

```
print("20BCE2110")
```

```
x <- c(4,2,6)
```

```
y <- c(1, 0, -1)
```

```
length(x)
```

```
sum(x)
```

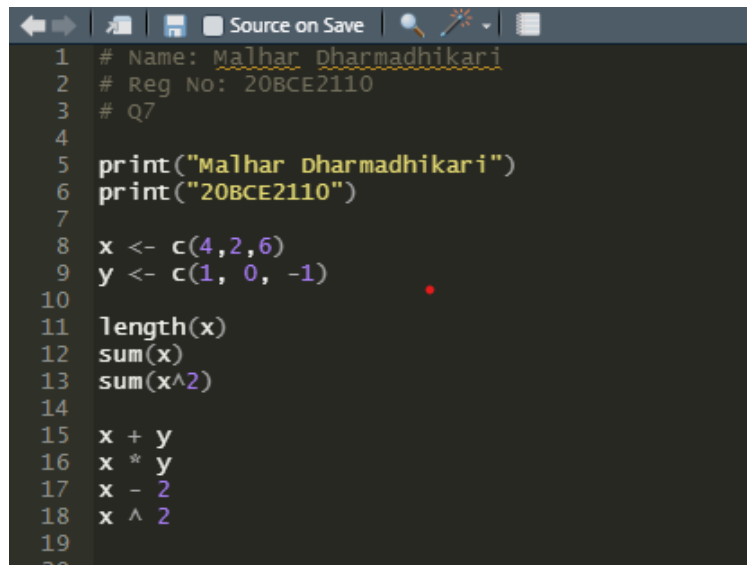
```
sum(x^2)
```

```
x + y
```

```
x * y
```

```
x - 2
```

```
x ^ 2
```

A screenshot of an RStudio script editor window. The window has a dark background with light-colored text. The top toolbar shows icons for running, saving, and other functions. The script content is as follows:

```
1 # Name: Malhar Dharmadhikari
2 # Reg No: 20BCE2110
3 # Q7
4
5 print("Malhar Dharmadhikari")
6 print("20BCE2110")
7
8 x <- c(4,2,6)
9 y <- c(1, 0, -1)
10
11 length(x)
12 sum(x)
13 sum(x^2)
14
15 x + y
16 x * y
17 x - 2
18 x ^ 2
19
20
```

```
Console Terminal x Jobs x
R 4.1.2 · ~/VIT/Sem4/DataViz/Lab/DA/DA1/ ↗
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
> x <- c(4,2,6)
> y <- c(1, 0, -1)
> length(x)
[1] 3
> sum(x)
[1] 12
> sum(x^2)
[1] 56
> x + y
[1] 5 2 5
> x * y
[1] 4 0 -6
> x - 2
[1] 2 0 4
> x ^ 2
[1] 16 4 36
> |
```

8) `print("Malhar Dharmadhikari")`  
`print("20BCE2110")`

`7:11`

`seq(2, 9)`

`seq(4, 10, by=2)`

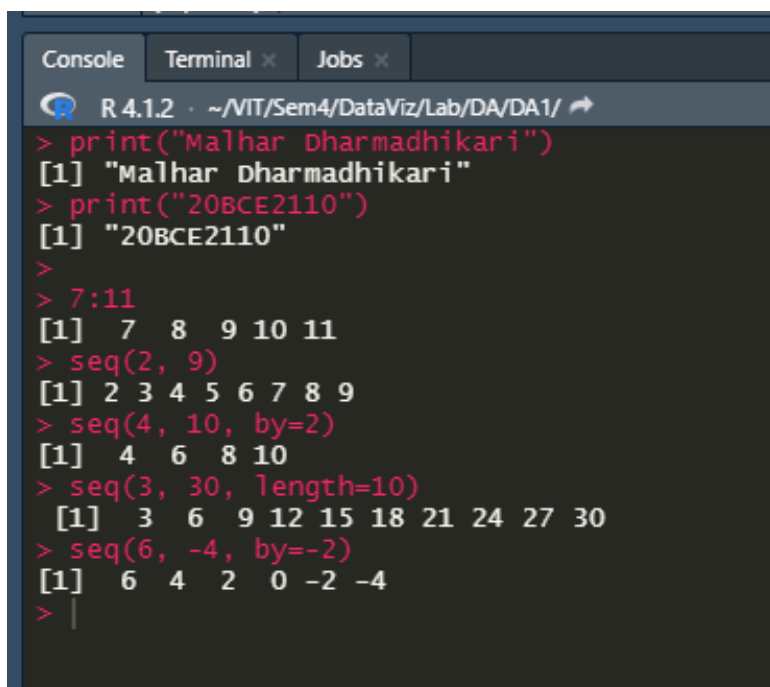
`seq(3, 30, length=10)`

`seq(6, -4, by=-2)`

```

19
20
21 # Name: Malhar Dharmadhikari
22 # Reg No: 20BCE2110
23 #Q8
24
25 print("Malhar Dharmadhikari")
26 print("20BCE2110")
27
28 7:11
29 seq(2, 9)
30 seq(4, 10, by=2)
31 seq(3, 30, length=10)
32 seq(6, -4, by=-2)
33 |
34

```



```

R 4.1.2 · ~/VIT/Sem4/DataViz/Lab/DA/DA1/ ↗
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
>
> 7:11
[1] 7 8 9 10 11
> seq(2, 9)
[1] 2 3 4 5 6 7 8 9
> seq(4, 10, by=2)
[1] 4 6 8 10
> seq(3, 30, length=10)
[1] 3 6 9 12 15 18 21 24 27 30
> seq(6, -4, by=-2)
[1] 6 4 2 0 -2 -4
> |

```

9) `print("Malhar Dharmadhikari")`  
`print("20BCE2110")`

`rep(2, 4)`

`rep(c(1, 2), 4)`

`rep(c(1,2), c(4,4))`

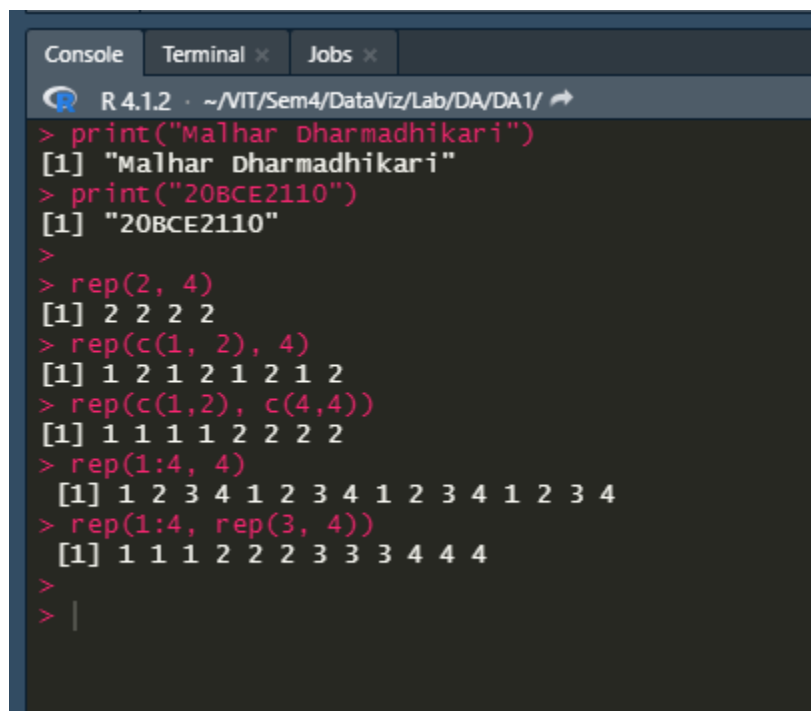
`rep(1:4, 4)`

`rep(1:4, rep(3, 4))`

```

33
34
35 # Name: Malhar Dharmadhikari
36 # Reg No: 20BCE2110
37 #Q9
38
39 print("Malhar Dharmadhikari")
40 print("20BCE2110")
41
42 rep(2, 4)
43 rep(c(1, 2), 4)
44 rep(c(1,2), c(4,4))
45 rep(1:4, 4)
46 rep(1:4, rep(3, 4))
47
48

```



```

R 4.1.2 · ~/VT/Sem4/DataViz/Lab/DA/DA1/ ↗
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
>
> rep(2, 4)
[1] 2 2 2 2
> rep(c(1, 2), 4)
[1] 1 2 1 2 1 2 1 2
> rep(c(1,2), c(4,4))
[1] 1 1 1 1 2 2 2 2
> rep(1:4, 4)
[1] 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
> rep(1:4, rep(3, 4))
[1] 1 1 1 2 2 2 3 3 3 4 4 4
>
> |

```

10) `print("Malhar Dharmadhikari")`  
`print("20BCE2110")`

```

x <- c(7.5,8.2,3.1,5.6,8.2,9.3,6.5,7.0,9.3,1.2,14.5,6.2)

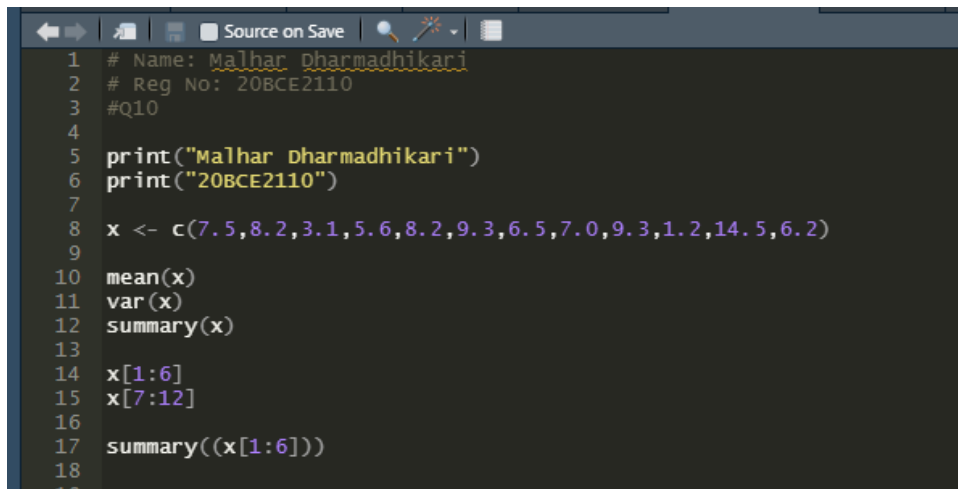
mean(x)

var(x)

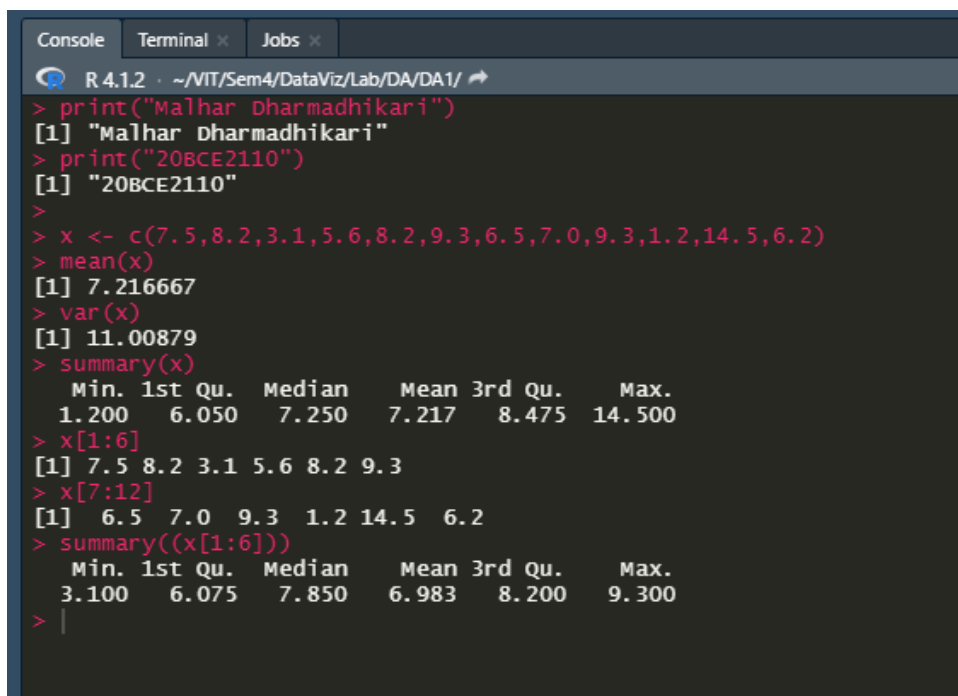
summary(x)

```

```
x[1:6]
x[7:12]
summary((x[1:6]))
```



```
1 # Name: Malhar Dharmadhikari
2 # Reg No: 20BCE2110
3 #Q10
4
5 print("Malhar Dharmadhikari")
6 print("20BCE2110")
7
8 x <- c(7.5,8.2,3.1,5.6,8.2,9.3,6.5,7.0,9.3,1.2,14.5,6.2)
9
10 mean(x)
11 var(x)
12 summary(x)
13
14 x[1:6]
15 x[7:12]
16
17 summary((x[1:6]))
18
19
```



```
Console Terminal Jobs
R 4.1.2 ~ /VIT/Sem4/DataViz/Lab/DA/DA1/
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
>
> x <- c(7.5,8.2,3.1,5.6,8.2,9.3,6.5,7.0,9.3,1.2,14.5,6.2)
> mean(x)
[1] 7.216667
> var(x)
[1] 11.00879
> summary(x)
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 1.200  6.050   7.250   7.217   8.475  14.500
> x[1:6]
[1] 7.5 8.2 3.1 5.6 8.2 9.3
> x[7:12]
[1] 6.5 7.0 9.3 1.2 14.5 6.2
> summary((x[1:6]))
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 3.100  6.075   7.850   6.983   8.200   9.300
> |
```

```
11) print("Malhar Dharmadhikari")
print("20BCE2110")
```

```

x <- c(5,9,2,3,4,6,7,0,8,12,2,9)

x[2]

x[2:4]

x[c(2, 3, 6)]

x[c(1:5, 10:12)]

x[-(10:12)]

```

```

19
20 # Name: Malhar Dharmadhikari
21 # Reg No: 20BCE2110
22 #Q11
23
24 print("Malhar Dharmadhikari")
25 print("20BCE2110")
26
27 x <- c(5,9,2,3,4,6,7,0,8,12,2,9)
28 x[2]
29 x[2:4]
30 x[c(2, 3, 6)]
31 x[c(1:5, 10:12)]
32 x[-(10:12)]
33 |

```

```

33:1 (Top Level)
Console Terminal x Jobs x
R 4.1.2 ~ /VIT/Sem4/DataViz/Lab/DA/DA1/
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
>
> x <- c(5,9,2,3,4,6,7,0,8,12,2,9)
> x[2]
[1] 9
> x[2:4]
[1] 9 2 3
> x[c(2, 3, 6)]
[1] 9 2 6
> x[c(1:5, 10:12)]
[1] 5 9 2 3 4 12 2 9
> x[-(10:12)]
[1] 5 9 2 3 4 6 7 0 8
> |

```

12) `print("Malhar Dharmadhikari")`

```

print("20BCE2110")

x <- c(5, 7, 9)
y <- c(6, 3, 4)
z <- cbind(x, y)
dim(z)
rbind(z , z)

z <- matrix(c(5, 7, 9, 3, 4), nrow=3)
z <- matrix(c(5, 7, 9, 3, 4), ncol=3)
z <- matrix(c(5, 7, 9, 3, 4), nr=3, byrow=T)
z <- matrix(c(5, 7, 9, 3, 4), nrow=3, byrow=F)
y <- matrix(c(1,3,0,9,5,-1), nrow=3, byrow=T)
y + z
y * z
x <- matrix(c(3,4,-2,6), nrow=2, byrow=T)
y%%x
solve(x)
z[1,1]
z[c(2,3), 2]
z[,2]
z[1:2,]

```



```
1 # Name: Malhar Dharmadhikari
2 # Reg No: 20BCE2110
3 #Q12
4
5 print("Malhar Dharmadhikari")
6 print("20BCE2110")
7
8 x <- c(5, 7, 9)
9 y <- c(6, 3, 4)
10 z <- cbind(x, y)
11
12 dim(z)
13 rbind(z, z)
14
15 z <- matrix(c(5, 7, 9, 3, 4), nrow=3)
16 z <- matrix(c(5, 7, 9, 3, 4), ncol=3)
17 z <- matrix(c(5, 7, 9, 3, 4), nr=3, byrow=T)
18 z <- matrix(c(5, 7, 9, 3, 4), nrow=3, byrow=F)
19 y <- matrix(c(1,3,0,9,5,-1), nrow=3, byrow=T)
20
21 y + z
22 y * z
23
24 x <- matrix(c(3,4,-2,6), nrow=2, byrow=T)
25
26 y%%x
27
28 solve(x)
29
30 z[1,1]
31 z[c(2,3), 2]
32 z[,2]
33 z[1:2,]
34
```

```
Console Terminal Jobs
R 4.1.2 - ~/VIT/Sem4/DataViz/Lab/DA1/ ↗
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
>
> x <- c(5, 7, 9)
> y <- c(6, 3, 4)
> z <- cbind(x, y)
> dim(z)
[1] 3 2
> rbind(z, z)
      x y
[1,] 5 6
[2,] 7 3
[3,] 9 4
[4,] 5 6
[5,] 7 3
[6,] 9 4
> z <- matrix(c(5, 7, 9, 3, 4), nrow=3)
warning message:
In matrix(c(5, 7, 9, 3, 4), nrow = 3) :
data length [5] is not a sub-multiple or multiple of the number of rows [3]
> z <- matrix(c(5, 7, 9, 3, 4), ncol=3)
warning message:
In matrix(c(5, 7, 9, 3, 4), ncol = 3) :
data length [5] is not a sub-multiple or multiple of the number of rows [2]
> z <- matrix(c(5, 7, 9, 3, 4), nr=3, byrow=T)
warning message:
In matrix(c(5, 7, 9, 3, 4), nr = 3, byrow = T) :
data length [5] is not a sub-multiple or multiple of the number of rows [3]
> z <- matrix(c(5, 7, 9, 3, 4), nrow=3, byrow=F)
warning message:
In matrix(c(5, 7, 9, 3, 4), nrow = 3, byrow = F) :
data length [5] is not a sub-multiple or multiple of the number of rows [3]
> y <- matrix(c(1,3,0,9,5,-1), nrow=3, byrow=T)
```

```

> y <- matrix(c(1,3,0,9,5,-1), nrow=3, byrow=T)
> y + z
      [,1] [,2]
[1,]    6    6
[2,]    7   13
[3,]   14    4
> y * z
      [,1] [,2]
[1,]     5    9
[2,]     0   36
[3,]    45   -5
> x <- matrix(c(3,4,-2,6), nrow=2, byrow=T)
> y%%x
      [,1] [,2]
[1,]   -3   22
[2,]  -18   54
[3,]   17   14
> solve(x)
      [,1] [,2]
[1,] 0.23076923 -0.1538462
[2,] 0.07692308  0.1153846
> z[1,1]
[1] 5
> z[c(2,3), 2]
[1] 4 5
> z[,2]
[1] 3 4 5
> z[1:2,]
      [,1] [,2]
[1,]     5    3
[2,]     7    4
> |

```

13) `print("Malhar Dharmadhikari")`

`print("20BCE2110")`

`x <- matrix(c(3, -1, 2, 1), ncol=2)`

`x`

`y <- matrix(c(1, 0, 4, 1, 0, -1), nrow=2)`

`y`

`2 * x`

`x * x`

`x%*%x`

```
← → Source on Save
1 # Name: Malhar Dharmadhikari
2 # Reg No: 20BCE2110
3 #Q13
4
5 print("Malhar Dharmadhikari")
6 print("20BCE2110")
7
8 x <- matrix(c(3, -1, 2, 1), ncol=2)
9 x
10
11 y <- matrix(c(1, 0, 4, 1, 0, -1), nrow=2)
12 y
13
14 2 * x
15 x * x
16 x%%x
17
```

```
Console Terminal × Jobs ×
R 4.1.2 · ~/VIT/Sem4/DataViz/Lab/DA/DA1/ ↗
> print("Malhar Dharmadhikari")
[1] "Malhar Dharmadhikari"
> print("20BCE2110")
[1] "20BCE2110"
>
> x <- matrix(c(3, -1, 2, 1), ncol=2)
> x
      [,1] [,2]
[1,]    3    2
[2,]   -1    1
> y <- matrix(c(1, 0, 4, 1, 0, -1), nrow=2)
> y
      [,1] [,2] [,3]
[1,]    1    4    0
[2,]    0    1   -1
> 2 * x
      [,1] [,2]
[1,]    6    4
[2,]   -2    2
> x * x
      [,1] [,2]
[1,]    9    4
[2,]    1    1
> x%%x
      [,1] [,2]
[1,]    7    8
[2,]   -4   -1
> |
```