ITA0448 Statistics with R Programming for Vectorized Expressions

DAY 3

ASSESSMENT 1

1. How to use the cbind() and rbind() in data frame for the fields city and zipcodedatas using vector and data frame.

Create a vectors:

cbind() function:
Output:

	city	zipcode
[1]	delhi	123456
[2]	bangalore	789654
[3]	chennai	698748
[4]	mumbai	456986

Source Code:

```
city<-c("delhi","bangalore","chennai","mumbai")
zipcode<-c(123456,789654,698748,456986)
cbind(city,zipcode)
```

Output:

```
city       zipcode
[1,] "delhi"    "123456"
[2,] "bangalore" "789654"
[3,] "chennai"  "698748"
[4,] "mumbai"   "456986"
```

rbind() function:
Output:

	city	zipcode
[1]	delhi	123456
[2]	bangalore	789654
[3]	chennai	698748
[4]	mumbai	456986
[5]	punjab	456978
[6]	kerala	569875

Source Code:

```
city<-c("delhi","bangalore","chennai","mumbai")
zipcode<-c(123456,789654,698748,456986)
```

```
cbind(city,zipcode)
r1<-c("delhi",123456)
r2<-c("bangalore",789654)
r3<-c("chennai",698748)
r4<-c("mumbai",456986)
r5<-c("punjab",456978)
r6<-c("kerala",569875)
rbind(r1,r2,r3,r4,r5,r6)
```

Output:

```
[,1]      [,2]
r1 "delhi"     "123456"
r2 "bangalore" "789654"
r3 "chennai"   "698748"
r4 "mumbai"    "456986"
r5 "punjab"    "456978"
r6 "kerala"    "569875"
```

2. **Create First Dataset with variables**
   - **surname**
   - **nationality**

Create Second Dataset with variables

- **surname**
- **movies**

The common key variable is surname. How to merge both data and check if the dimensionality is 7x3.

Output:

	surname	nationality	movies
1	Hitchcock	UK	Psycho
2	Hitchcock	UK	North by Northwest
3	Polanski	Poland	Chinatown
4	Scorsese	US	Taxi Driver
5	Spielberg	US	Super 8
6	Spielberg	US	Catch Me If You Can
7	Tarantino	US	Reservoir Dogs

Source Code:

3. **Write a R program to create an empty data frame.**

Output:

```
[1] "Structure of the empty dataframe:"
'data.frame':  0 obs. of  5 variables:
 $ Ints  : int
 $ Doubles   : num
 $ Characters: chr
 $ Logicals  :logi
 $ Factors   : Factor w/ 0 levels:
NULL
```

Source Code:

```
df = data.frame(Ints=integer(),
                Doubles=double(),
                Characters=character(),
```

```
            Logicals=logical(),
            Factors=factor(),
            stringsAsFactors=FALSE)
print("Structure of the empty dataframe:")
print(str(df))
```

Output:

```
'data.frame':      0 obs. of  5 variables:
 $ Ints      : int
 $ Doubles   : num
 $ Characters: chr
 $ Logicals  : logi
 $ Factors   : Factor w/ 0 levels:
NULL
```

4. **Write a R program to create a data frame from four given vectors**

```
name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew',
'Laura', 'Kevin', 'Jonas')
score = c(12.5, 9, 16.5, 12, 9, 20, 14.5, 13.5, 8, 19)
attempts = c(1, 3, 2, 3, 2, 3, 1, 1, 2, 1)
qualify = c('yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes')
```

Output:

```
[1] "Original data frame:"
 [1] "Anastasia" "Dima"     "Katherine" "James"    "Emily"    "Michael"
 [7] "Matthew"   "Laura"    "Kevin"     "Jonas"
 [1] 12.5  9.0 16.5 12.0  9.0 20.0 14.5 13.5  8.0 19.0
 [1] 1 3 2 3 2 3 1 1 2 1
 [1] "yes" "no"  "yes" "no"  "no"  "yes" "yes" "no"  "no"  "yes"
```

	name	score	attempts	qualify
1	Anastasia	12.5	1	yes
2	Dima	9.0	3	no
3	Katherine	16.5	2	yes
4	James	12.0	3	no
5	Emily	9.0	2	no
6	Michael	20.0	3	yes
7	Matthew	14.5	1	yes
8	Laura	13.5	1	no
9	Kevin	8.0	2	no
10	Jonas	19.0	1	yes

Source Code:

```
name<-
c("Anastasia","Dima","Katherine","James","Emily","Michael","Matthew","Laura","Kevin","
Jonas")
score<-c(12.5,9,16.5,12,9,20,14.5,13.5,8,19)
Attempts<-c(1,3,2,3,2,3,1,1,2,1)
Qualify<-c("yes","no","yes","no","no","yes","yes","no","no","yes")
df<-data.frame(name,score,Attempts,Qualify)
df
```

Output:

```
 name score Attempts Qualify
1  Anastasia  12.5       1    yes
2      Dima   9.0       3     no
3  Katherine  16.5       2    yes
4     James  12.0       3     no
5     Emily   9.0       2     no
6   Michael  20.0       3    yes
7   Matthew  14.5       1    yes
8     Laura  13.5       1     no
9     Kevin   8.0       2     no
10    Jonas  19.0       1    yes
```

5. **Write a R program to extract specific column from a data frame using column name.**

Output:

```
[1] "Original dataframe:"
       name score attempts qualify
1  Anastasia  12.5       1    yes
2      Dima   9.0       3     no
3  Katherine  16.5       2    yes
4     James  12.0       3     no
5     Emily   9.0       2     no
6   Michael  20.0       3    yes
7   Matthew  14.5       1    yes
8     Laura  13.5       1     no
9     Kevin   8.0       2     no
10    Jonas  19.0       1    yes
[1] "Extract Specific columns:"
   exam_data.name exam_data.score
1       Anastasia            12.5
2           Dima            9.0
3       Katherine            16.5
4           James            12.0
5           Emily            9.0
6         Michael            20.0
7         Matthew            14.5
8           Laura            13.5
9           Kevin            8.0
10          Jonas            19.0
```

Source Code:

```
name<-
c("Anastasia","Dima","Katherine","James","Emily","Michael","Matthew","Laura","
Kevin","Jonas")
score<-c(12.5,9,16.5,12,9,20,14.5,13.5,8,19)
Attempts<-c(1,3,2,3,2,3,1,1,2,1)
Qualify<-c("yes","no","yes","no","no","yes","yes","no","no","yes")
df<-data.frame(name,score,Attempts,Qualify)
result<-(data.frame(df$name,df$score))
result
```

Output:

```
df.name df.score
1  Anastasia    12.5
2      Dima     9.0
3  Katherine    16.5
4     James     12.0
5     Emily     9.0
6   Michael     20.0
7   Matthew     14.5
8     Laura     13.5
9     Kevin     8.0
10    Jonas     19.0
```

6.Write a R program to extract first two rows from a given data frame.

Output:

```
[1] "Original dataframe:"
       name score attempts qualify
1  Anastasia  12.5        1     yes
2      Dima   9.0        3      no
3  Katherine  16.5        2     yes
4     James  12.0        3      no
5     Emily   9.0        2      no
6   Michael  20.0        3     yes
7   Matthew  14.5        1     yes
8     Laura  13.5        1      no
9     Kevin   8.0        2      no
10    Jonas  19.0        1     yes
[1] "Extract first two rows:"
       name score attempts qualify
1 Anastasia  12.5        1     yes
2     Dima   9.0        3      no
```

Source Code:

```
name<-
c("Anastasia","Dima","Katherine","James","Emily","Michael","Matthew","Laura","
Kevin","Jonas")
score<-c(12.5,9,16.5,12,9,20,14.5,13.5,8,19)
Attempts<-c(1,3,2,3,2,3,1,1,2,1)
Qualify<-c("yes","no","yes","no","no","yes","yes","no","no","yes")
df<-data.frame(name,score,Attempts,Qualify)
result =df[c(1,2),c(1,2,3,4)]
print(result)
```

Output:

```
name score Attempts Qualify
1 Anastasia  12.5        1     yes
2     Dima   9.0        3      no
```

6. **Write a R program to extract 3rd and 5th rows with 1st and 3rd columns from a given data frame.**

Output:

```
[1] "Original dataframe:"
      name score attempts qualify
1  Anastasia  12.5        1     yes
2       Dima   9.0        3      no
3  Katherine  16.5        2     yes
4      James  12.0        3      no
5      Emily   9.0        2      no
6    Michael  20.0        3     yes
7    Matthew  14.5        1     yes
8      Laura  13.5        1      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
[1] "Extract 3rd and 5th rows with 1st and 3rd columns :"
      name attempts
3 Katherine        2
5    Emily        2
```

Source Code:

```
name<-
c("Anastasia","Dima","Katherine","James","Emily","Michael","Matthew","Laura","Kevin","
Jonas")
score<-c(12.5,9,16.5,12,9,20,14.5,13.5,8,19)
Attempts<-c(1,3,2,3,2,3,1,1,2,1)
Qualify<-c("yes","no","yes","no","no","yes","yes","no","no","yes")
df<-data.frame(name,score,Attempts,Qualify)
result =df[c(3,5),c(1,3)]
print(result)
```

Output:

```
name Attempts
3 Katherine       2
5    Emily        2
```

7. **Write a R program to add a new column in a given data frame**

Output:

```
[1] "Original dataframe:"
      name score attempts qualify
```

```
1  Anastasia  12.5       1    yes
2       Dima   9.0       3     no
3  Katherine  16.5       2    yes
4      James  12.0       3     no
5      Emily   9.0       2     no
6    Michael  20.0       3    yes
7    Matthew  14.5       1    yes
8      Laura  13.5       1     no
9      Kevin   8.0       2     no
10     Jonas  19.0       1    yes
[1] "New data frame after adding the 'country' column:"
       name score attempts qualify country
1  Anastasia  12.5       1    yes     USA
2       Dima   9.0       3     no     USA
3  Katherine  16.5       2    yes     USA
4      James  12.0       3     no     USA
5      Emily   9.0       2     no     USA
6    Michael  20.0       3    yes     USA
7    Matthew  14.5       1    yes     USA
8      Laura  13.5       1     no     USA
9      Kevin   8.0       2     no     USA
10     Jonas  19.0       1    yes     USA
```

Source Code:

```
name<-
c('Anastasia','Dima','Katherine','James','Emily','Michael','Matthew','Laura','Kevin',
'Jonas')
score <-c(12.5,9,16.5,12,9,20,14.5,13.5,8,19)
attempts<-c(1, 3, 2, 3, 2, 3, 1, 1, 2, 1)
qualify <-c('yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes')
exam<-data.frame(name,score,attempts,qualify)
print("New data frame after adding the 'country' column:")
exam$country =
c("USA","USA","USA","USA","USA","USA","USA","USA","USA","USA")
exam
```

Output:

```
name score attempts qualify country
1  Anastasia  12.5       1    yes     USA
2       Dima   9.0       3     no     USA
3  Katherine  16.5       2    yes     USA
4      James  12.0       3     no     USA
5      Emily   9.0       2     no     USA
6    Michael  20.0       3    yes     USA
7    Matthew  14.5       1    yes     USA
8      Laura  13.5       1     no     USA
9      Kevin   8.0       2     no     USA
10     Jonas  19.0       1    yes     USA
```

8.Write a R program to add new row(s) to an existing data frame.

Output:

```
[1] "Original dataframe:"
```

```
      name score attempts qualify
1  Anastasia  12.5        1     yes
2       Dima   9.0        3      no
3  Katherine  16.5        2     yes
4      James  12.0        3      no
5      Emily   9.0        2      no
6    Michael  20.0        3     yes
7    Matthew  14.5        1     yes
8      Laura  13.5        1      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
[1] "After adding new row(s) to an existing data frame:"
      name score attempts qualify
1  Anastasia  12.5        1     yes
2       Dima   9.0        3      no
3  Katherine  16.5        2     yes
4      James  12.0        3      no
5      Emily   9.0        2      no
6    Michael  20.0        3     yes
7    Matthew  14.5        1     yes
8      Laura  13.5        1      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
11    Robert  10.5        1     yes
12    Sophia   9.0        3      no
```

Source Code:

```
name<-
c("Anastasia","Dima","Katherine","James","Emily","Michael","Matthew","Laura","Kevin","
Jonas")

score<-c(12.5,9,16.5,12,9,20,14.5,13.5,8,19)

Attempts<-c(1,3,2,3,2,3,1,1,2,1)

Qualify<-c("yes","no","yes","no","no","yes","yes","no","no","yes")

df<-data.frame(name,score,Attempts,Qualify)

df

name<-c("Robert","Sophia")

score<-c(10.5,9)

Attempts<-c(1,3)

Qualify<-c("yes","no")

new<-data.frame(name,score,Attempts,Qualify)

a<-rbind(df,new)
```

```
print("After adding rows to an existing dataframe")

print(a)
```

Output:

```
"After adding rows to an existing dataframe"

> print(a)

         name score Attempts Qualify
1  Anastasia  12.5    1    yes
2      Dima   9.0     3     no
3  Katherine  16.5    2    yes
4      James  12.0    3     no
5      Emily   9.0     2     no
6    Michael  20.0    3    yes
7    Matthew  14.5    1    yes
8      Laura  13.5    1     no
9      Kevin   8.0     2     no
10     Jonas  19.0    1    yes
11    Robert  10.5    1    yes
12    Sophia   9.0     3     no
```

Write a R program to drop column(s) by name from a given data frame.

Output:

```
[1] "Original dataframe:"
       name score attempts qualify
1  Anastasia  12.5       1     yes
2      Dima   9.0       3      no
3  Katherine  16.5       2     yes
4      James  12.0       3      no
5      Emily   9.0       2      no
6    Michael  20.0       3     yes
7    Matthew  14.5       1     yes
```

```
8     Laura  13.5       1     no
9     Kevin   8.0       2     no
10    Jonas  19.0       1     yes
   score attempts
1   12.5       1
2    9.0       3
3   16.5       2
4   12.0       3
5    9.0       2
6   20.0       3
7   14.5       1
8   13.5       1
9    8.0       2
10  19.0       1
```

Source Code:

```
name<-
c('Anastasia','Dima','Katherine','James','Emily','Michael','Matthew','Laura','Kevin',
'Jonas')
score <-c(12.5,9,16.5,12,9,20,14.5,13.5,8,19)
attempts<-c(1, 3, 2, 3, 2, 3, 1, 1, 2, 1)
qualify <-c('yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes')
exam<-data.frame(name,score,attempts,qualify)
exam<-subset(exam,select = -c(name, qualify))
exam
```

Output:

```
 score attempts
1   12.5       1
2    9.0       3
3   16.5       2
4   12.0       3
5    9.0       2
6   20.0       3
7   14.5       1
8   13.5       1
9    8.0       2
10  19.0       1
```

8. **Write a R program to drop row(s) by number from a given data frame.**

Output:

```
[1] "Original dataframe:"
       name score attempts qualify
1  Anastasia  12.5       1     yes
2      Dima   9.0       3      no
3  Katherine  16.5       2     yes
4      James  12.0       3      no
5      Emily   9.0       2      no
6    Michael  20.0       3     yes
7    Matthew  14.5       1     yes
8      Laura  13.5       1      no
9      Kevin   8.0       2      no
10     Jonas  19.0       1     yes
```

```
      name score attempts qualify
1  Anastasia  12.5        1     yes
3  Katherine  16.5        2     yes
5      Emily   9.0        2      no
7    Matthew  14.5        1     yes
8      Laura  13.5        1      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
```

Source Code:

```
name<-
c('Anastasia','Dima','Katherine','James','Emily','Michael','Matthew','Laura','Kevin','Jo
nas')
score <-c(12.5,9,16.5,12,9,20,14.5,13.5,8,19)
attempts<-c(1, 3, 2, 3, 2, 3, 1, 1, 2, 1)
qualify <-c('yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes')
exam<-data.frame(name,score,attempts,qualify)
exam<- exam[-c(2, 4, 6),]
exam
```

Output:

```
name score attempts qualify
1  Anastasia  12.5        1     yes
3  Katherine  16.5        2     yes
5      Emily   9.0        2      no
7    Matthew  14.5        1     yes
8      Laura  13.5        1      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
```

9. Write a R program to sort a given data frame by multiple column(s).

Output:

```
[1] "Original dataframe:"
      name score attempts qualify
1  Anastasia  12.5        1     yes
2       Dima   9.0        3      no
3  Katherine  16.5        2     yes
4      James  12.0        3      no
5      Emily   9.0        2      no
6    Michael  20.0        3     yes
7    Matthew  14.5        1     yes
8      Laura  13.5        1      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
[1] "dataframe after sorting 'name' and 'score' columns:"
      name score attempts qualify
1  Anastasia  12.5        1     yes
2       Dima   9.0        3      no
5      Emily   9.0        2      no
4      James  12.0        3      no
10     Jonas  19.0        1     yes
3  Katherine  16.5        2     yes
9      Kevin   8.0        2      no
```

```
8     Laura  13.5       1     no
7   Matthew  14.5       1     yes
6   Michael  20.0       3     yes
```

Source Code:

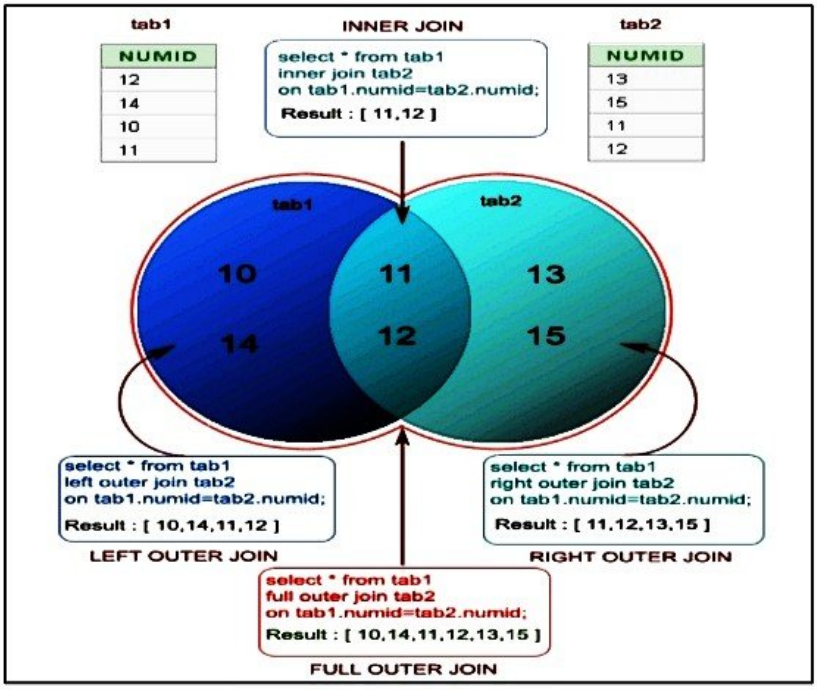
```
name<-
c('Anastasia','Dima','Katherine','James','Emily','Michael','Matthew','Laura','Kevin',
'Jonas')
score <-c(12.5,9,16.5,12,9,20,14.5,13.5,8,19)
attempts<-c(1, 3, 2, 3, 2, 3, 1, 1, 2, 1)
qualify <-c('yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes')
exam<-data.frame(name,score,attempts,qualify)
print("dataframe after sorting 'name' and 'score' columns:")
exam<-exam[with(exam,order(name, score)), ]
print(exam)
```

Output:

```
name score attempts qualify
1  Anastasia  12.5       1     yes
2      Dima   9.0       3      no
5      Emily   9.0       2      no
4      James  12.0       3      no
10     Jonas  19.0       1     yes
3  Katherine  16.5       2     yes
9      Kevin   8.0       2      no
8      Laura  13.5       1      no
7    Matthew  14.5       1     yes
6    Michael  20.0       3     yes
```

Write a R program to create inner, outer, left, right join(merge) from given two data frames.

Output:



```
[1] "Left outer Join:"
numid
1   10
2   11
3   12
4   14
[1] "Right outer Join:"
numid
1   11
2   12
3   13
4   15
[1] "Outer Join:"
numid
1   10
2   11
3   12
4   13
5   14
6   15
[1] "Cross Join:"
numid.xnumid.y
1      12     13
2      14     13
3      10     13
4      11     13
5      12     15
6      14     15
7      10     15
8      11     15
9      12     11
10     14     11
11     10     11
12     11     11
13     12     12
14     14     12
15     10     12
16     11     12
```

Source Code:

```
df1<-data.frame(numid = c(12, 14, 10, 11))
df2<-data.frame(numid = c(13, 15, 11, 12))
print("Left outer Join:")
result<-merge(df1, df2, by = "numid", all.x = TRUE)
print(result)
print("Right outer Join:")
result<-merge(df1, df2, by = "numid", all.y = TRUE)
print(result)
print("Outer Join:")
result<-merge(df1, df2, by = "numid", all = TRUE)
print(result)
```

```
print("Cross Join:")
result<-merge(df1, df2, by = NULL)
print(result)
Output:

print(result)
  numid
1    10
2    11
3    12
4    14
> print("Right outer Join:")
[1] "Right outer Join:"
> result<-merge(df1, df2, by = "numid", all.y = TRUE)
> print(result)
  numid
1    11
2    12
3    13
4    15
> print("Outer Join:")
[1] "Outer Join:"
> result<-merge(df1, df2, by = "numid", all = TRUE)
> print(result)
  numid
1    10
2    11
3    12
4    13
5    14
6    15
> print("Cross Join:")
[1] "Cross Join:"
> result<-merge(df1, df2, by = NULL)
> print(result)
   numid.x numid.y
1       12      13
2       14      13
3       10      13
4       11      13
5       12      15
6       14      15
7       10      15
```

8	11	15
9	12	11
10	14	11
11	10	11
12	11	11
13	12	12
14	14	12
15	10	12
16	11	12

>

10. Write a R program to replace NA values with 3 in a given data frame.

Output:

```
[1] "Original dataframe:"
       name score attempts qualify
1  Anastasia  12.5        1     yes
2       Dima   9.0       NA      no
3  Katherine  16.5        2     yes
4      James  12.0       NA      no
5      Emily   9.0        2      no
6    Michael  20.0       NA     yes
7    Matthew  14.5        1     yes
8      Laura  13.5       NA      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
[1] "After removing NA with 3, the said dataframe becomes:"
       name score attempts qualify
1  Anastasia  12.5        1     yes
2       Dima   9.0        3      no
3  Katherine  16.5        2     yes
4      James  12.0        3      no
5      Emily   9.0        2      no
6    Michael  20.0        3     yes
7    Matthew  14.5        1     yes
8      Laura  13.5        3      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
```

11. Write a R program to change a column name of a given data frame.

Output:

```
[1] "Original dataframe:"
       name score attempts qualify
1  Anastasia  12.5        1     yes
2       Dima   9.0       NA      no
3  Katherine  16.5        2     yes
4      James  12.0       NA      no
5      Emily   9.0        2      no
6    Michael  20.0       NA     yes
7    Matthew  14.5        1     yes
8      Laura  13.5       NA      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
[1] "Change column-name 'name' to 'student_name' of the said dataframe:"
student_name score attempts qualify
1    Anastasia  12.5        1     yes
2         Dima   9.0       NA      no
3    Katherine  16.5        2     yes
4        James  12.0       NA      no
```

```
5      Emily  9.0      2     no
6    Michael 20.0     NA    yes
7    Matthew 14.5      1    yes
8      Laura 13.5     NA     no
9      Kevin  8.0      2     no
10     Jonas 19.0      1    yes
```

12. **Write a R program to change more than one column name of a given data frame.**

Output:

```
[1] "Original dataframe:"
      name score attempts qualify
1  Anastasia 12.5       1    yes
2       Dima  9.0      NA     no
3  Katherine 16.5       2    yes
4      James 12.0      NA     no
5      Emily  9.0       2     no
6    Michael 20.0      NA    yes
7    Matthew 14.5       1    yes
8      Laura 13.5      NA     no
9      Kevin  8.0       2     no
10     Jonas 19.0       1    yes
[1] "Change more than one column name  of the said dataframe:"
student_nameavg_score attempts qualify
1    Anastasia     12.5       1    yes
2         Dima      9.0      NA     no
3    Katherine     16.5       2    yes
4        James     12.0      NA     no
5        Emily      9.0       2     no
6      Michael     20.0      NA    yes
7      Matthew     14.5       1    yes
8        Laura     13.5      NA     no
9        Kevin      8.0       2     no
10       Jonas     19.0       1    yes
```

13. **Write a R program to select some random rows from a given data frame.**

Output:

```
[1] "Original dataframe:"
      name score attempts qualify
1  Anastasia 12.5       1    yes
2       Dima  9.0       3     no
3  Katherine 16.5       2    yes
4      James 12.0       3     no
5      Emily  9.0       2     no
6    Michael 20.0       3    yes
```

```
7   Matthew  14.5       1     yes
8     Laura  13.5       1      no
9     Kevin   8.0       2      no
10    Jonas  19.0       1     yes
[1] "Select three random rows of the said dataframe:"
     name score attempts qualify
10  Jonas  19.0       1     yes
7  Matthew  14.5       1     yes
4   James  12.0       3      no
```

14. Write a R program to reorder an given data frame by column name.

Output:

```
[1] "Original dataframe:"
       name score attempts qualify
1  Anastasia  12.5       1     yes
2       Dima   9.0       3      no
3  Katherine  16.5       2     yes
4     James  12.0       3      no
5     Emily   9.0       2      no
6   Michael  20.0       3     yes
7   Matthew  14.5       1     yes
8     Laura  13.5       1      no
9     Kevin   8.0       2      no
10    Jonas  19.0       1     yes
[1] "Reorder by column name:"
       name attempts score qualify
1  Anastasia        1  12.5     yes
2       Dima        3   9.0      no
3  Katherine        2  16.5     yes
4     James        3  12.0      no
5     Emily        2   9.0      no
6   Michael        3  20.0     yes
7   Matthew        1  14.5     yes
8     Laura        1  13.5      no
9     Kevin        2   8.0      no
10    Jonas        1  19.0     yes
```

15. Write a R program to compare two data frames to find the elements in first data frame that are not present in second data frame.

Output:

```
[1] "Original Dataframes"
[1] "a" "b" "c" "d" "e"
[1] "d" "e" "f" "g"
[1] "Data in first dataframe  that are not present in second dataframe:"
[1] "a" "b" "c"
```

16. **Write a R program to find elements which are present in two given data frames.**

Output:

```
[1] "Original Dataframes"
[1] "a" "b" "c" "d" "e"
[1] "d" "e" "f" "g"
[1] "Elements which are present in both dataframe:"
[1] "d" "e"
```

17. **Write a R program to find elements come only once that are common to both given data frames.**

Output:

```
[1] "Original Dataframes"
[1] "a" "b" "c" "d" "e"
[1] "d" "e" "f" "g"
[1] "Find elements come only once that are common to both given
dataframes:"
[1] "a" "b" "c" "d" "e" "f" "g"
```

18. **Write a R program to save the information of a data frame in a file and display the information of the file.**

Output:

```
[1] "Original dataframe:"
       name score attempts qualify
1  Anastasia  12.5        1     yes
2       Dima   9.0        3      no
3  Katherine  16.5        2     yes
4      James  12.0        3      no
5      Emily   9.0        2      no
6    Michael  20.0        3     yes
7    Matthew  14.5        1     yes
8      Laura  13.5        1      no
9      Kevin   8.0        2      no
10     Jonas  19.0        1     yes
        size isdir mode               mtimectime
data.rda  344 FALSE  644 2018-10-25 12:06:09 2018-10-25 12:06:09
atimeuidgidunamegrname
data.rda 2018-10-25 12:06:09 1000 1000 trinket trinket
```

19. **Write a R program to count the number of NA values in a data frame column.**

Output:

```
[1] "Original dataframe:"
       name score attempts qualify
1  Anastasia  12.5        1     yes
```

```
2      Dima  9.0      NA     no
3  Katherine 16.5       2    yes
4     James  12.0      NA     no
5     Emily  9.0       2     no
6   Michael  20.0      NA    yes
7   Matthew  14.5       1    yes
8     Laura  13.5      NA     no
9     Kevin  8.0       2     no
10    Jonas  19.0       1    yes
[1] "The number of NA values in attempts column:"
[1] 4
```

20. **Write a R program to create a data frame using two given vectors and display the duplicated elements and unique rows of the said data frame.**

Output:

```
[1] "Original data frame:"
a  b
1 10 10
2 20 30
3 10 10
4 10 20
5 40  0
6 50 50
7 20 30
8 30 30
[1] "Duplicate elements of the said data frame:"
[1] FALSE FALSE  TRUE FALSE FALSEFALSE  TRUE FALSE
[1] "Unique rows of the said data frame:"
a  b
1 10 10
2 20 30
4 10 20
5 40  0
6 50 50
8 30 30
```

21. **Write a R program to call the (built-in) dataset airquality. Check whether it is a data frame or not? Order the entire data frame by the first and second column.**

Output:

```
[1] "Original data: Daily air quality measurements in New York, May to
September 1973."
[1] "data.frame"
   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
5    NA     NA 14.3   56    5   5
6    28     NA 14.9   66    5   6
7    23    299  8.6   65    5   7
8    19     99 13.8   59    5   8
9     8     19 20.1   61    5   9
10   NA    194  8.6   69    5  10
[1] "Order the entire data frame by the first and second column:"
   Ozone Solar.R Wind Temp Month Day
21     1       8  9.7   59     5  21
23     4      25  9.7   61     5  23
18     6      78 18.4   57     5  18
.....
119   NA     153  5.7   88     8  27
150   NA     145 13.2   77     9  27
```

22. **Write a R program to call the (built-in) dataset airquality. Remove the variables 'Solar.R' and 'Wind' and display the data frame.**

Output:

```
[1] "Original data: Daily air quality measurements in New York, May to
September 1973."
   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
5     NA      NA 14.3   56     5   5
.....
152   18     131  8.0   76     9  29
153   20     223 11.5   68     9  30
[1] "data.frame after removing 'Solar.R'  and 'Wind' variables:"
   Ozone Temp Month Day
```

```
1     41   67     5   1
2     36   72     5   2
3     12   74     5   3
4     18   62     5   4
5     NA   56     5   5
.....
152   18   76     9  29
153   20   68     9  30
```