CS544 Module 1 Assignment

The following sample data shows the scores of the students in an exam:

58, 46, 50, 90, 42, 52, 62, 44, 96, 92, 54, 82

Do the following using R code **with only a single expression** for each case. The solutions should be generic and work for any size data. You can assume there will be an even number of values in the given data.

Q1 (25 points)

a) Assign the above data as a *vector* in the same order to the variable ***scores***. Use this variable for the remaining problems.
b) Using the *length* function, compute how many students took the exam? Store the expression in the variable ***n*.**
c) Using indexing, write the expression for accessing the first two items. Store the expression in the variable ***first_and_second*.**
d) Using indexing, write the expression for accessing the first and last items. Store the expression in the variable ***first_and_last.***
e) Using indexing, write the expression for accessing the middle two items. Store the expression in the variable ***middle_two.***

Sample output:

```
 [1] 12
 [1] 58 46
 [1] 58 82
 [1] 52 62
```

Q2 (25 points)

a) Use *median(scores)* to compute the median of the data. Store the expression in the variable **median_score**.
b) Using comparison operators, write the R expression for scores less than or equal to the median of the data. Store the expression in the variable **below_median.**
c) Using comparison operators, write the R expression for scores greater than the median of the data. Store the expression in the variable **above_median.**
d) Using the **sum** function, write the R expression for the number of scores less than or equal to the median of the data. Store the expression in the variable **count_below_median.**
e) Using the **sum** function, write the R expression for the number of scores greater than the median of the data. Store the expression in the variable **count_above_median.**

Sample output:

```
[1] 56
[1]  FALSE  TRUE  TRUE FALSE  TRUE  TRUE FALSE  TRUE FALSE FALSE  TRUE FALSE
[1] TRUE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE  TRUE  TRUE FALSE  TRUE
[1] 6
[1] 6
```

Q3 (10 points)

a) Using logical indexing and the results from Q2), write the R expression for all the scores that are less than or equal to the median value of the data. Store the expression in the variable **scores_below_median.**
b) Similarly, write the R expression for all the scores that are greater than the median. Store the expression in the variable **scores_above_median.**

Sample output:
[1] 46 50 42 52 44 54
[1] 58 90 62 96 92 82

Q4 (10 points)

a) Using numeric indexing, write the R expression for the odd indexed values from the scores. Store the expression in the variable **odd_index_values**.
b) Similarly, write the R expression for the even indexed values from the scores. Store the expression in the variable **even_index_values**.

Use the **seq** function to generate the numeric indices for the above.

Sample output:
[1] 58 50 42 62 96 54
[1] 46 90 52 44 92 82

Q5 (10 points)

a) Using the **paste** function with LETTERS, write the expression for the following output. Store the expression in the variable **format_scores_version1**.
You can assume there are no more than 26 values.
Sample output:
[1] "A=58" "B=46" "C=50" "D=90" "E=42" "F=52" "G=62" "H=44" "I=96" "J=92" "K=54" "L=82"

b) Similarly, using the **paste** function with LETTERS, write the expression for the following output. Store the expression in the variable **format_scores_version2**.
Sample output:
[1] "L=58" "K=46" "J=50" "I=90" "H=42" "G=52" "F=62" "E=44" "D=96" "C=92" "B=54" "A=82"

Q6 (10 points)

a) Create a matrix with two rows using the ***scores*** data. The first half of the values belong to the first row of the matrix. Store the expression in the variable **scores_matrix.**
The code should work for any size input data.
You can assume that there are even number of values in scores.
Sample output:

```
     [,1] [,2] [,3] [,4] [,5] [,6]
[1,]   58   46   50   90   42   52
[2,]   62   44   96   92   54   82
```

b) Write the expression for displaying the first and last columns of the above matrix. The code should work for any size matrix. Store the expression in the variable **first_and_last_version1.**
Sample output:

```
     [,1] [,2]
[1,]   58   52
[2,]   62   82
```

Q7 (10 points)

a) Copy **scores_matrix** to the variable **named_matrix**.
Assign column names for the *named_matrix* as Student_1, Student_2,… and row names as Quiz_1, Quiz_2, ... The code should work for any size matrix, i.e., for any number of columns in the matrix and any number of rows. The code can contain multiple steps.
Sample output:

```
       Student_1 Student_2 Student_3 Student_4 Student_5 Student_6
Quiz_1        58        46        50        90        42        52
Quiz_2        62        44        96        92        54        82
```

b) Show the result for displaying the first and last columns of the *named_matrix*. The code should work for any size matrix. Store the expression in the variable **first_and_last_version2.**
Sample output:

```
       Student_1 Student_6
Quiz_1        58        52
Quiz_2        62        82
```

Submission:

- You must work on your assignments individually. You are not allowed to copy the answers from the others.
- Each assignment has a strict deadline. Please plan accordingly to submit on time.
- When the term *lastName* is referenced, please replace it with your last name.
- Create a folder, **CS544_HW1_lastName** and place the following files in this folder.
- Provide all R code in a single file, **CS544_HW1_lastName.R**. Clearly mark each subpart of each question.
- Provide the corresponding code and outputs from the R console in a single Word document, CS544_HW1_lastName.doc.
- Archive the folder (**CS544_HW1_lastName.zip**). Upload the zip file to the Assignments section of Blackboard.

Note: Only ONE submission is allowed. Please be sure that what you are submitting is your final submission.