1.Write a R program to create an array of two 3x3 matrices each with3 rows and 3 columns from two given two vectors. Print the second row of the second matrix of the array and the element in the 3rd row and 3rd column of the 1st matrix.

Program:

```
vec1 <- 1:9

vec2 <- 10:18

mat1 <- matrix(vec1, nrow = 3, ncol = 3)

mat2 <- matrix(vec2, nrow = 3, ncol = 3)

arr <- array(c(mat1, mat2), dim = c(3, 3, 2))

print(arr[2,,2])

print(arr[3,3,1])
```

output:

```
> print(arr[2,,2])

[1] 13 14 15


> print(arr[3,3,1])

[1] 9
```

2. .Write a R program to combine three arrays so that the first row of the first array is followed by the first row of the second array and then first row of the third array.

Program:

```
array1 <- array(1:12, dim = c(3, 4))

array2 <- array(13:24, dim = c(3, 4))

array3 <- array(25:36, dim = c(3, 4))

combined_array <- rbind(array1, array2, array3)
```

```
print(combined_array)
```

output:

```
   [,1] [,2] [,3] [,4]
[1,]    1    4    7   10
[2,]    2    5    8   11
[3,]    3    6    9   12
[4,]   13   16   19   22
[5,]   14   17   20   23
[6,]   15   18   21   24
[7,]   25   28   31   34
[8,]   26   29   32   35
[9,]   27   30   33   36
```

3. Writea R program to create an array using four given columns, three given rows, and two given tables and display the content of the array.

Program:

```
col1 <- c(1, 2, 3)
col2 <- c(4, 5, 6)
col3 <- c(7, 8, 9)
col4 <- c(10, 11, 12)
table1 <- cbind(col1, col2, col3, col4)
table2 <- table1 + 10
array <- array(c(table1, table2), dim = c(3, 4, 2))
print(array)
```

output:

```
 1
   col1 col2 col3 col4
[1,]   1   4   7  10
[2,]   2   5   8  11
[3,]   3   6   9  12
 2
   col1 col2 col3 col4
[1,]  11  14  17  20
[2,]  12  15  18  21
[3,]  13  16  19  22
```

4.Createbelow data frame exam_data = data. Frame(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'))

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

b. Write a R program to add a new column named country in a given data frame
Country<\c("USA","USA","USA","USA","UK","USA","USA","India","USA","USA")

program:

Here are the R programs to solve the problems:

Problem :

```
exam_data <- data.frame(
  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')
)
result <- exam_data[c(3, 5), c(1, 3)]
print(result)
```

Output:

```
      name attempts
3  Katherine       2
5      Emily       2
```

Problem b

```
exam_data <- data.frame(
  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')
)
Country <- c("USA","USA","USA","USA","UK","USA","USA","India","USA","USA")
exam_data$country <- Country
print(exam_data)
```

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      UK
6    Michael  20.0        3     yes     USA
7    Matthew  14.5        1     yes     USA
8      Laura  13.5        1      no   India
9      Kevin   8.0        2      no     USA
10     Jonas  19.0        1     yes     USA
```

5.Write a R program to add new row(s) to an existing data frame new_exam_data = data.frame(name = c('Robert', 'Sophia'),score = c(10.5, 9), attempts = c(1, 3),qualify = c('yes', 'no')) d. Write a R program to sort a given data frame by name and score e. Write a R program to save the information of a data frame in a file and display the information of the file.

Program:

```
exam_data <- data.frame(
  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')
```

```
)
new_exam_data <- data.frame(
 name = c('Robert', 'Sophia'),
 score = c(10.5, 9),
 attempts = c(1, 3),
 qualify = c('yes', 'no')
)
exam_data <- rbind(exam_data, new_exam_data)
print(exam_data)
```

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
11    Robert  10.5        1     yes
12    Sophia   9.0        3      no
```

Problem d

```
exam_data <- data.frame(
  name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin',
'Jonas', 'Robert', 'Sophia'),
  score = c(12.5, 9, 16.5, 12, 9, 20, 14.5, 13.5, 8, 19, 10.5, 9),
  attempts = c(1, 3, 2, 3, 2, 3, 1, 1, 2, 1, 1, 3),
  qualify = c('yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes', 'yes', 'no')
)
exam_data <- exam_data[order(exam_data$name, exam_data$score), ]
print(exam_data)
```

Output:

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

Problem e

```
# Create the data frame
exam_data <- data.frame(
  name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin',
'Jonas', 'Robert', 'Sophia'),
  score = c(12.5, 9, 16.5, 12, 9, 20, 14.5, 13.5, 8, 19, 10.5, 9),
  attempts = c(1, 3, 2, 3, 2, 3, 1, 1,
```