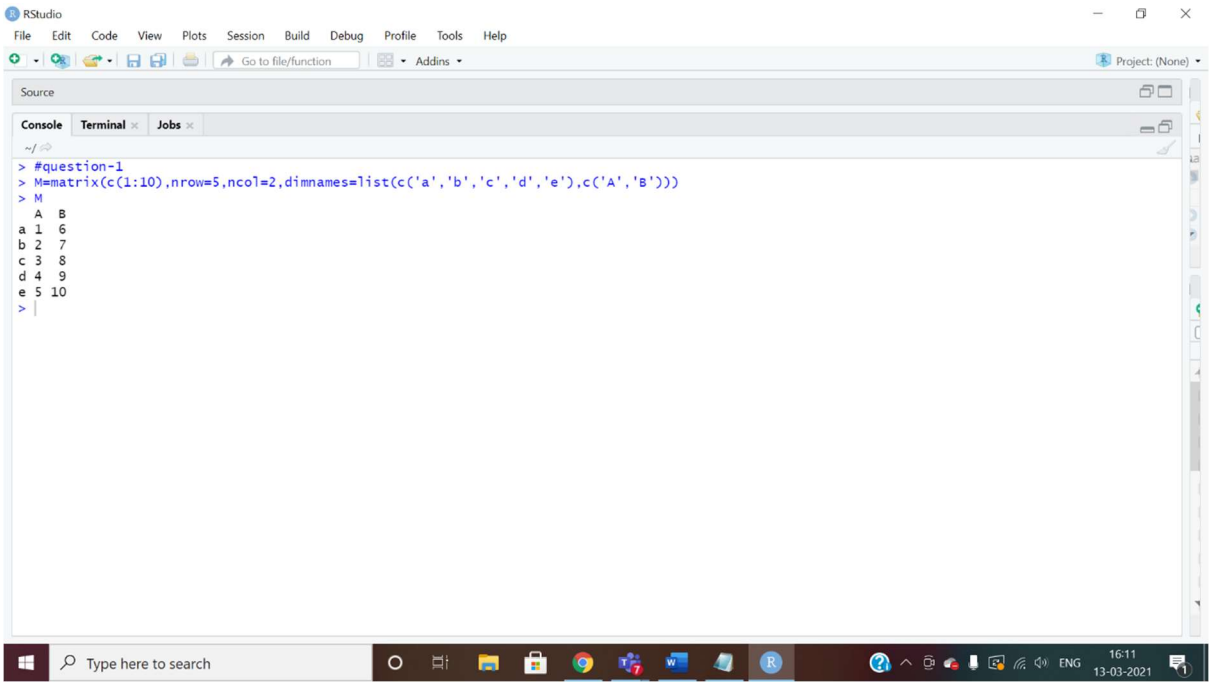
Q1. If M=matrix(c(1:10),nrow=5,ncol=2, dimnames=list(c('a','b','c','d','e'),c('A','B'))) What is the value of: M

Answer: M=matrix(c(1:10),nrow=5,ncol=2,dimnames=list(c('a','b','c','d','e'),c('A','B')))

M

OUTPUT



Q2. Consider the matrix M, What is the value of: M[1,]

M[,1]

M[3,2]

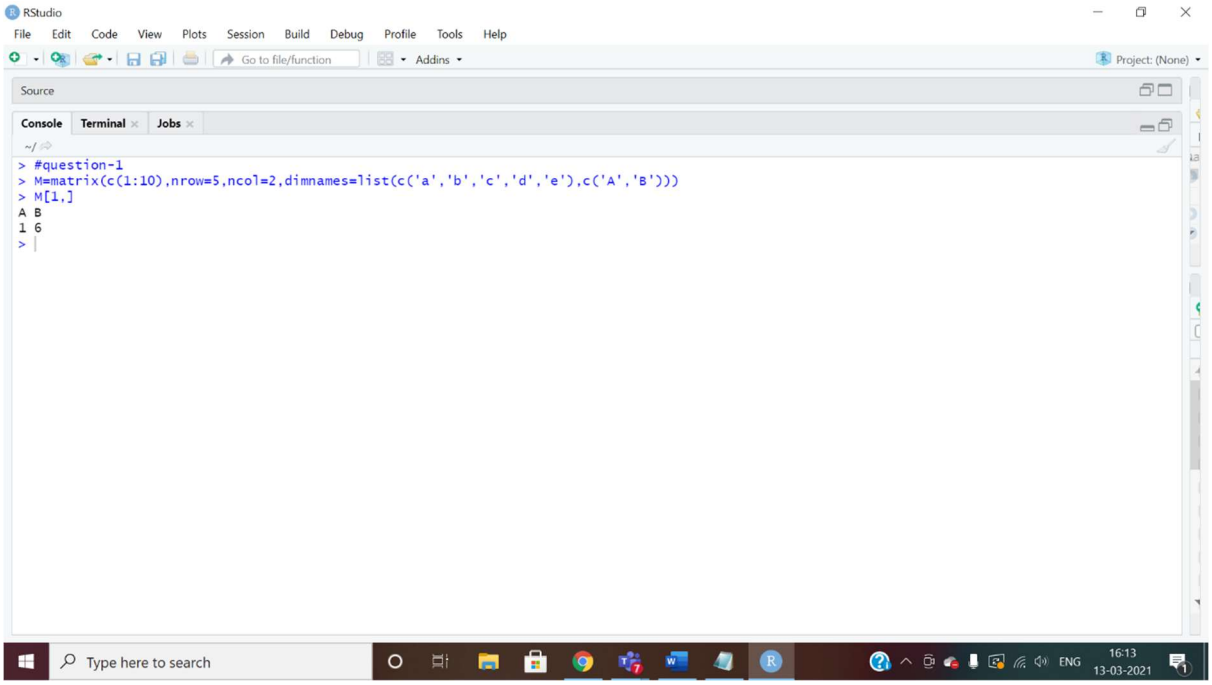
M['e','A']

Answer:

1)M=matrix(c(1:10),nrow=5,ncol=2,dimnames=list(c('a','b','c','d','e'),c('A','B')))

M[1,]

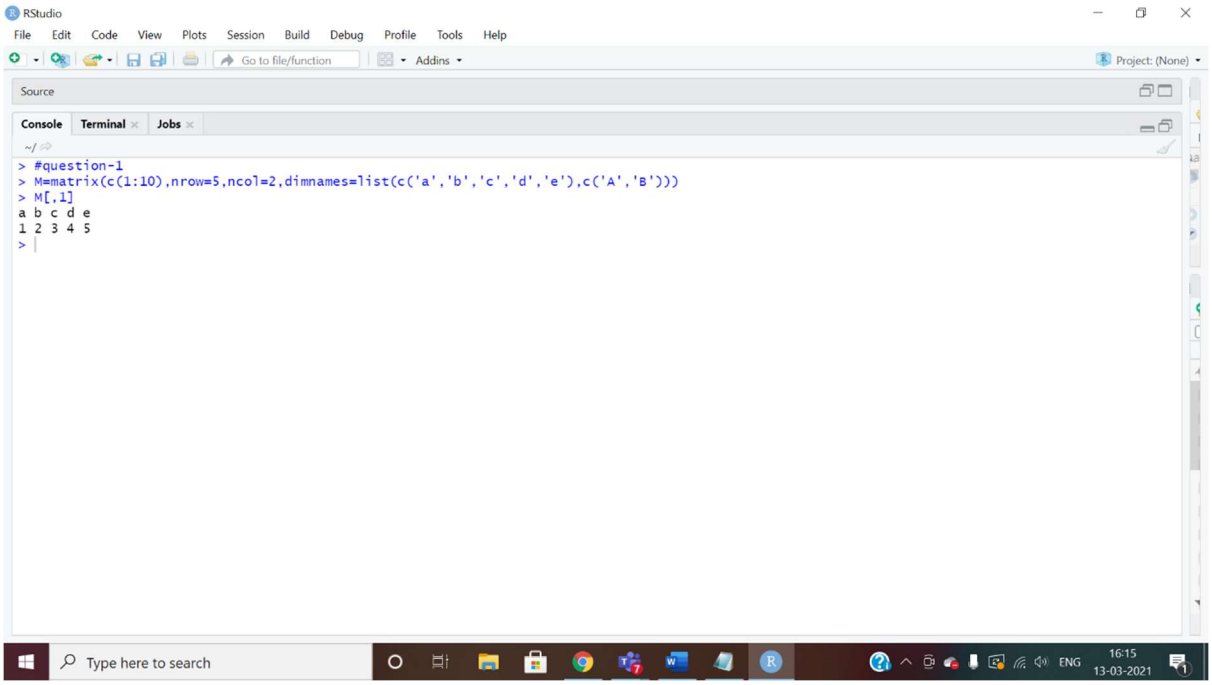
OUTPUT



2)M=matrix(c(1:10),nrow=5,ncol=2,dimnames=list(c('a','b','c','d','e'),c('A','B')))

M[,1]

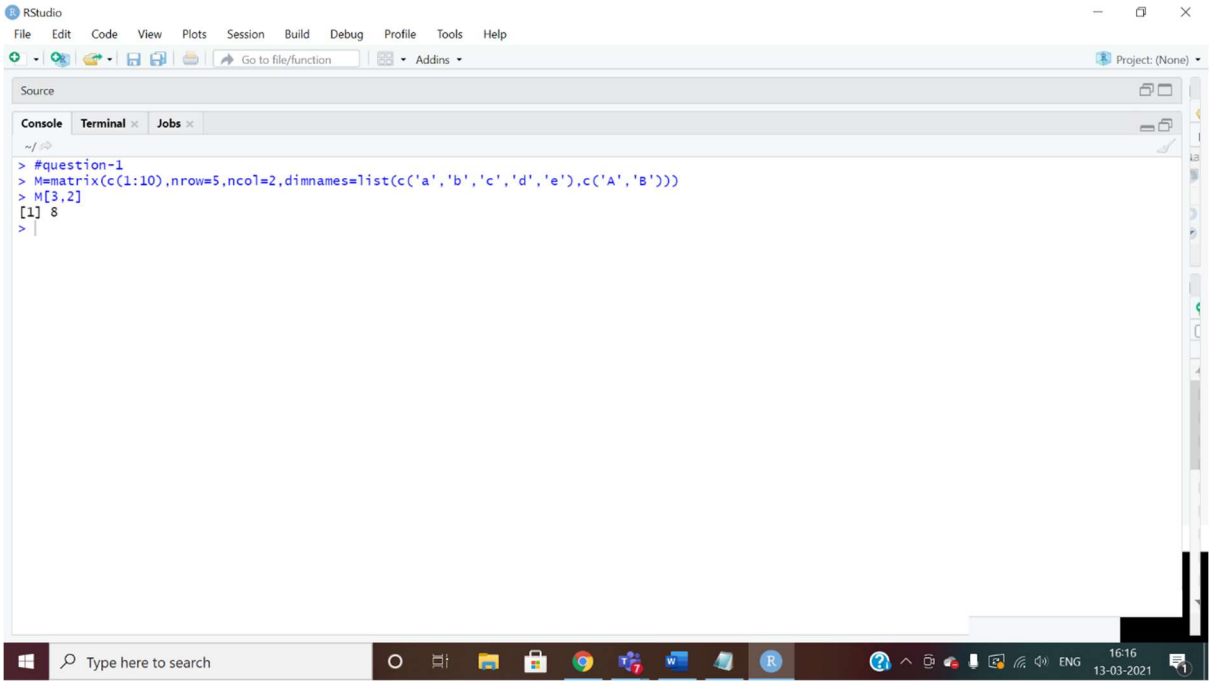
OUTPUT



3)M=matrix(c(1:10),nrow=5,ncol=2,dimnames=list(c('a','b','c','d','e'),c('A','B')))

M[3,2]

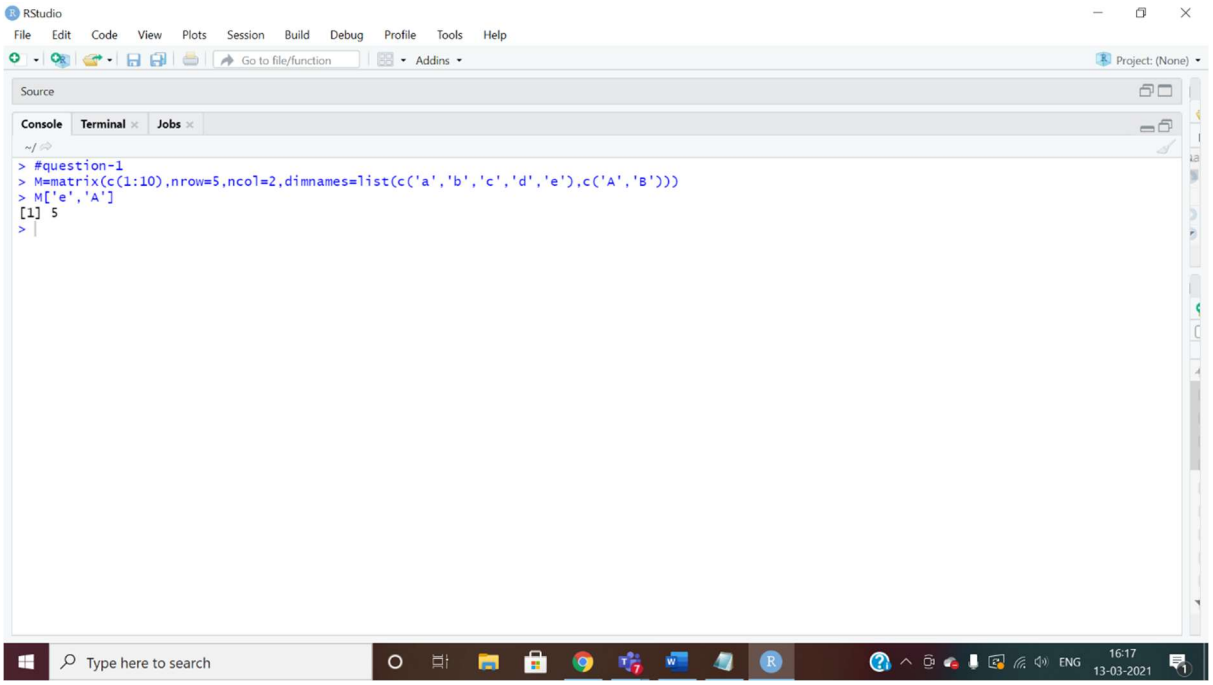
OUTPUT



4)M=matrix(c(1:10),nrow=5,ncol=2,dimnames=list(c('a','b','c','d','e'),c('A','B')))

M['e','A']

OUTPUT



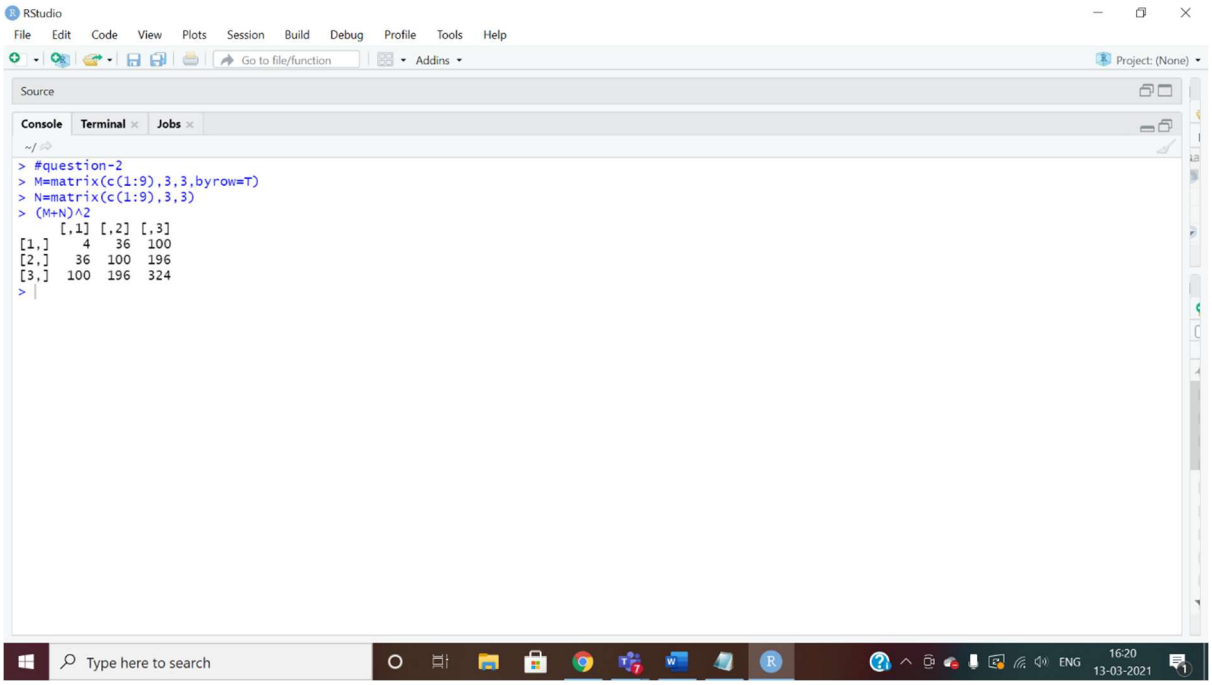
Q2. Consider two matrix, M,N M=matrix(c(1:9),3,3,byrow=T) N=matrix(c(1:9),3,3) What is the value of: (M+N)^2

Answer: M=matrix(c(1:9),3,3,byrow=T)

N=matrix(c(1:9),3,3)

(M+N)^2

OUTPUT



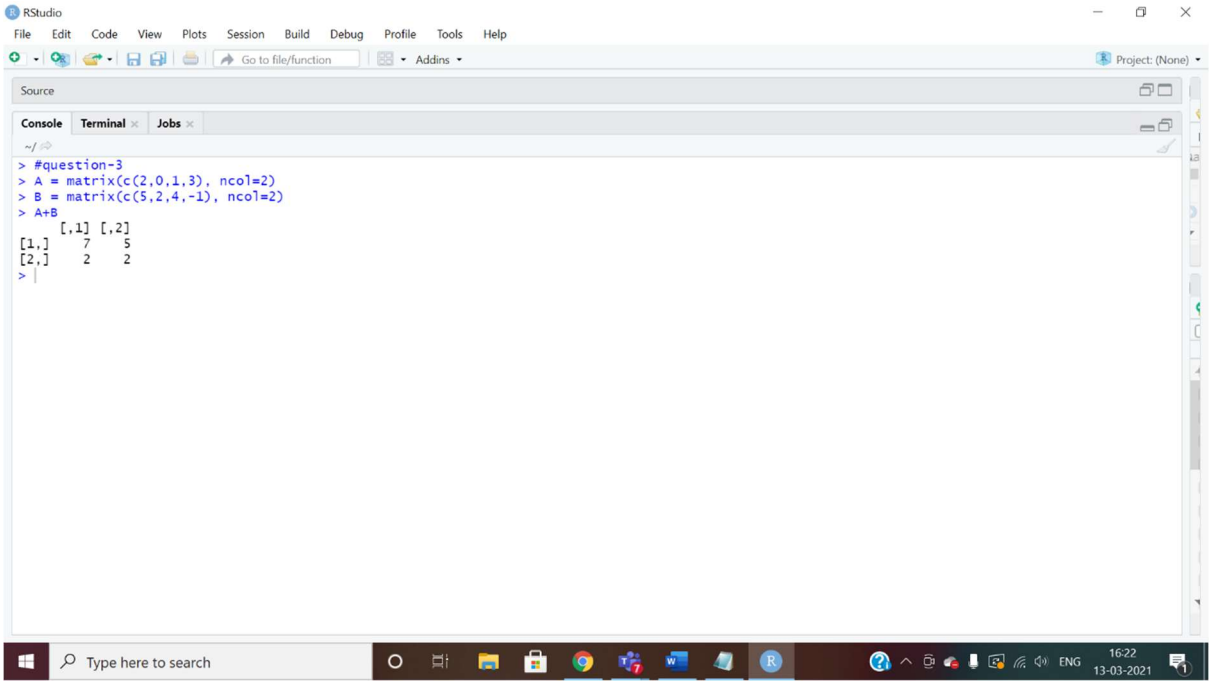
Q3. Consider A=matrix(c(2,0,1,3), ncol=2) and B=matrix(c(5,2,4,-1), ncol=2). a) Find A + B b) Find A – B

Answer:a) A = matrix(c(2,0,1,3), ncol=2)

B = matrix(c(5,2,4,-1), ncol=2)

A+B

OUTPUT

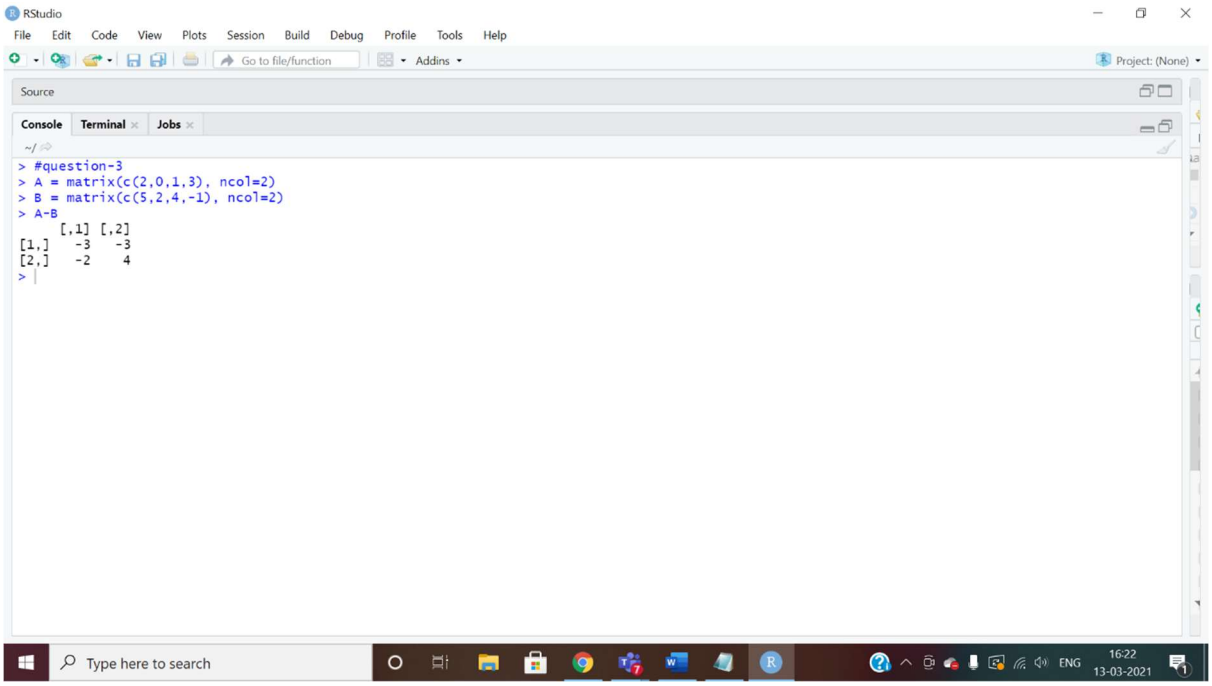


b) A = matrix(c(2,0,1,3), ncol=2)

B = matrix(c(5,2,4,-1), ncol=2)

A-B

OUTPUT



Q4. Write the code to create a Data Frame with name df

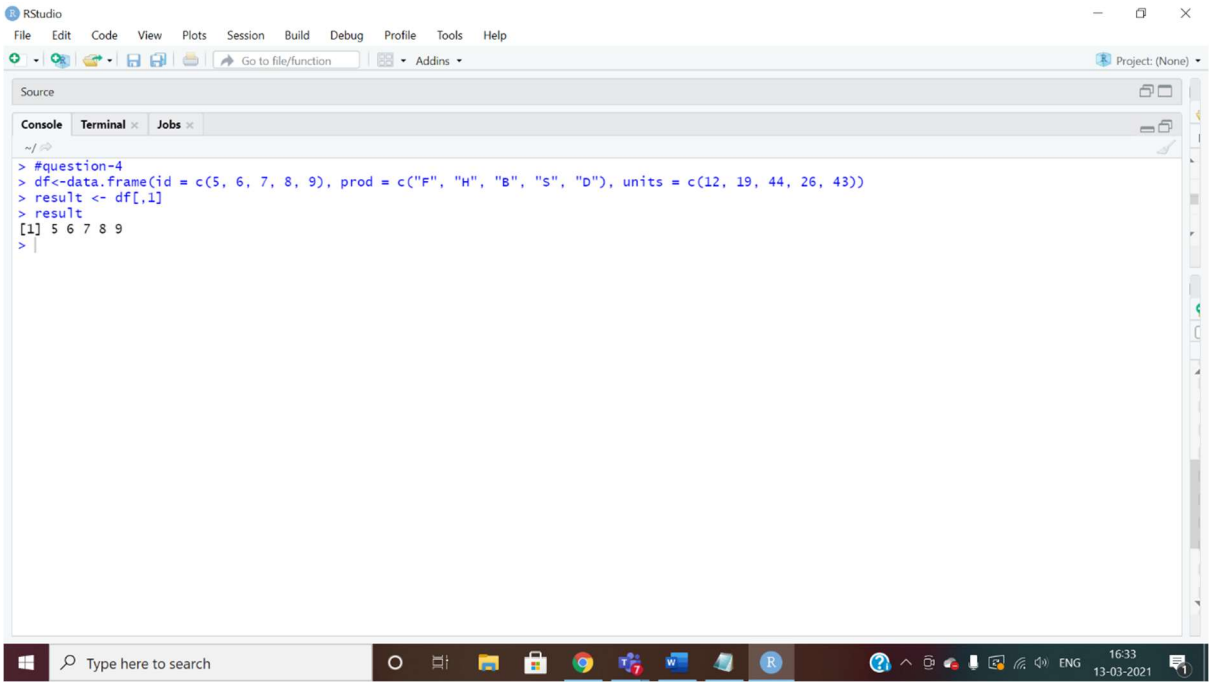
id = c(5, 6, 7, 8, 9), prod = c("F", "H", "B", "S", "D"), units = c(12, 19, 44, 26, 43) How to access the values of attribute id

Answer: df<-data.frame(id = c(5, 6, 7, 8, 9), prod = c("F", "H", "B", "S", "D"), units = c(12, 19, 44, 26, 43))

result <- df[,1]

result

OUTPUT



Q5. Create a dataframe df : a <- c(rep("A", 3), rep("B", 3), rep("C",2)) b <- c(1,1,2,4,1,1,2,2) df <- data.frame(a,b)

• Use duplicated() function to print the logical vector indicating the duplicate values present in dataframe "df"

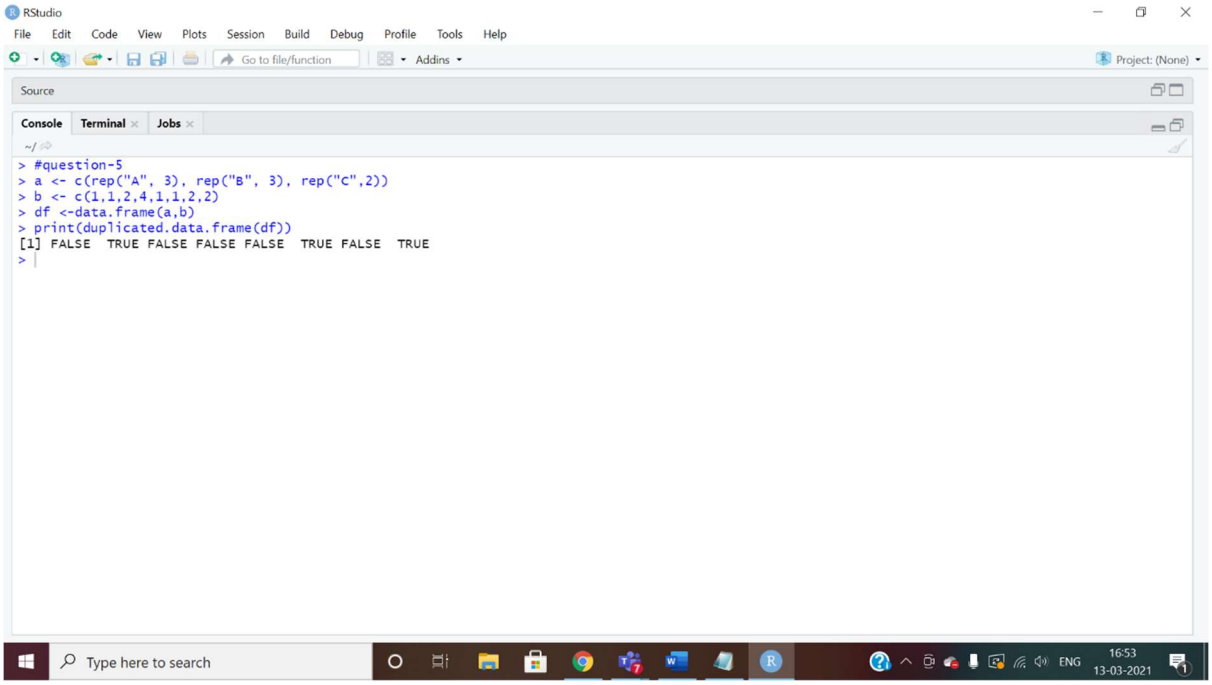
Answer: a <- c(rep("A", 3), rep("B", 3), rep("C",2))

b <- c(1,1,2,4,1,1,2,2)

df <-data.frame(a,b)

print(duplicated.data.frame(df))

OUTPUT



- **Extract duplicate elements from dataframe "df"**

Answer: a <- c(rep("A", 3), rep("B", 3), rep("C",2))

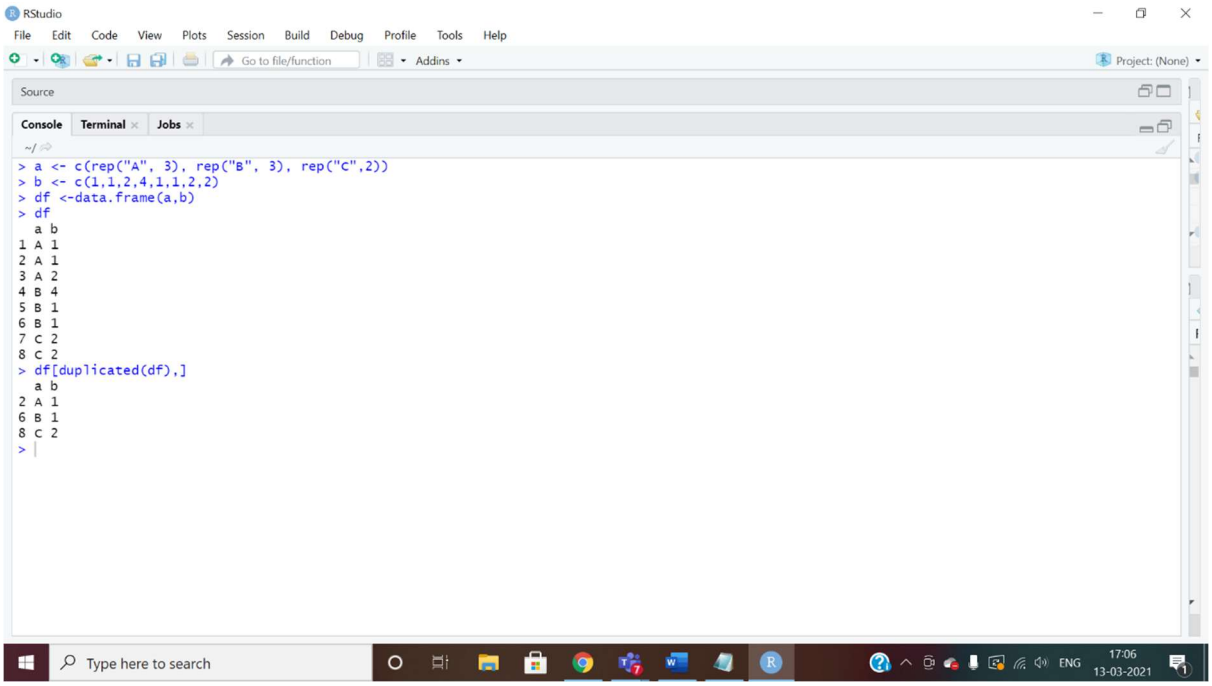
b <- c(1,1,2,4,1,1,2,2)

df <-data.frame(a,b)

df

df[duplicated(df),]

<u>OUTPUT</u>



• **Extract unique elements from dataframe “df”**

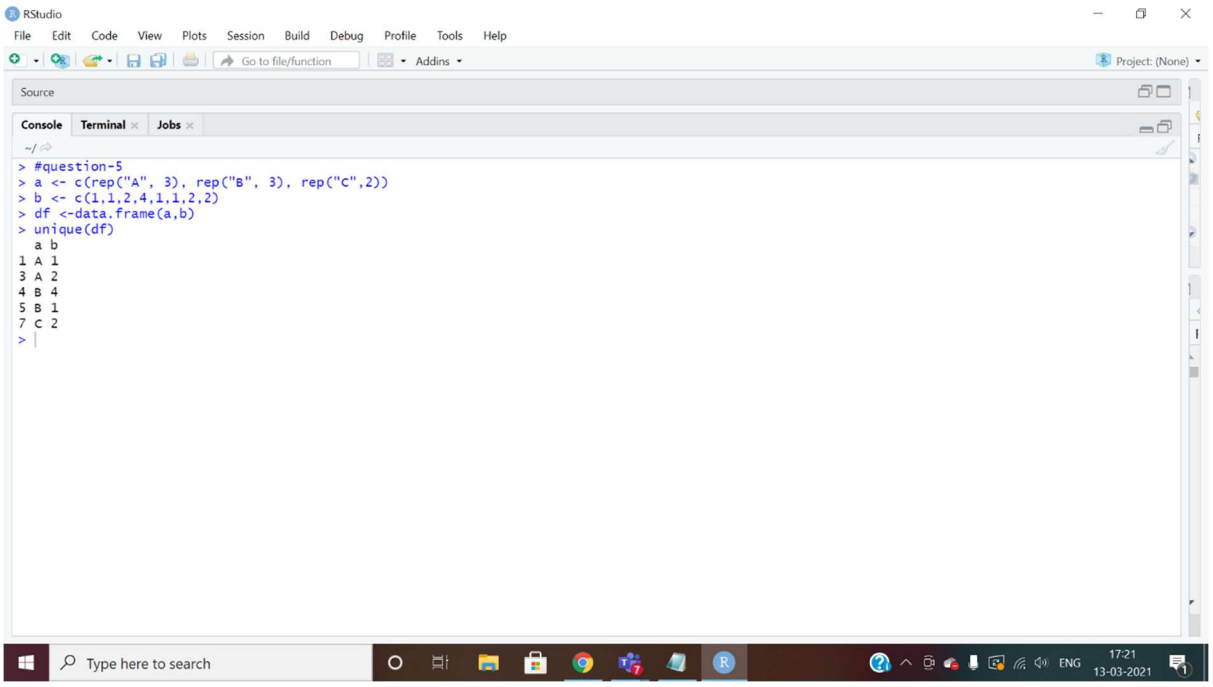
Answer: a <- c(rep("A", 3), rep("B", 3), rep("C",2))

b <- c(1,1,2,4,1,1,2,2)

df <-data.frame(a,b)

unique(df)

OUTPUT



• **Print the indices of duplicate elements**

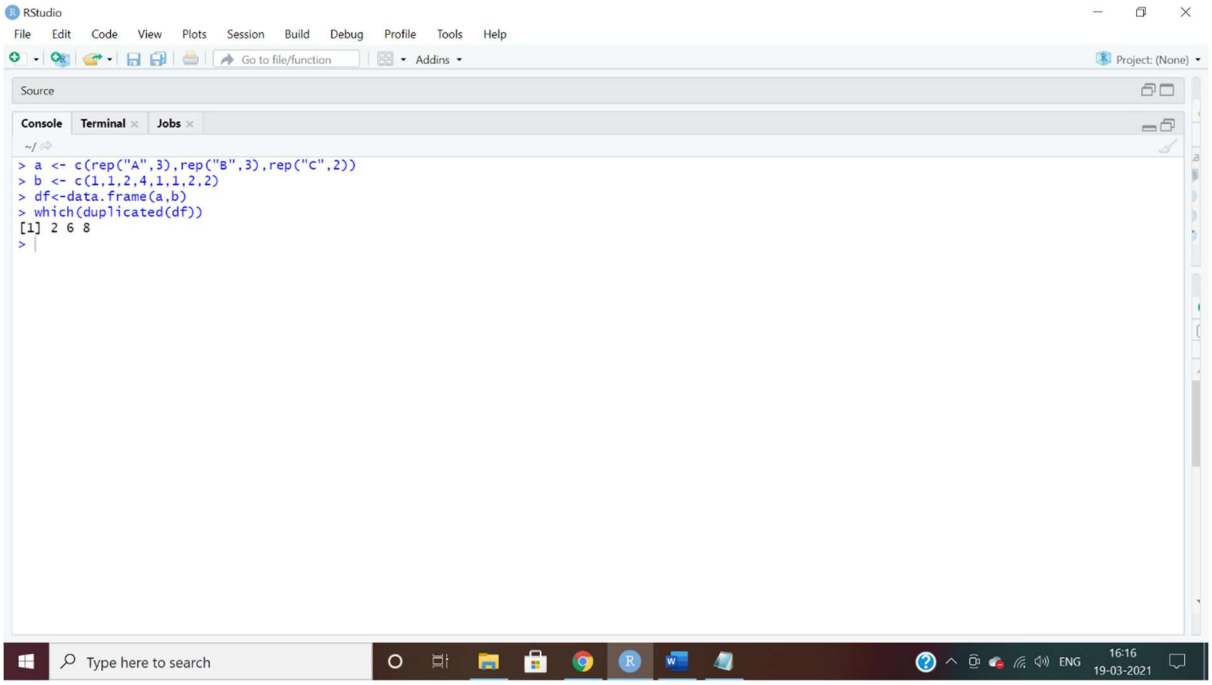
Answer: a <- c(rep("A",3),rep("B",3),rep("C",2))

b <- c(1,1,2,4,1,1,2,2)

df<-data.frame(a,b)

which(duplicated(df))

OUTPUT



- **Print the indices of unique elements**

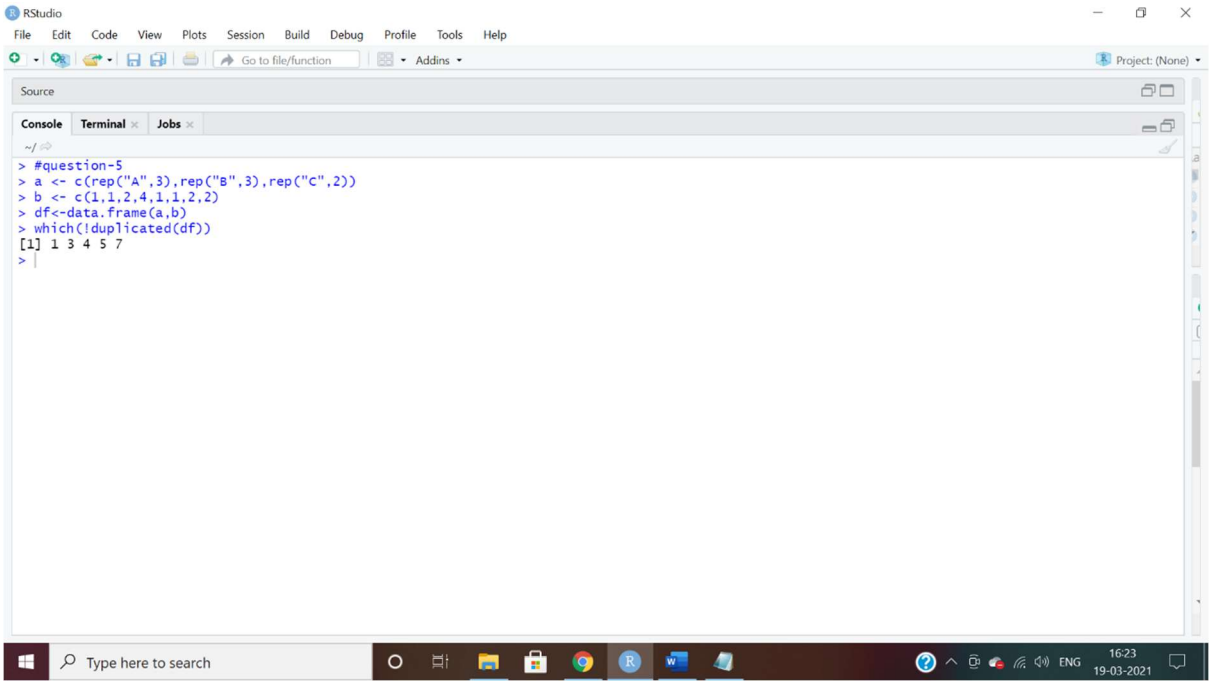
Answer: a <- c(rep("A",3),rep("B",3),rep("C",2))

b <- c(1,1,2,4,1,1,2,2)

df<-data.frame(a,b)

which(!duplicated(df))

<u>OUTPUT</u>



• **How many unique elements are in dataframe "df"**

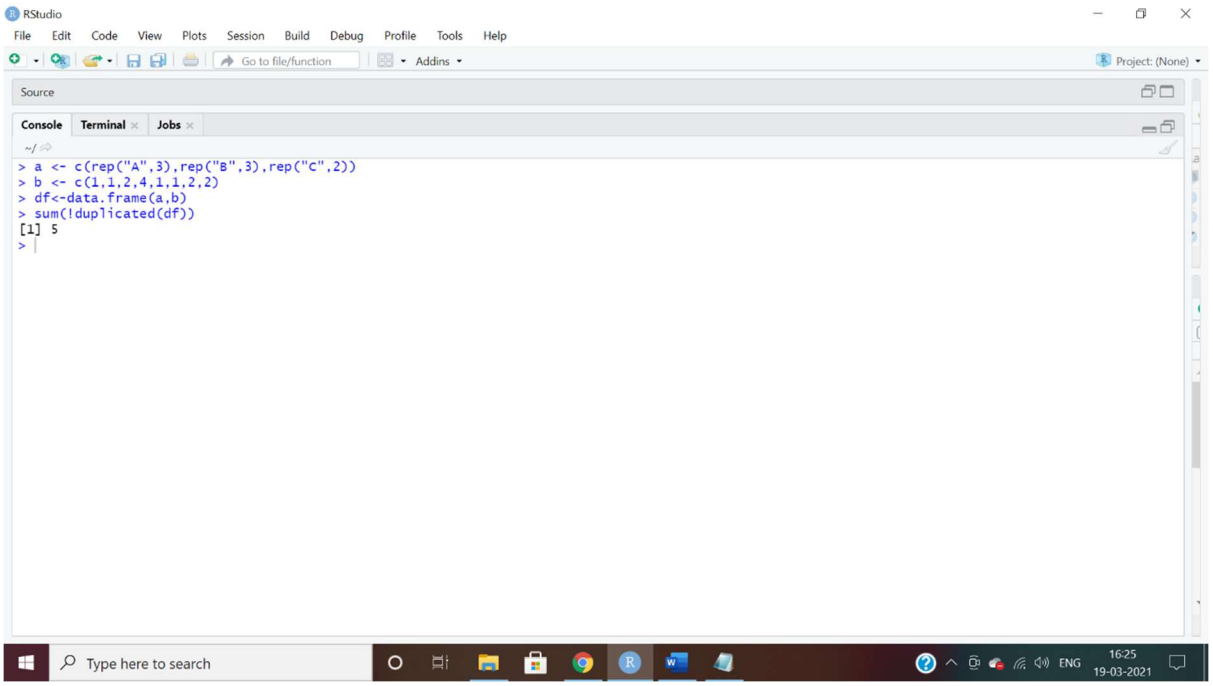
Answer: a <- c(rep("A",3),rep("B",3),rep("C",2))

b <- c(1,1,2,4,1,1,2,2)

df<-data.frame(a,b)

sum(!duplicated(df))

OUTPUT



• **How many duplicate elements are in dataframe "df"**

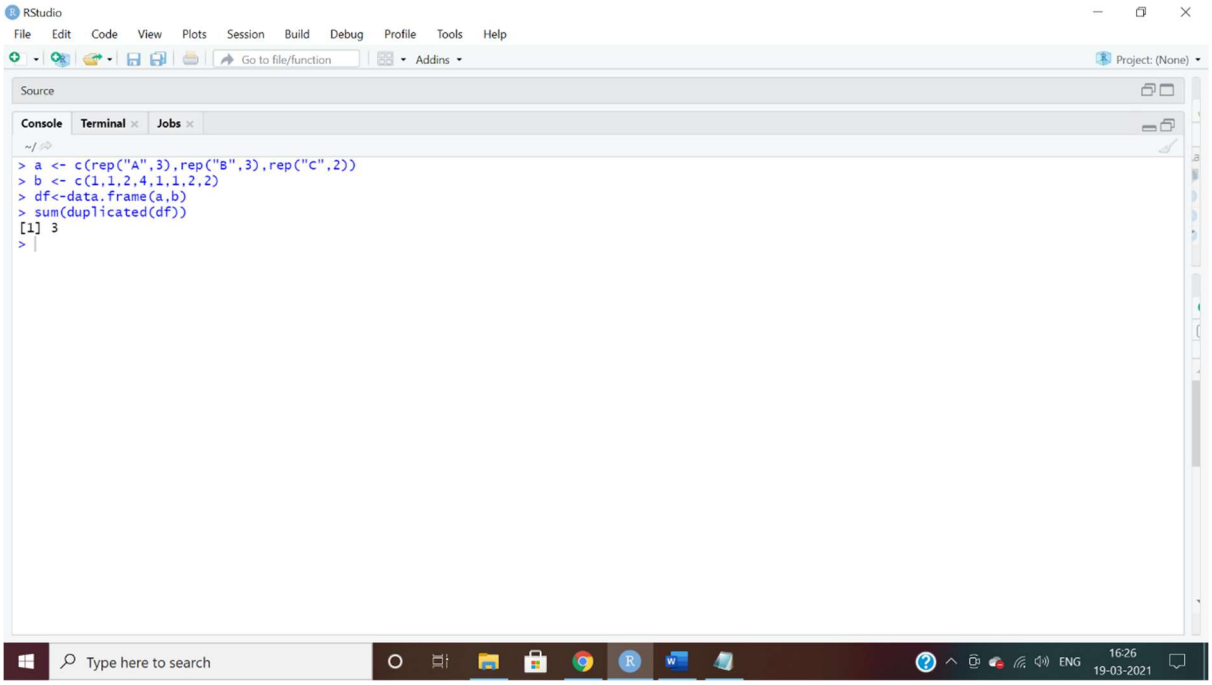
Answer: a <- c(rep("A",3),rep("B",3),rep("C",2))

b <- c(1,1,2,4,1,1,2,2)

df<-data.frame(a,b)

sum(duplicated(df))

OUTPUT

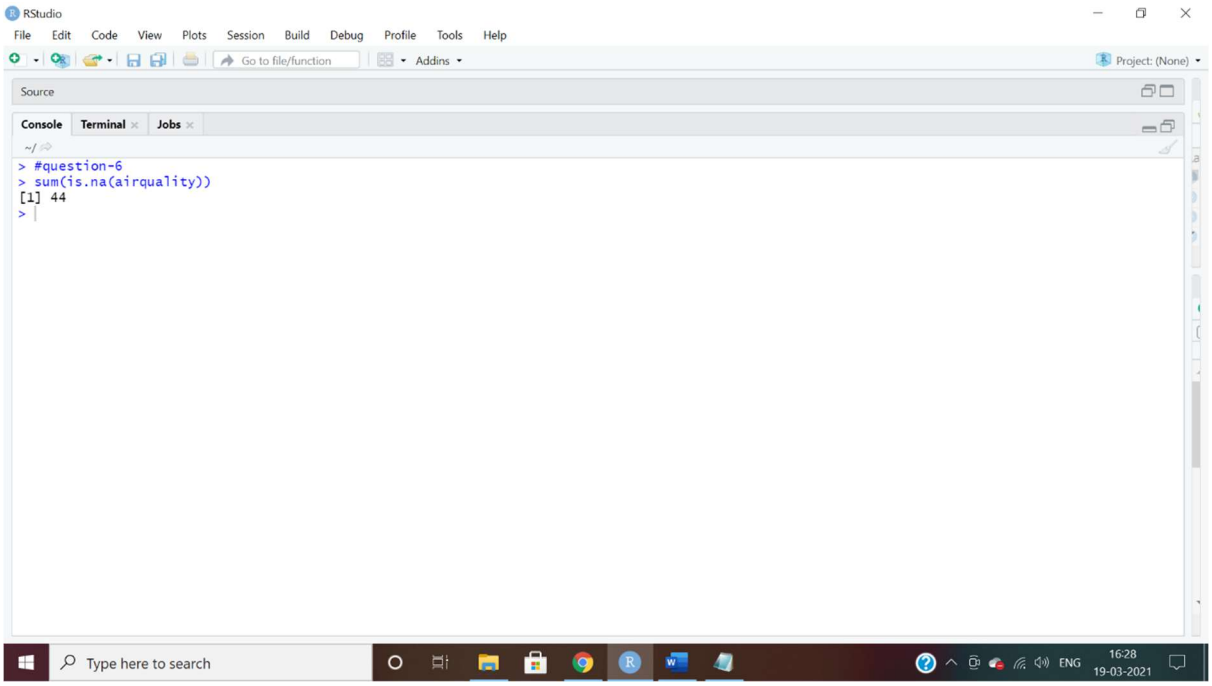


6. Print the dataset airquality

• How many missing values are in the dataset airquality?

Answer: sum(is.na(airquality))

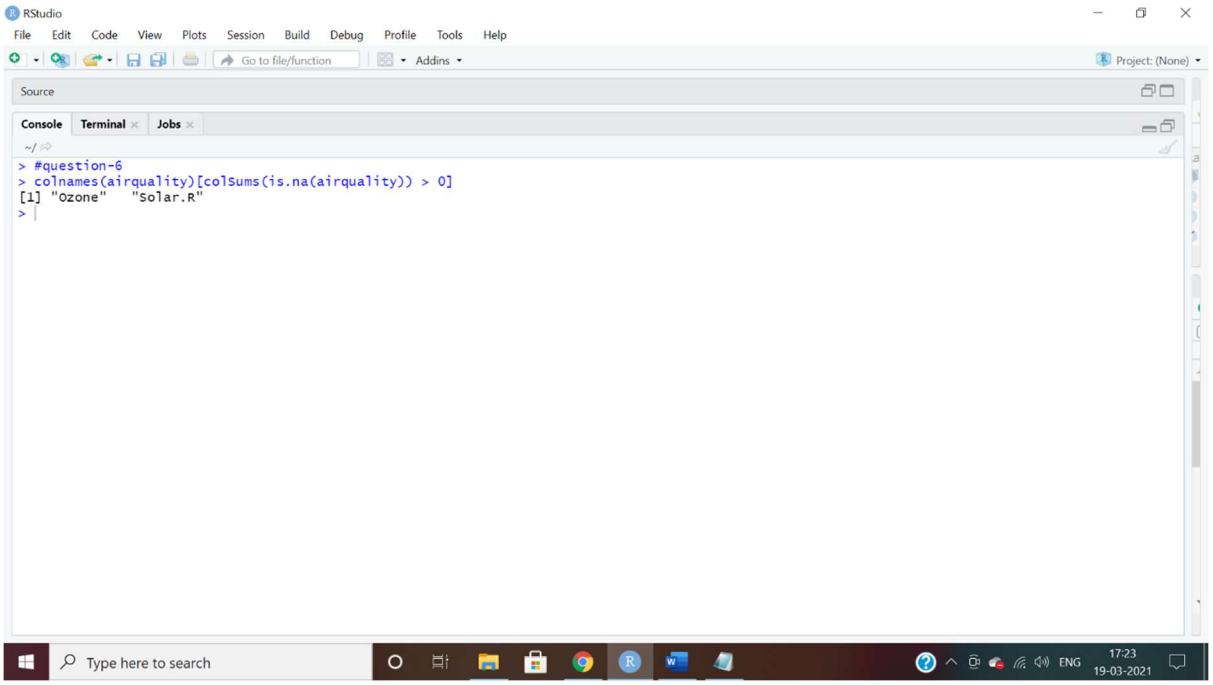
OUTPUT



• Which variables are the missing values concentrated in?

Answer: colnames(airquality)[colSums(is.na(airquality)) > 0]

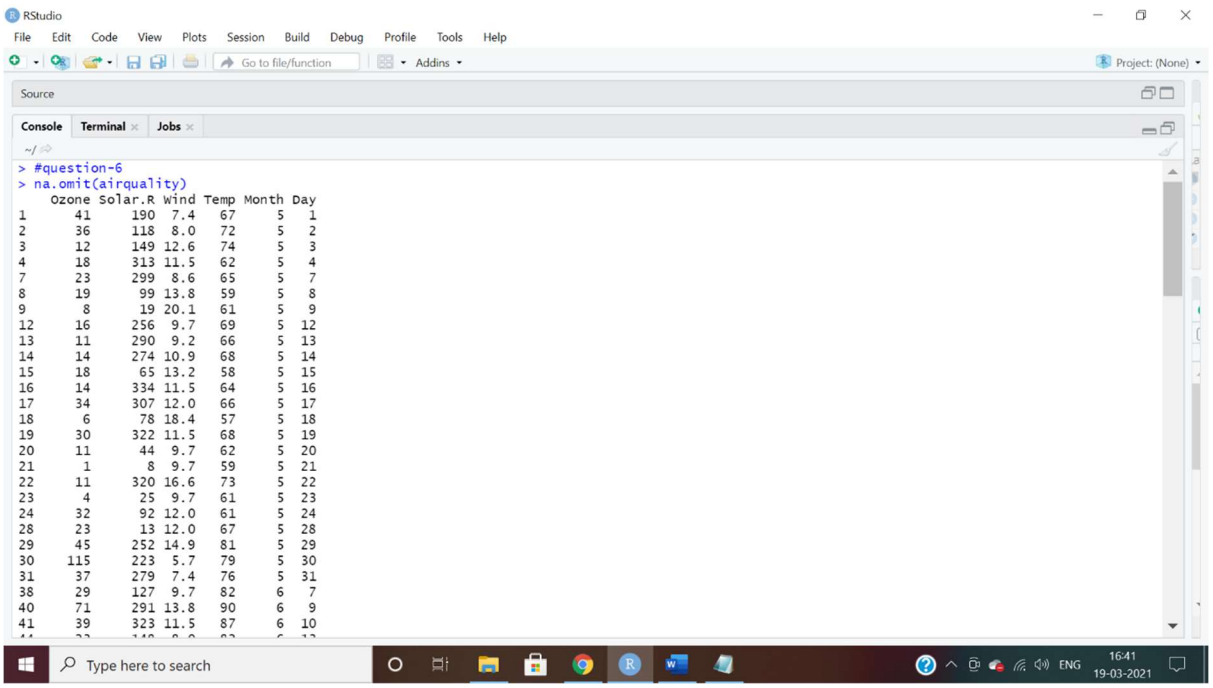
OUTPUT



• How would you omit all rows containing missing values?

Answer: na.omit(airquality)

OUTPUT

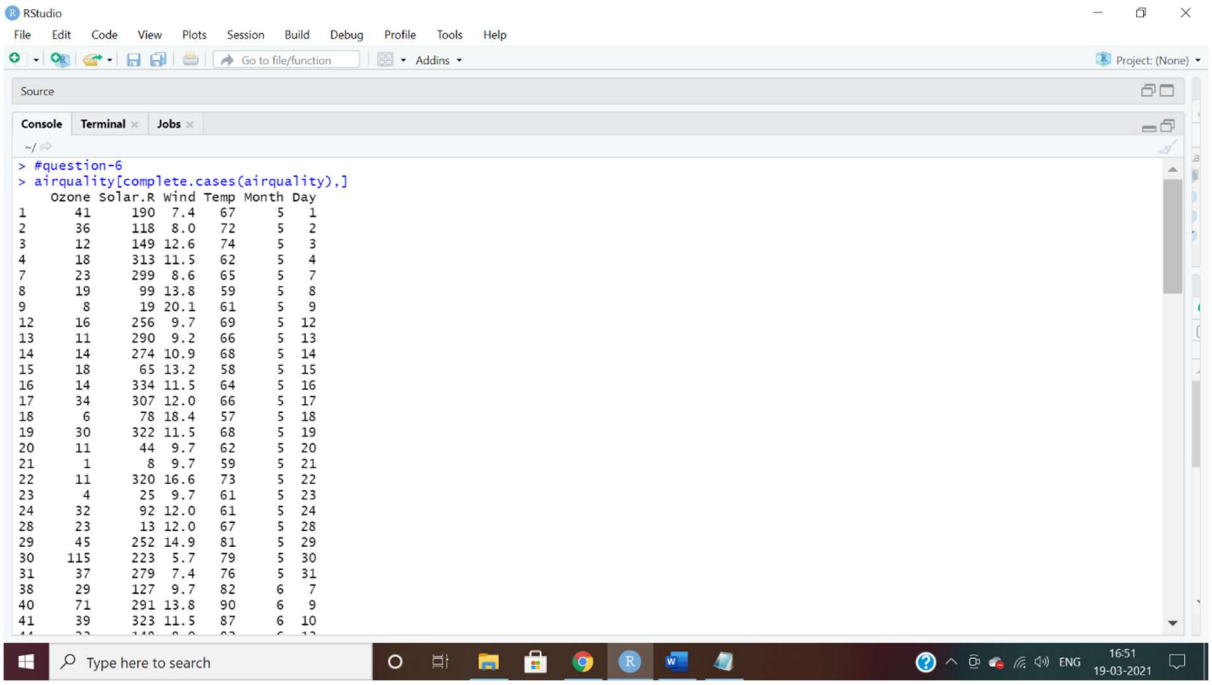


	Ozone	Solar.R	Wind	Temp	Month	Day
1	41	190	7.4	67	5	1
2	36	118	8.0	72	5	2
3	12	149	12.6	74	5	3
4	18	313	11.5	62	5	4
7	23	299	8.6	65	5	7
8	19	99	13.8	59	5	8
9	8	19	20.1	61	5	9
12	16	256	9.7	69	5	12
13	11	290	9.2	66	5	13
14	14	274	10.9	68	5	14
15	18	65	13.2	58	5	15
16	14	334	11.5	64	5	16
17	34	307	12.0	66	5	17
18	6	78	18.4	57	5	18
19	30	322	11.5	68	5	19
20	11	44	9.7	62	5	20
21	1	8	9.7	59	5	21
22	11	320	16.6	73	5	22
23	4	25	9.7	61	5	23
24	32	92	12.0	61	5	24
28	23	13	12.0	67	5	28
29	45	252	14.9	81	5	29
30	115	223	5.7	79	5	30
31	37	279	7.4	76	5	31
38	29	127	9.7	82	6	7
40	71	291	13.8	90	6	9
41	39	323	11.5	87	6	10

• Print the records without missing values in the dataset airquality using the function complete.cases()

Answer: airquality[complete.cases(airquality),]

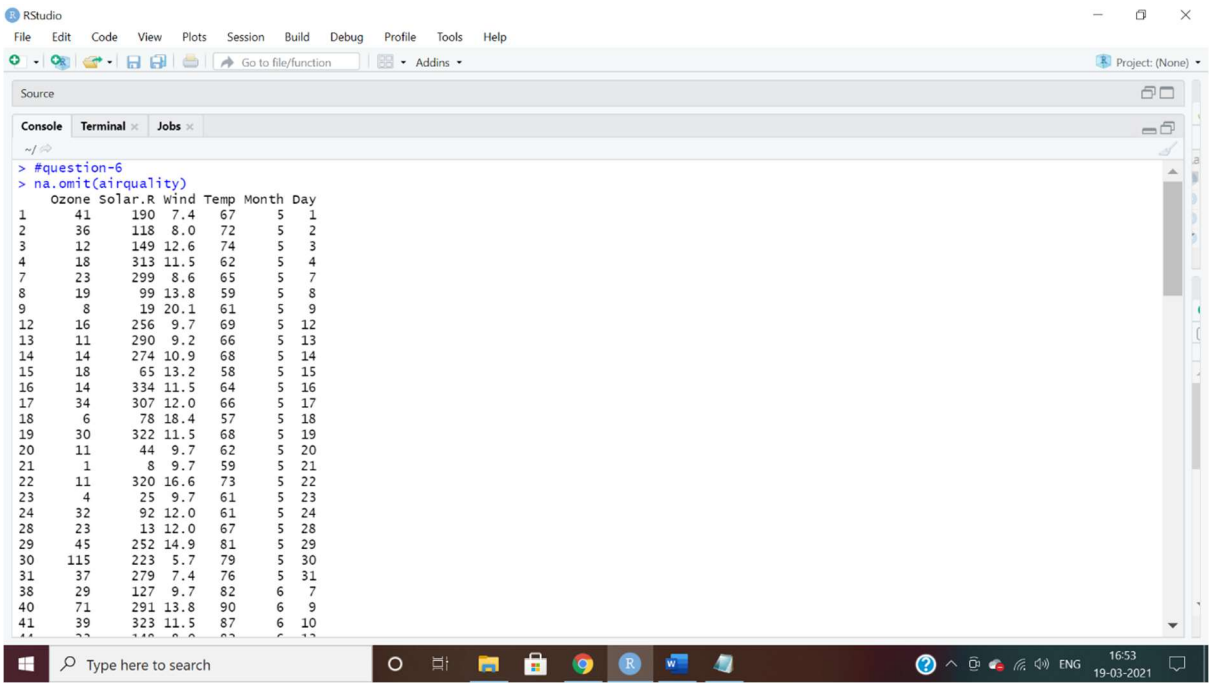
OUTPUT



- **Print the records without missing values in the dataset airquality using the function na.omit()**

Answer: na.omit(airquality)

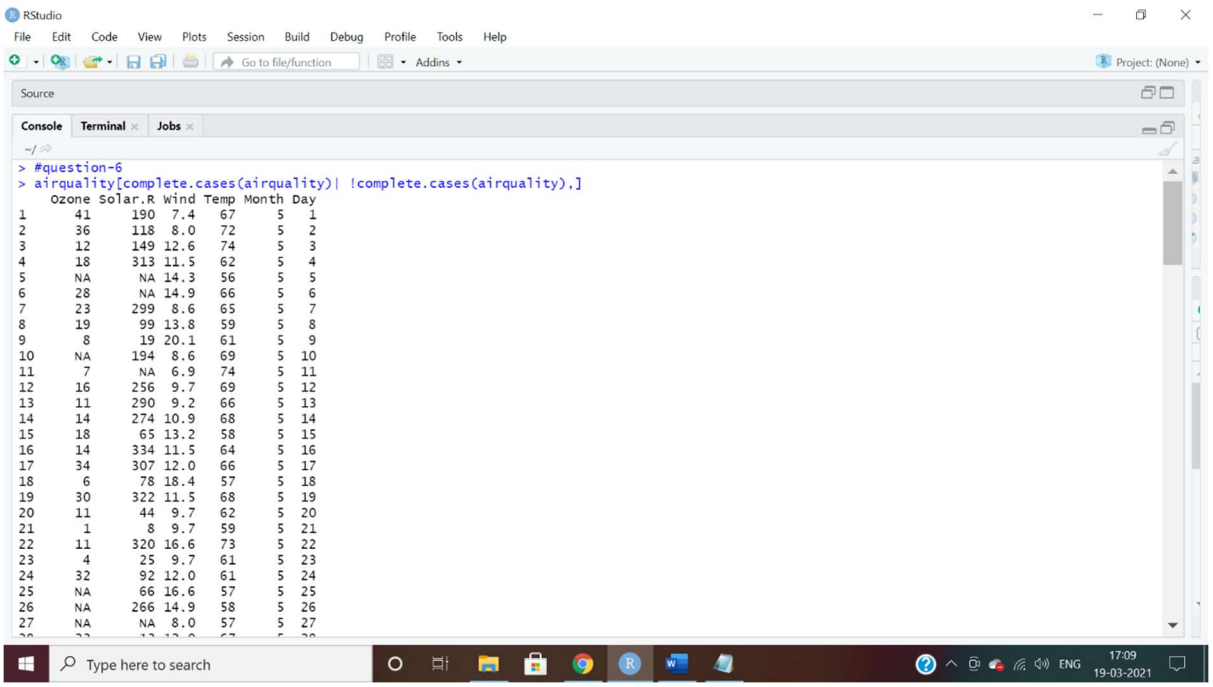
OUTPUT



• Print the records containing missing values in the dataset airquality using the function complete.cases()

Answer: airquality[complete.cases(airquality)| !complete.cases(airquality),]

OUTPUT



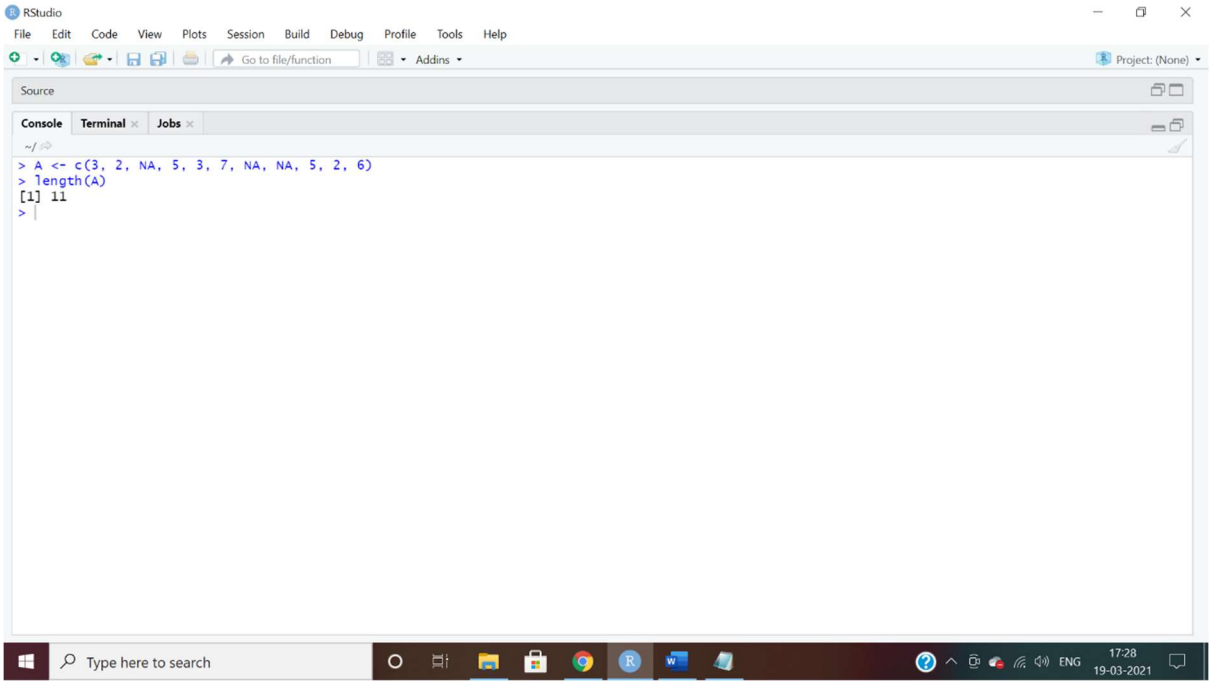
7. Consider the given vectors: A <- c(3, 2, NA, 5, 3, 7, NA, NA, 5, 2, 6) B <- c(3, 2, NA, 5, 3, 7, NA, "NA", 5, 2, 6)

• Find the length of the vector A

Answer: A <- c(3, 2, NA, 5, 3, 7, NA, NA, 5, 2, 6)

length(A)

OUTPUT

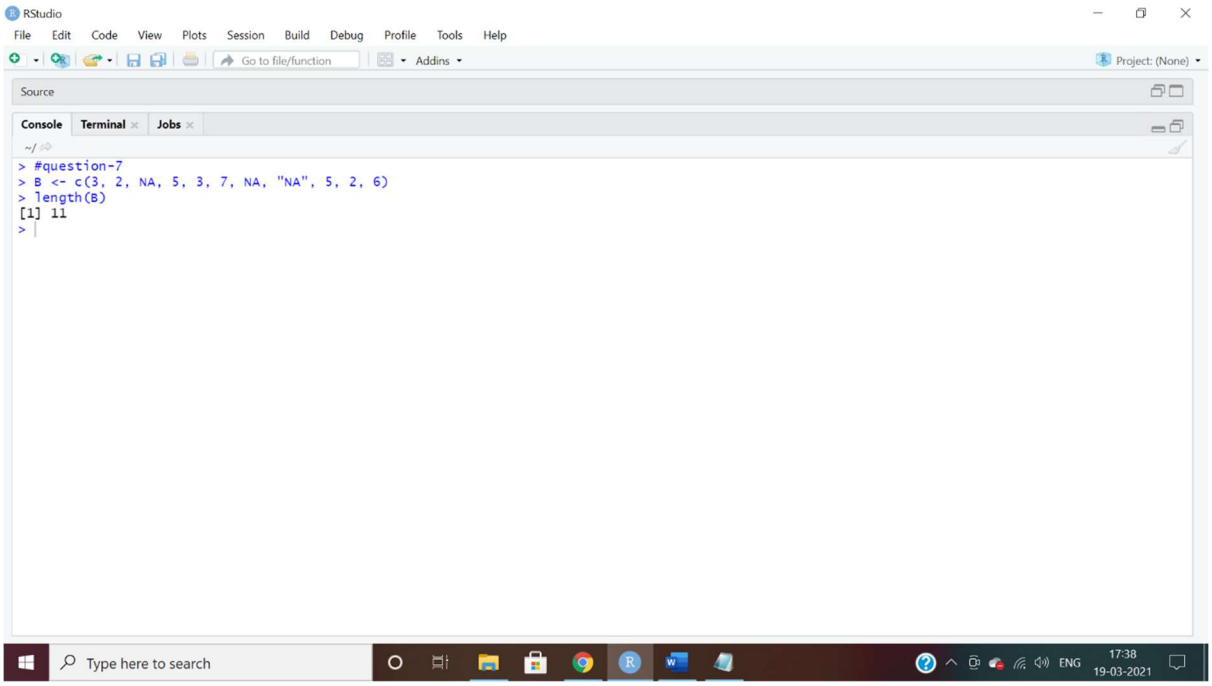


- **Find the length of the vector B**

Answer: B <- c(3, 2, NA, 5, 3, 7, NA, "NA", 5, 2, 6)

length(B)

OUTPUT

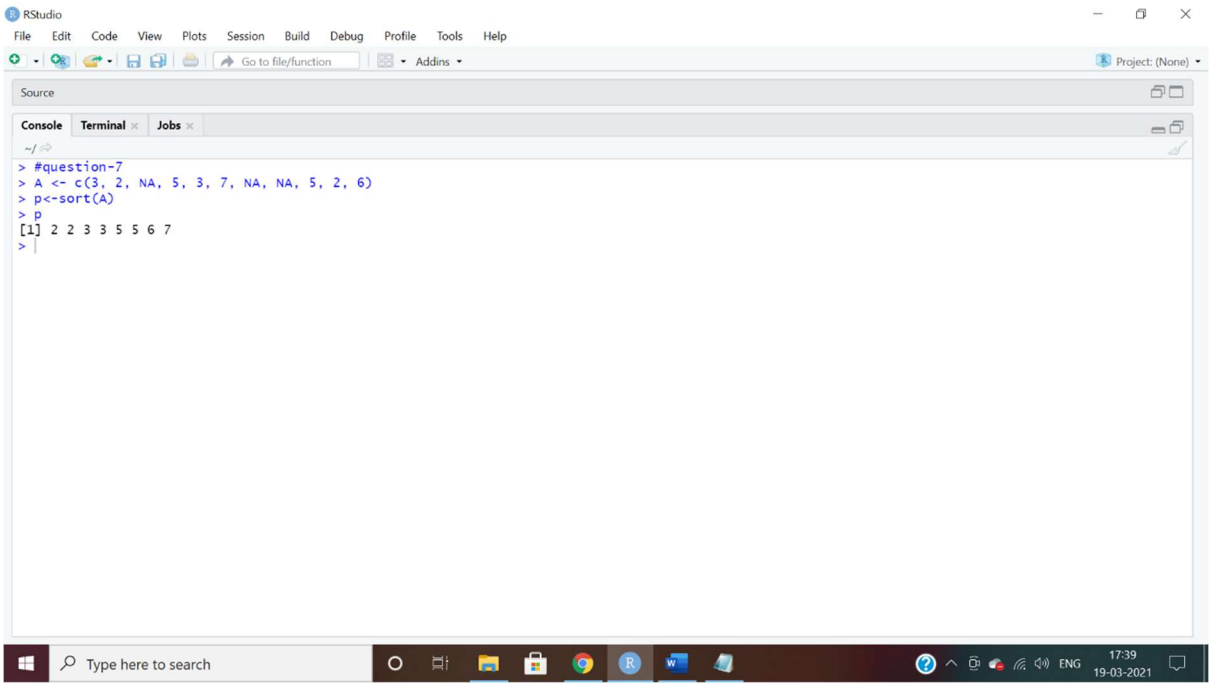


• **Sort the values in vector A and put it in p**

A <- c(3, 2, NA, 5, 3, 7, NA, NA, 5, 2, 6)

p<-sort(A)

OUTPUT



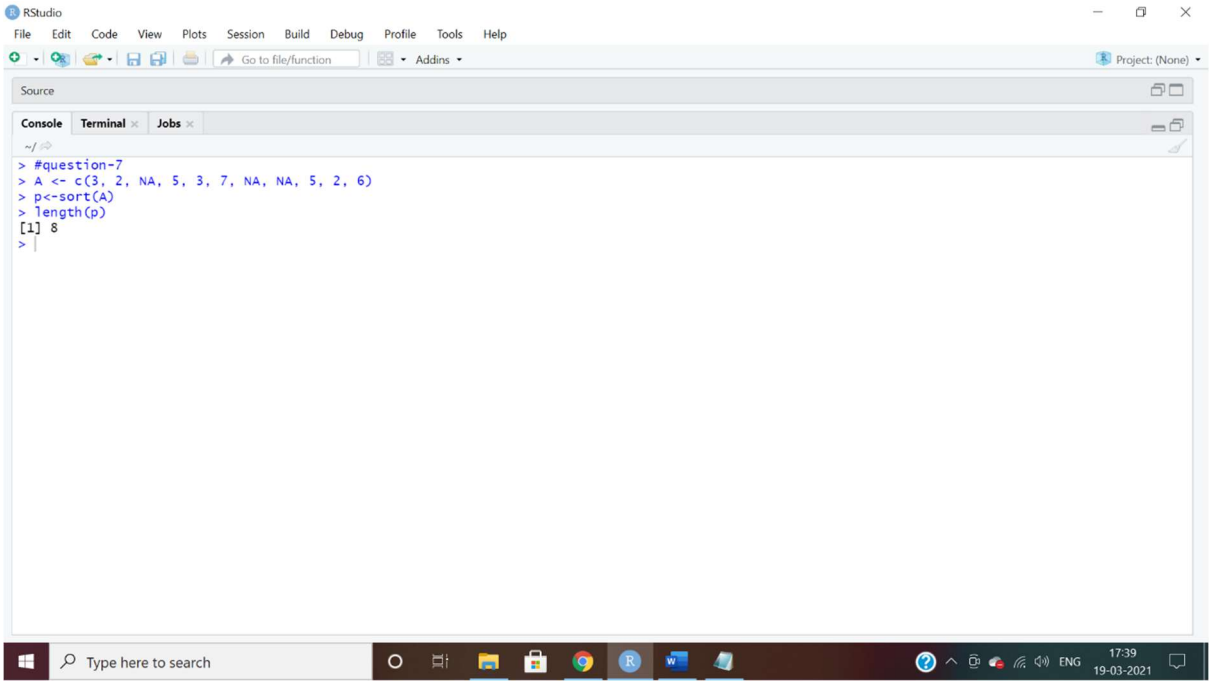
• **Find the length of p**

Answer: A <- c(3, 2, NA, 5, 3, 7, NA, NA, 5, 2, 6)

p<-sort(A)

length(p)

OUTPUT

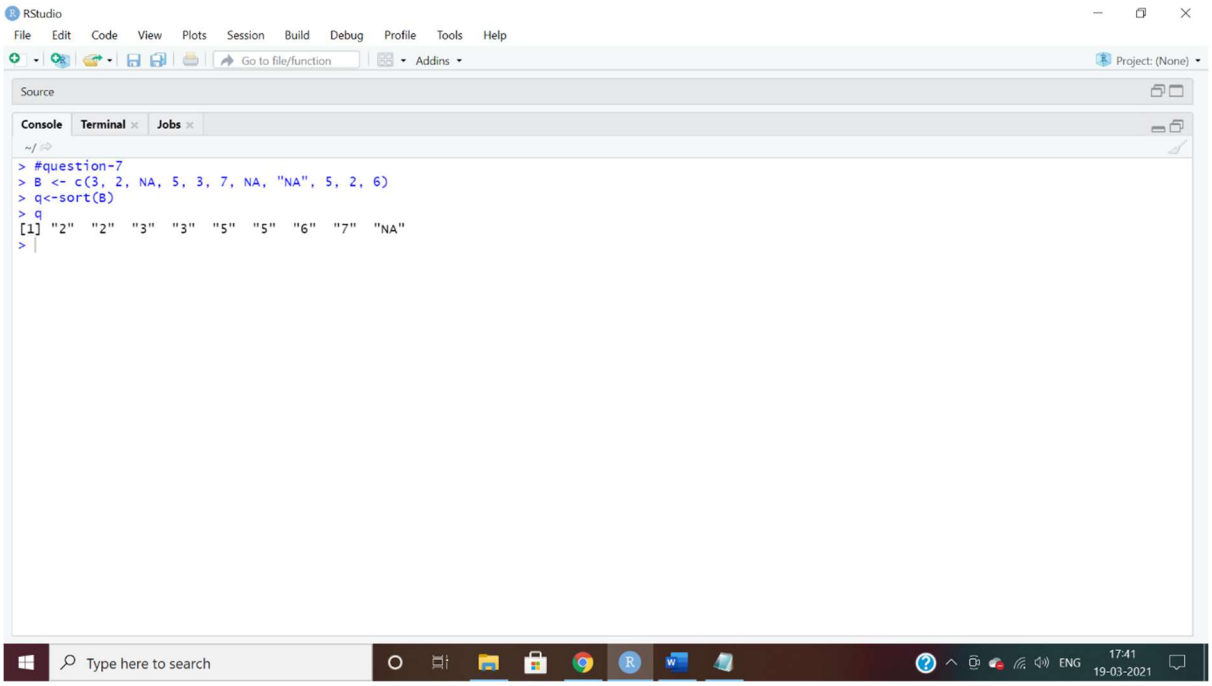


• Sort the values in vector B and put it in q

Answer: B <- c(3, 2, NA, 5, 3, 7, NA, "NA", 5, 2, 6)

q<-sort(B)

OUTPUT



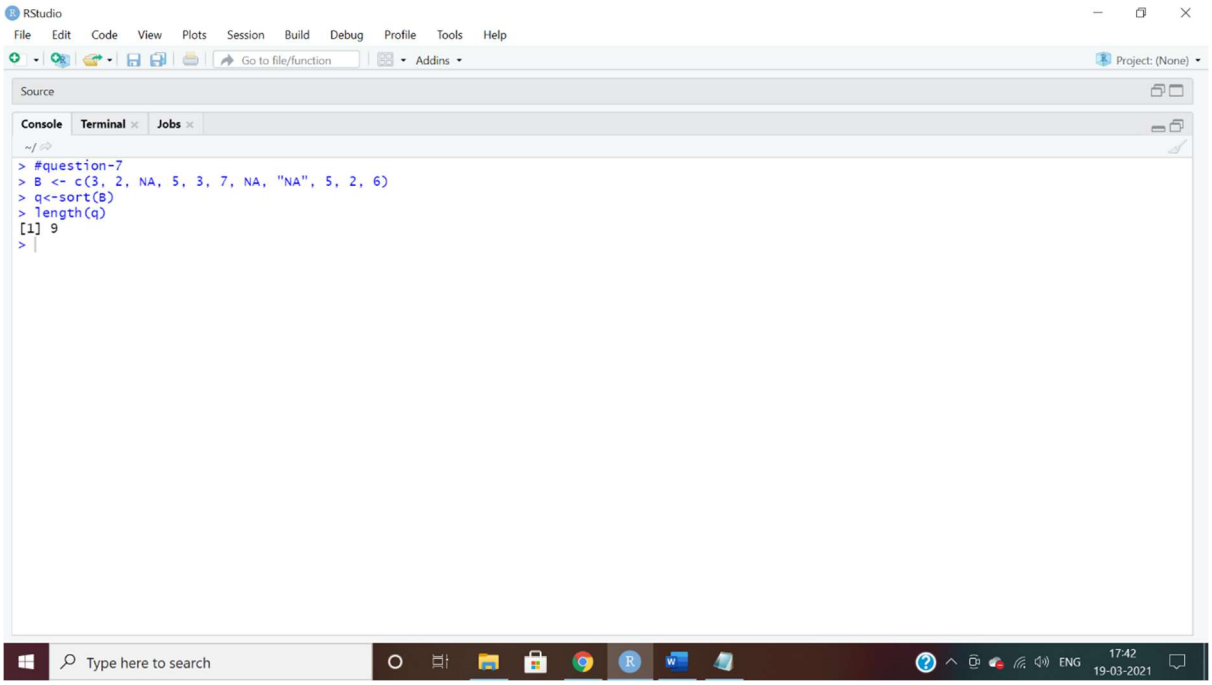
• **Find the length of q**

Answer: B <- c(3, 2, NA, 5, 3, 7, NA, "NA", 5, 2, 6)

q<-sort(B)

length(q)

OUTPUT



• **What did you infer from the above results**

Answer: #Inferring

#Sort function removes NA, but since in B, One NA is taken as character, it's treated as character and hence the length is 1 more than A.