FUNDAMENTALS OF R Programming

1. How to add two vectors of integer's type and length 3?

```r
vec1 <- c(1L, 2L, 3L)  # "L" makes them integers
vec2 <- c(4L, 5L, 6L)
# add the two vectors element-wise
result <- vec1 + vec2
result
```

```
> vec1 <- c(1L, 2L, 3L)  # "L" makes them integers
> vec2 <- c(4L, 5L, 6L)
> result <- vec1 + vec2
> result
[1] 5 7 9
>
```

2. How to multiply two vectors of integer's type and length 3?

```r
# define two integer vectors of length 3
vec1 <- c(2L, 3L, 4L)
vec2 <- c(5L, 6L, 7L)
# multiply the two vectors element-wise
result <- vec1 * vec2
result
```

```
> vec1 <- c(2L, 3L, 4L)
> vec2 <- c(5L, 6L, 7L)
> result <- vec1 * vec2
> result
[1] 10 18 28
> vec <- c(10, 20, 30, 40, 50)
> element <- 30
> if (element %in% vec) {
```

3. Write an R program to test whether a given vector contains a specified element?

```r
# define a vector
vec <- c(10, 20, 30, 40, 50)
# define the element to test
element <- 30
# check if element is in vector
if (element %in% vec) {
  cat(element, "is present in the vector\n")
} else {
  cat(element, "is NOT present in the vector\n")
}
#Using any() function
if (any(vec == element)) {
  print("Element found!")
} else {
  print("Element not found!")
}
```

```
> vec <- c(10, 20, 30, 40, 50)
> element <- 30
> if (element %in% vec) {
+   cat(element, "is present in the vector\n")
+ } else {
+   cat(element, "is NOT present in the vector\n")
+ }
30 is present in the vector
> if (any(vec == element)) {
+   print("Element found!")
+ } else {
+   print("Element not found!")
+ }
[1] "Element found!"
>
```

4. Create a list containing a vector, a matrix and a list and add element at the end of the list?

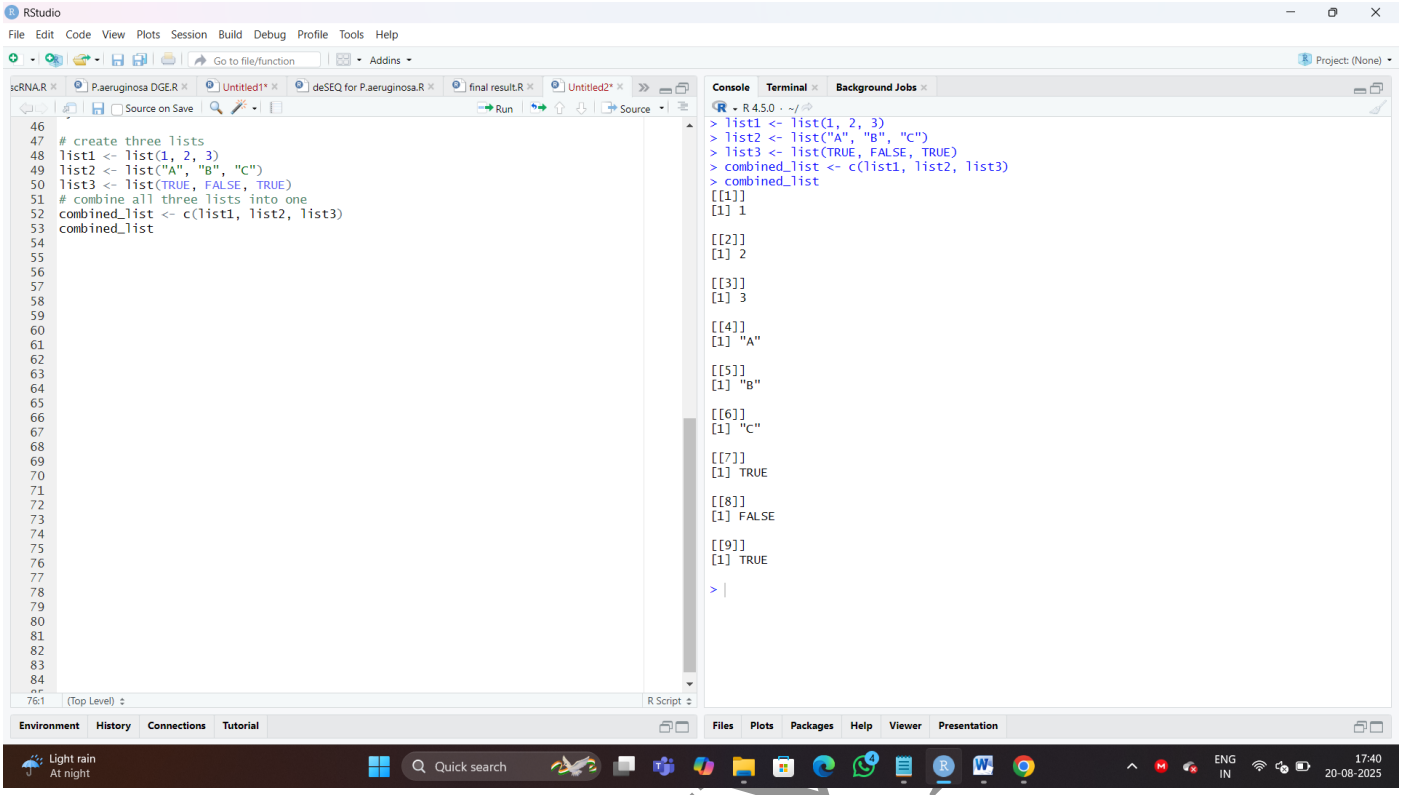
```r
# create a vector
vec <- c(1, 2, 3)
# create a matrix
mat <- matrix(1:6, nrow = 2)
# create a sub-list
sub_list <- list(name = "R Programming", level = "Beginner")
# combine them into one list
my_list <- list(vec, mat, sub_list)
my_list
# add a new element at the end using append()
my_list <- append(my_list, "New Element")
my_list
# add multiple elements at the end using append()
my_list <- append(my_list, list("New Element 1", 99, c("A", "B", "C")))
my_list
```

```
> my_list <- list(vec, mat, sub_list)
> my_list
[[1]]
[1] 1 2 3

[[2]]
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6

[[3]]
[[3]]$name
[1] "R Programming"

[[3]]$level
[1] "Beginner"


> my_list <- append(my_list, "New Element")
> my_list
[[1]]
[1] 1 2 3

[[2]]
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6

[[3]]
[[3]]$name
[1] "R Programming"

[[3]]$level
[1] "Beginner"


[[4]]
[1] "New Element"

>
```

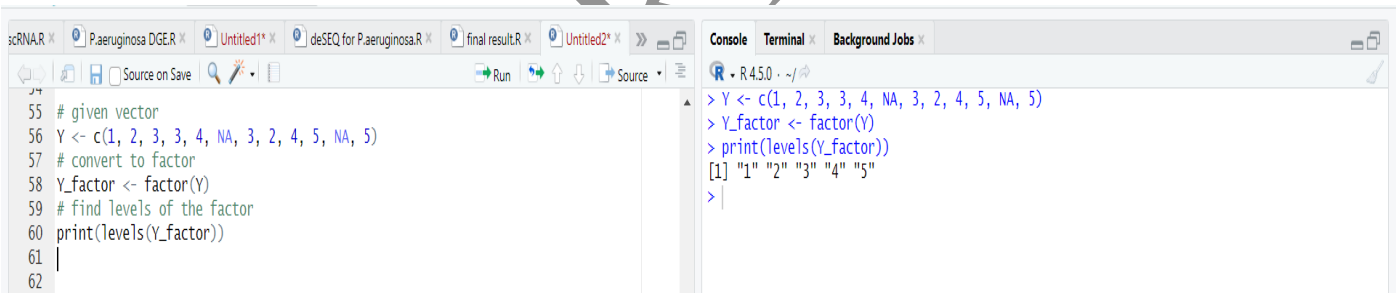
```r
# create a vector
vec <- c(1, 2, 3)
# create a matrix
mat <- matrix(1:6, nrow = 2)
# create a sub-list
sub_list <- list(name = "R Programming", level = "Beginner")
# combine them into one list
my_list <- list(vec, mat, sub_list)
my_list
# add a new element at the end using append()
my_list <- append(my_list, "New Element")
my_list
# add multiple elements at the end using append()
my_list <- append(my_list, list("New Element 1", 99, c("A", "B", "C")))
my_list
```

```
[1] "R Programming"

[[3]]$level
[1] "Beginner"


[[4]]
[1] "New Element"

> my_list <- append(my_list, list("New Element 1", 99, c("A", "B", "C")))
> my_list
[[1]]
[1] 1 2 3

[[2]]
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6

[[3]]
[[3]]$name
[1] "R Programming"

[[3]]$level
[1] "Beginner"


[[4]]
[1] "New Element"

[[5]]
[1] "New Element 1"

[[6]]
[1] 99

[[7]]
[1] "A" "B" "C"

>
```

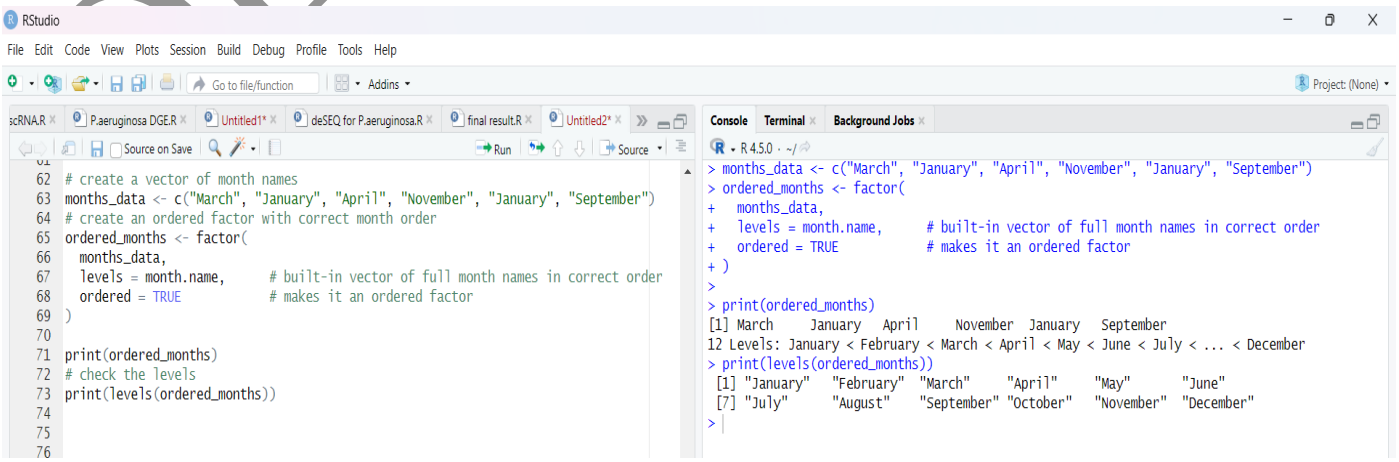
5. Create three lists and combine the entire list into one list?



6. Find out the levels of factors of a given below vector? Y=C(1, 2, 3, 3, 4, NA, 3, 2, 4, 5, NA, 5)



7. Write an R program to create an ordered factor from data consisting of the names of months?



8. Create a data frame by taking following variables & find out the structure of data.

Name = "RX","TX","VX" "FX"

V1 = 10,30,40,90

V2 = 0.5, 0.8.1.5.1.9

Logi=TRUE, FALSE, TRUE, TRUE

```r
# create data frame
df <- data.frame(
  name=c("RX", "TX", "VX", "FX"),
  V1=c(10, 30, 40, 90),
  V2=c(0.5, 0.8, 1.5, 1.9),
  Logi=c(TRUE, FALSE, TRUE, TRUE)
)
df
# find structure of data frame
str(df)
```

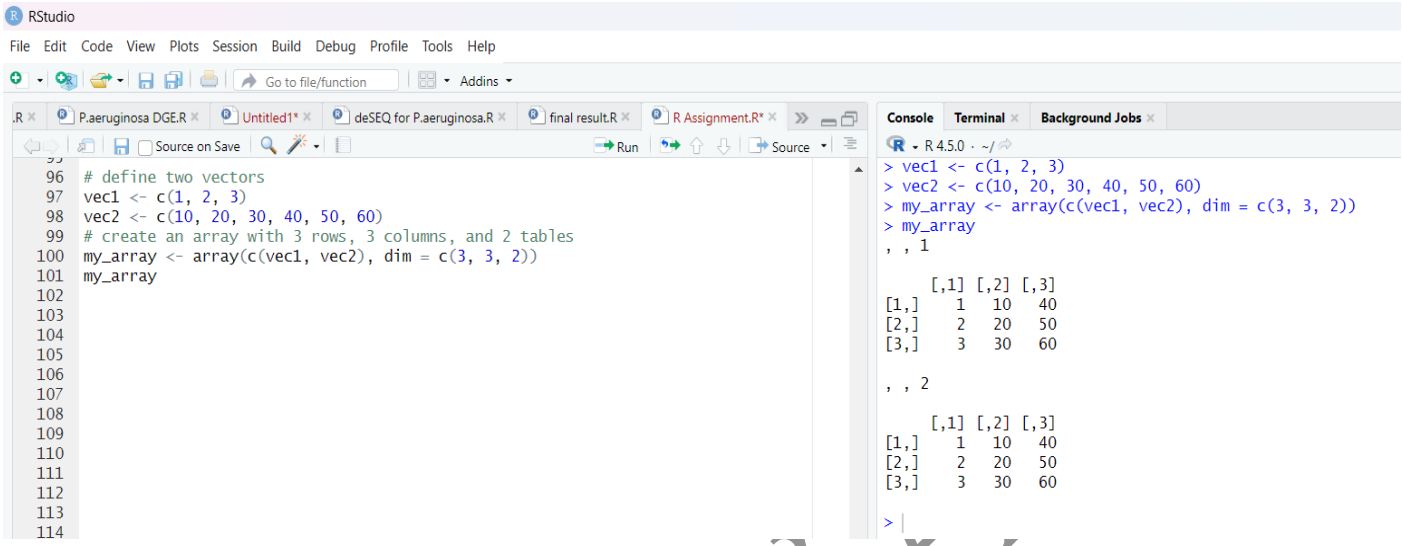
```
> df <- data.frame(
+   name=c("RX", "TX", "VX", "FX"),
+   V1=c(10, 30, 40, 90),
+   V2=c(0.5, 0.8, 1.5, 1.9),
+   Logi=c(TRUE, FALSE, TRUE, TRUE)
+ )
> df
  name V1  V2  Logi
1   RX 10 0.5  TRUE
2   TX 30 0.8 FALSE
3   VX 40 1.5  TRUE
4   FX 90 1.9  TRUE
> str(df)
'data.frame':   4 obs. of  4 variables:
 $ name: chr  "RX" "TX" "VX" "FX"
 $ V1  : num  10 30 40 90
 $ V2  : num  0.5 0.8 1.5 1.9
 $ Logi: logi  TRUE FALSE TRUE TRUE
>
```

9. Write an R program to find the maximum and the minimum value of a given vector, nums = c(10, 20, 30, 40, 50, 60)

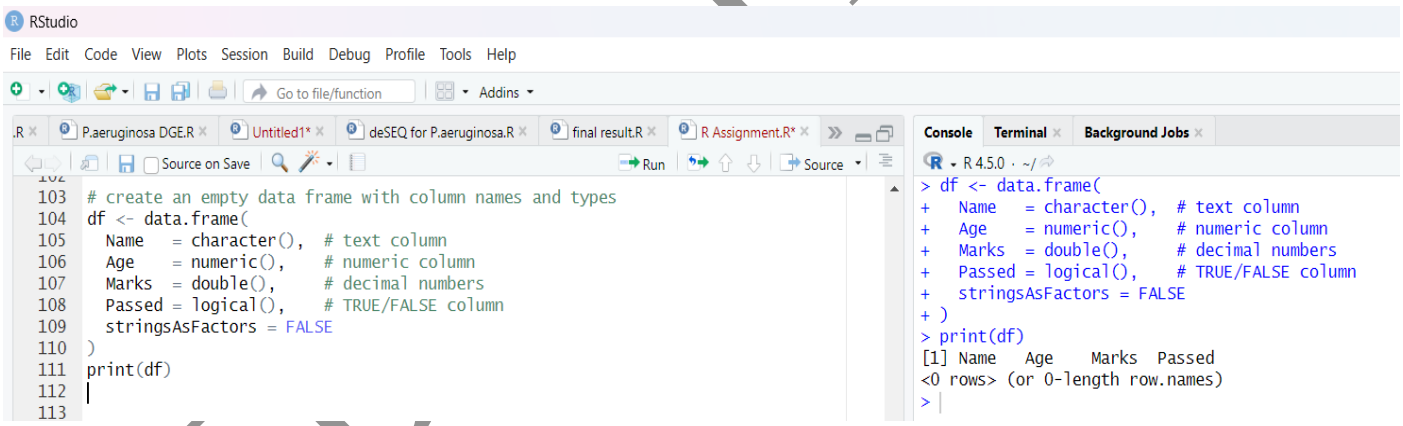
```r
# given vector
nums <- c(10, 20, 30, 40, 50, 60)
# find maximum
max_value <- max(nums)
# find minimum
min_value <- min(nums)
# print results
cat("Maximum value:", max_value, "\n")
cat("Minimum value:", min_value, "\n")
```

```
> nums <- c(10, 20, 30, 40, 50, 60)
> max_value <- max(nums)
> min_value <- min(nums)
> cat("Maximum value:", max_value, "\n")
Maximum value: 60
> cat("Minimum value:", min_value, "\n")
Minimum value: 10
>
```

10. How to create an array with three columns, three rows, and two "tables", taking two vectors as input to the array.



11. How to create an empty data frame.



12. How to get the structure of following data frame.

exam_data = data.frame (

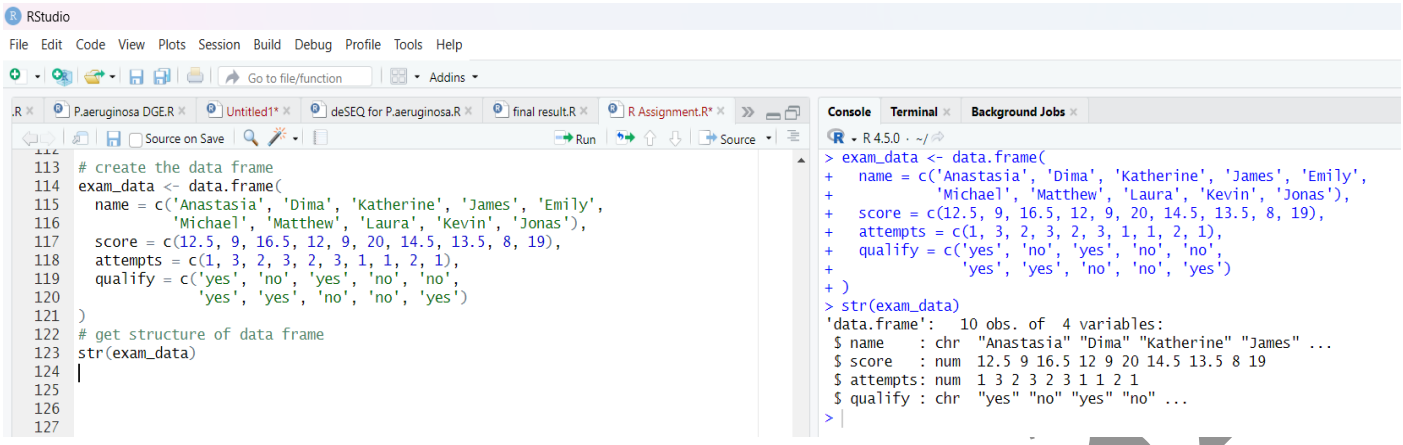
name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'),

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')

)



13. How to get the statistical summary of the data of a following data frame?

exam_data = data.frame (

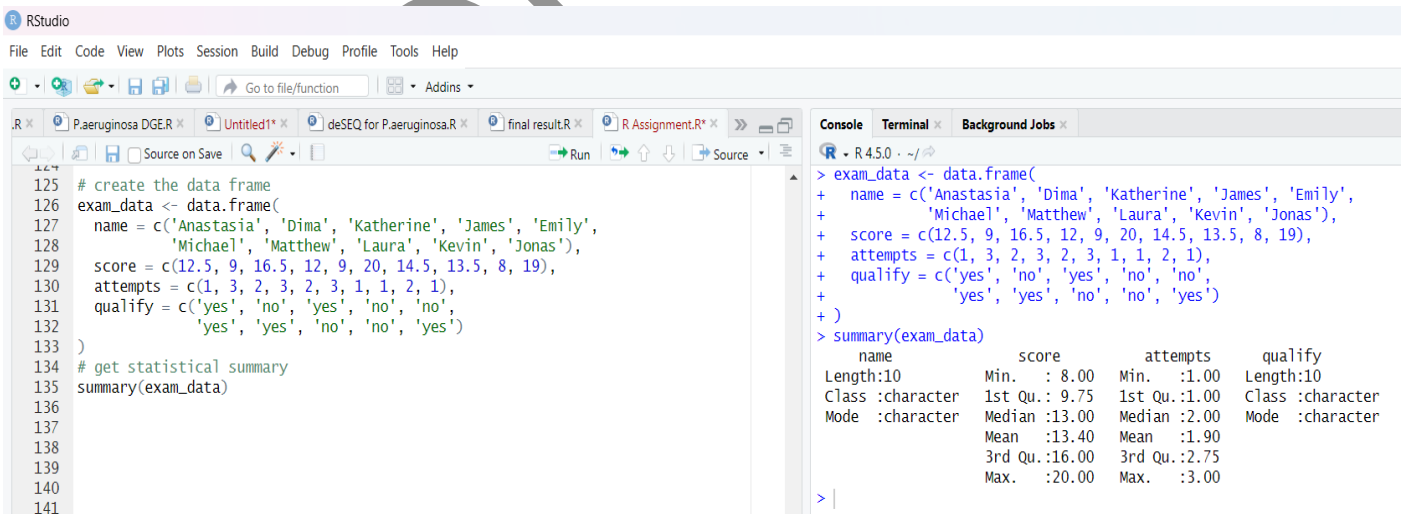
name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'),

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')

)



14. How to extract specific column from a given data frame without using indexing method?

exam_data = data.frame(

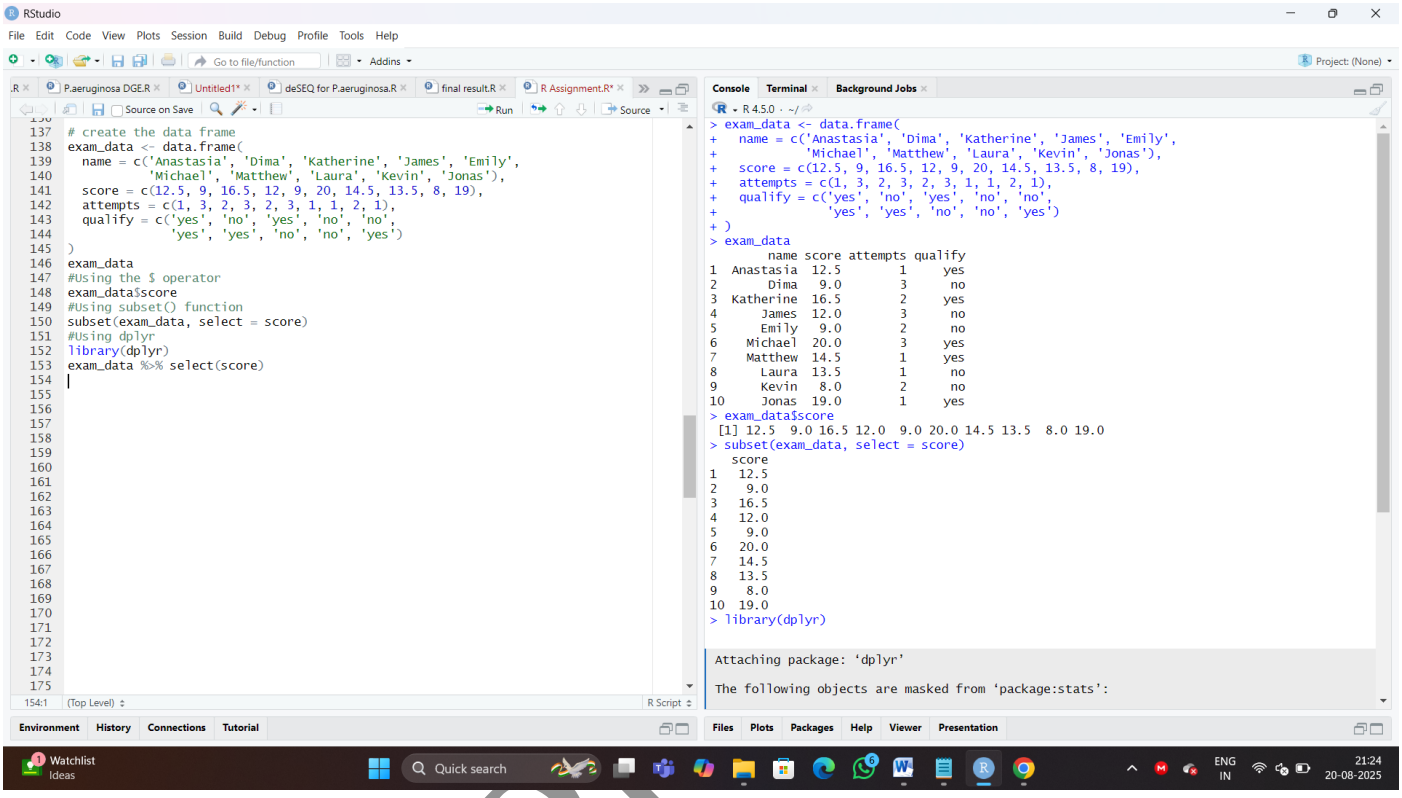
name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'),

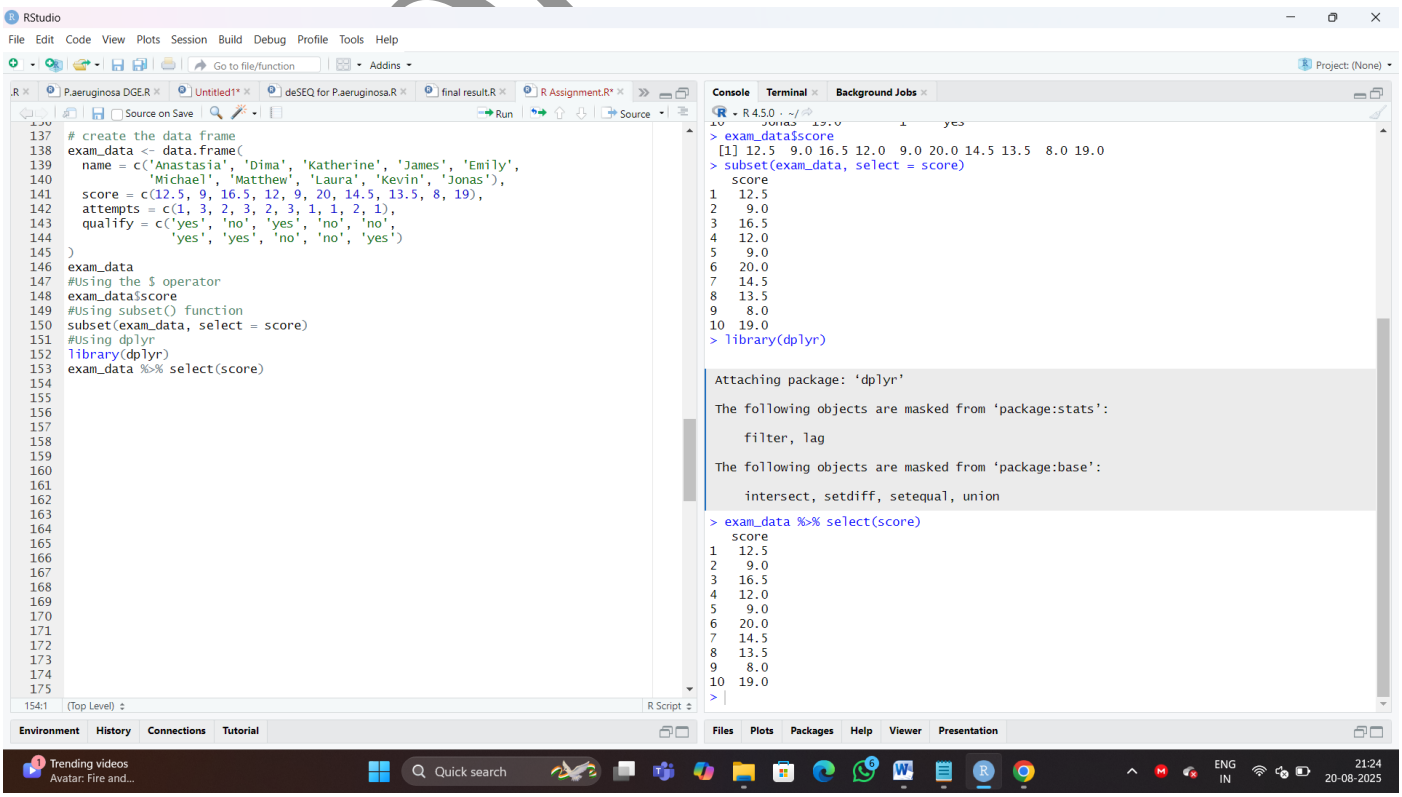
score = c(12.5, 9, 16.5, 12, 9, 20, 14.5, 13.5, 8, 19),

attempts = c(1, 3, 2, 3, 2, 3, 1, 1, 2, 1),

qualify = c('yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes')

)





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

exam_data = data.frame(

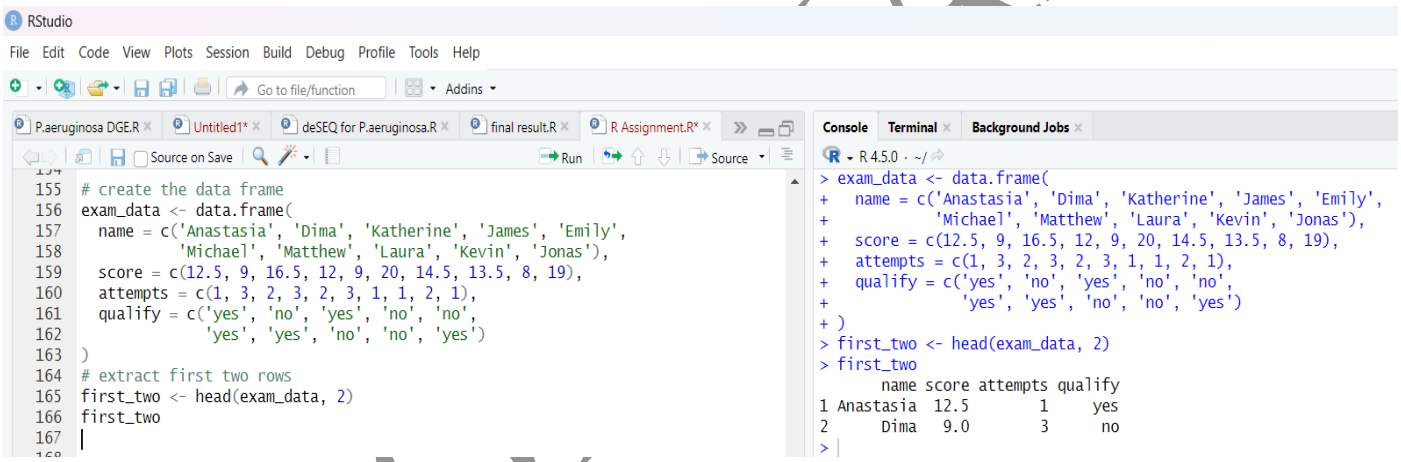
name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'),

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')

)



16. How to extract 3rd and 5th rows with 1st and 3rd columns from a given data frame.

exam_data = data.frame(

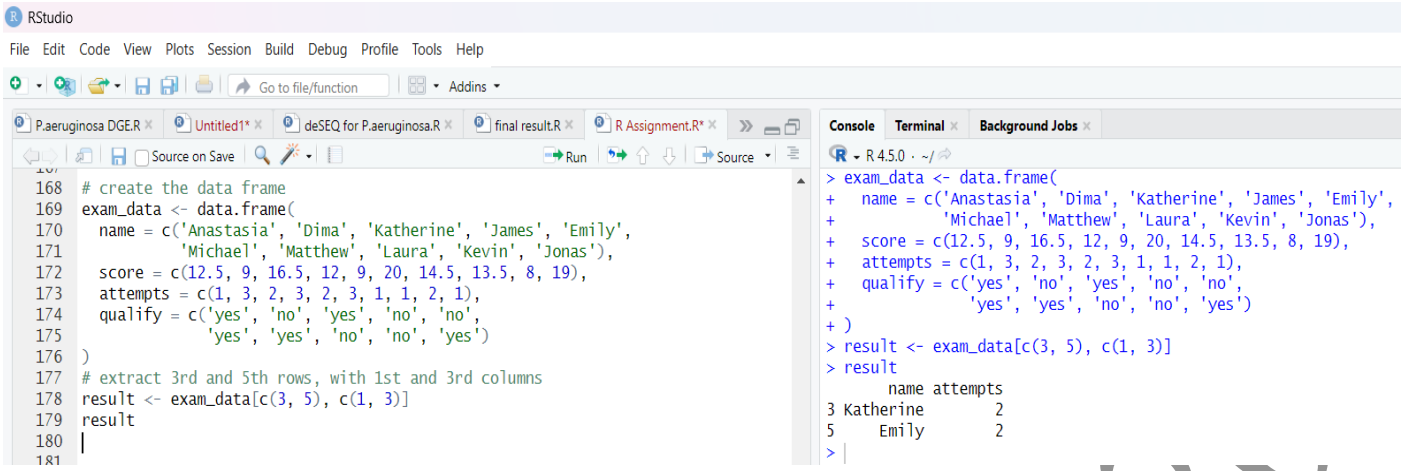
name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'),

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')

)



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

exam_data = data.frame(

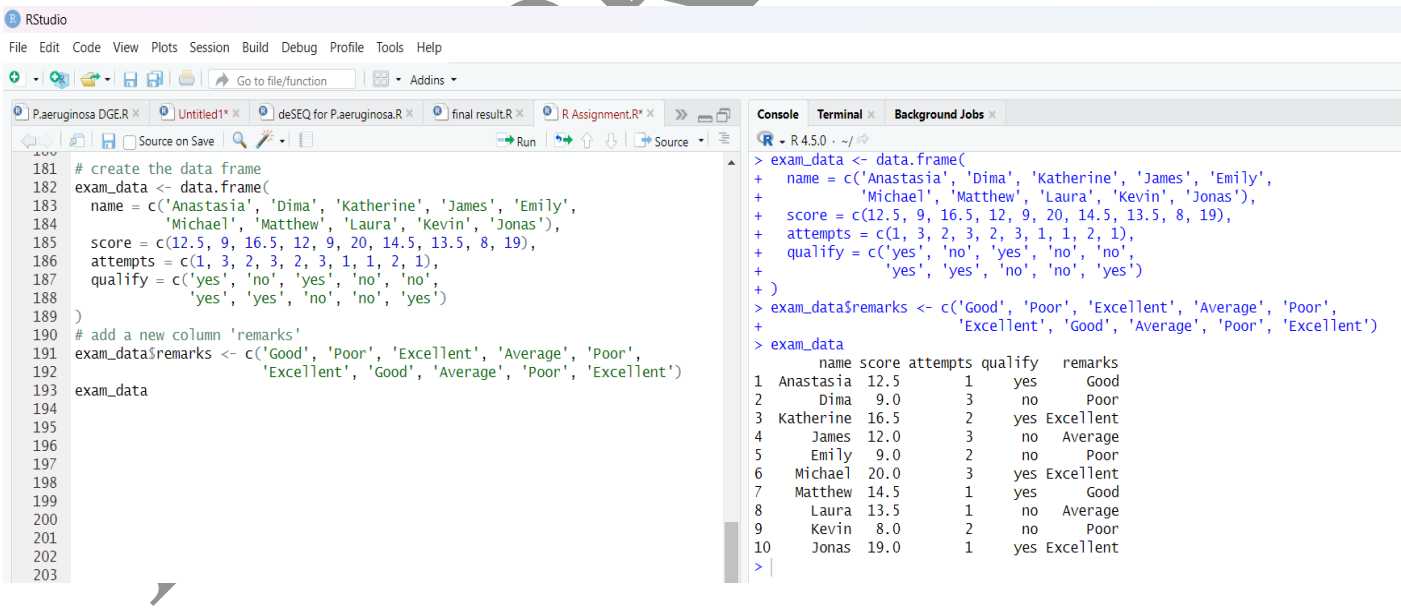
name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'),

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')

)



18. How to add new row(s) to an existing data frame.

exam_data = data.frame(

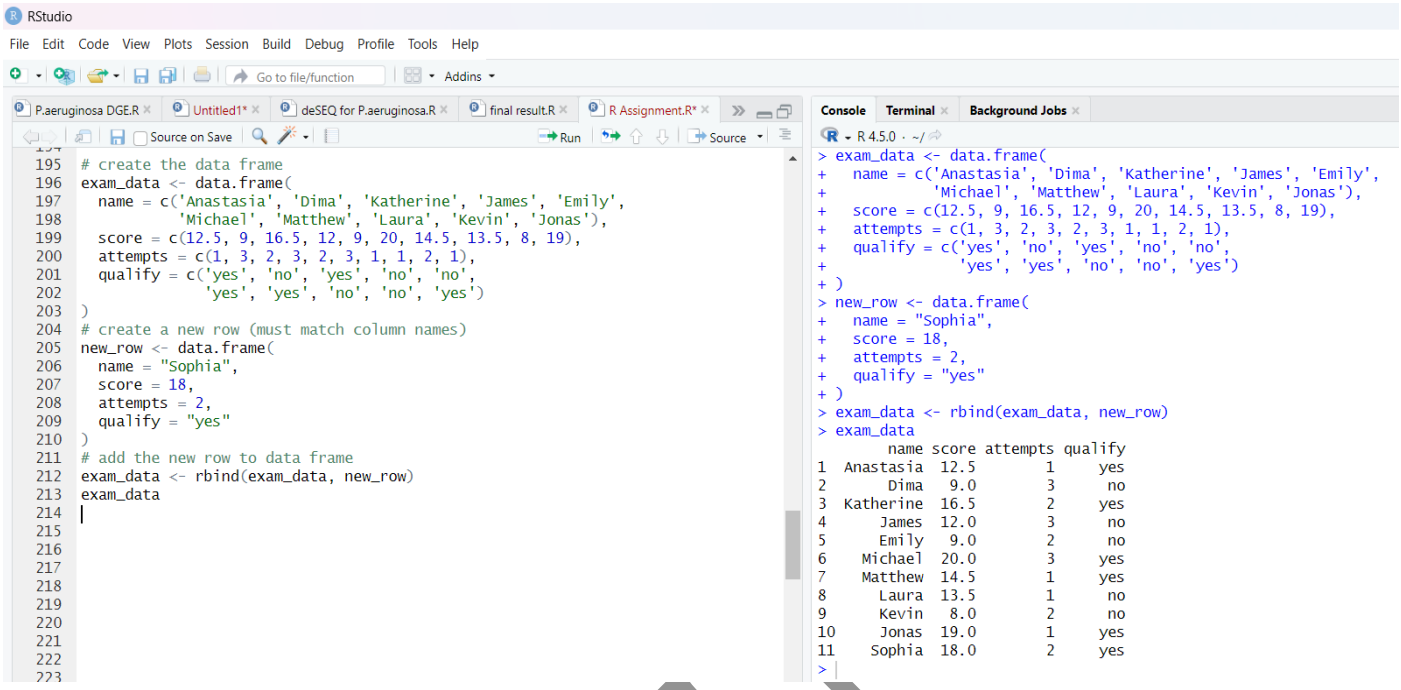
name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'),

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')

)



19. How to drop 3rd column(s) by name from a given data frame.

exam_data = data.frame(

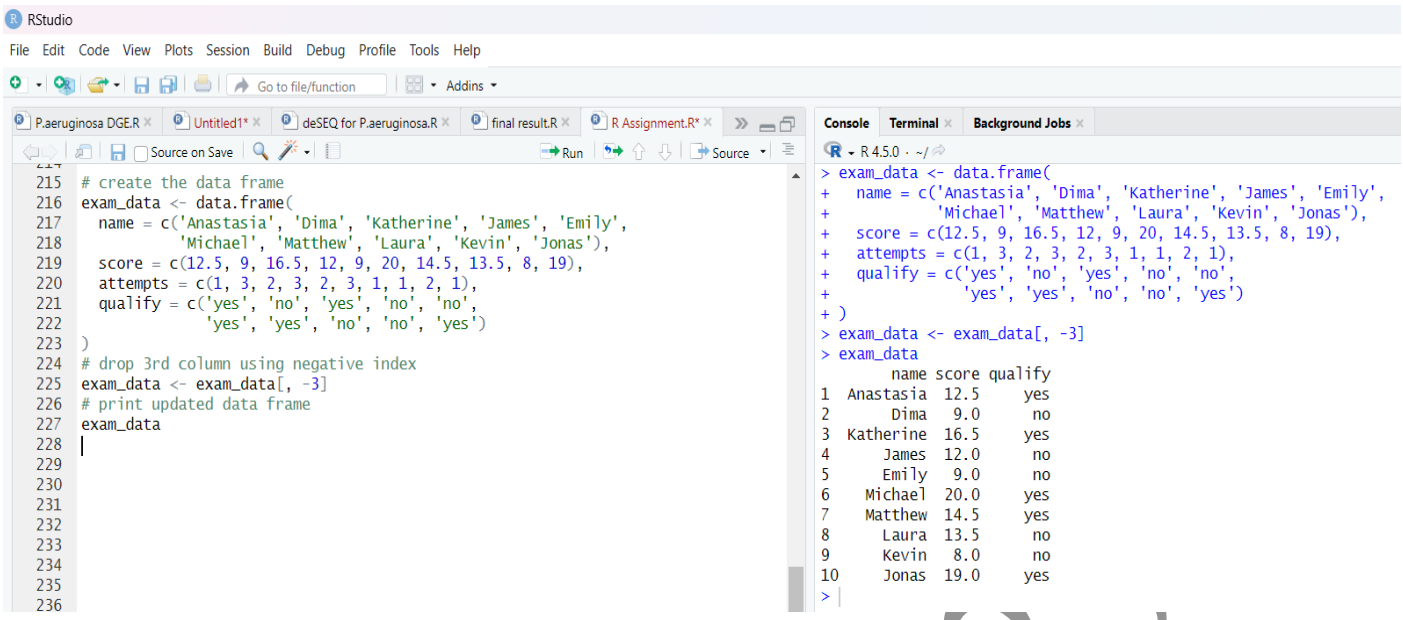
name = c('Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'),

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')

)



20. How to drop 2nd & 4th row(s) from a given 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')

)