Project 02: Data Analysis
CSE-020-01, Fall 2019 **Points: 100**

Overview

Create a new class called DataAnalyze (`DataAnalyze.java`) to do all your work. You may work in pairs or by yourself. The expectation is that you work on the project outside of lab time but you may certainly use any extra time during the lab sessions. Your partner can be in any section. Both you and your partner will make separate submissions, each noting the collaborator/partner in the "Comments…" text-box in the submission page. We have included sample runs to give you a better idea of how the program works given the project requirements. Refer to your previous lab assignments for hints on how to approach this project. You can ask the TAs or the instructor for clarifications and help. This project is worth 100 points so be sure to complete it. Submit `DataAnalyze.java` for this project in the assignment page after properly formatting it as stated in the instructions below.

Problem

For this assignment, you have been asked to write a computer program to automatically analyze some of the data collected by some experiments. Data analysis in scientific research is a complicated endeavor, so we will simplify our task by just calculating average, minimum and maximum for the collected data. There are four trials ran with many different data points for each trial.

Your program will perform the following operations:

1. Get the sample size.
2. For each of the 4 trials:
   a. Reads in the data for each sample and stores them in an array (per trial).
3. Print out data per sample in a table format (see sample run for output formatting). As a hint on formatting the output, the following statement is used to output the table header:
   ```
   System.out.println("\tSample #\tTrial 1\tTrial 2\tTrial 3\tTrial 4");
   ```
4. Print out the average for all data in each trial, along with the minimum average and maximum average values as shown in the sample runs.
   a. You MUST not use any Java library functions (such as sort) to find the max and min. You need to make the comparisons yourself.
5. Figure out how closely the trials match with each other by comparing the minimum and maximum averages.
   a. Matching minimum and maximum averages implies that the trials match exactly in which case output the phrase "`The trials match EXACTLY!`".
   b. The trials concur with each other if the maximum average is less than twice the minimum average in which case output "`The trials concur with each other!`".
   c. Otherwise the difference between the trials is too high and they do not concur with each other in which case output "`The trials do NOT concur!`".
6. Before you submit, in Eclipse, type CTRL-A (to select everything) followed by a CTRL-I (to fix indentation) on `DataAnalyze.java`. In MacOS the corresponding keystrokes are Cmd-A followed by Cmd-I.
7. As in project 1, your program must produce an output that **exactly resembles the Sample Output shown below, including identical wording of prompts, spacing, input locations, etc**.

Sample Runs (user input shown in green, with each run separated by a dashed-line):

```
----------------------------------------SAMPLE RUN 1----------------------------------------
Please enter the sample size: 1
Enter numbers for Trial 0
Enter sample #1: 5
```

```
Enter numbers for Trial 1
Enter sample #1: 4

Enter numbers for Trial 2
Enter sample #1: 4

Enter numbers for Trial 3
Enter sample #1: 3

      Sample #     Trial 1      Trial 2      Trial 3      Trial 4
      1            5            4            4            3
      ------------------------------------------------------------
Averages:          5.0          4.0          4.0          3.0

Min Average: 3.0
Max Average: 5.0

The trials concur with each other!
----------------------------------------SAMPLE RUN 2----------------------------------------
Please enter the sample size: 1

Enter numbers for Trial 1
Enter sample #1: 5

Enter numbers for Trial 2
Enter sample #1: 4

Enter numbers for Trial 3
Enter sample #1: 3

Enter numbers for Trial 4
Enter sample #1: 2

      Sample #     Trial 1      Trial 2      Trial 3      Trial 4
      1            5            4            3            2
      ------------------------------------------------------------
Averages:          5.0          4.0          3.0          2.0

Min Average: 2.0
Max Average: 5.0

The trials do NOT concur!
----------------------------------------SAMPLE RUN 3----------------------------------------
Please enter the sample size: 1
Enter numbers for Trial 1
Enter sample #1: 5

Enter numbers for Trial 2
Enter sample #1: 5

Enter numbers for Trial 3
Enter sample #1: 5

Enter numbers for Trial 4
Enter sample #1: 5

      Sample #     Trial 1      Trial 2      Trial 3      Trial 4
      1            5            5            5            5
      ------------------------------------------------------------
Averages:          5.0          5.0          5.0          5.0
```

```
Min Average: 5.0
Max Average: 5.0

The trials match EXACTLY!
----------SAMPLE RUN 4----------
Please enter the sample size: 2
Enter numbers for Trial 1
Enter sample #1: 5
Enter sample #2: -5

Enter numbers for Trial 2
Enter sample #1: -4
Enter sample #2: 4

Enter numbers for Trial 3
Enter sample #1: 3
Enter sample #2: -3

Enter numbers for Trial 4
Enter sample #1: 2
Enter sample #2: -2

      Sample #     Trial 1      Trial 2      Trial 3      Trial 4
      1            5            -4           3            2
      2            -5           4            -3           -2
      ------------------------------------------------------------
Averages:          0.0          0.0          0.0          0.0

Min Average: 0.0
Max Average: 0.0

The trials match EXACTLY!
----------SAMPLE RUN 5----------
Please enter the sample size: 0
No data to analyze. Ending program.
----------SAMPLE RUN 6----------
Please enter the sample size: 3
Enter numbers for Trial 1
Enter sample #1: 50
Enter sample #2: 49
Enter sample #3: 51

Enter numbers for Trial 2
Enter sample #1: 30
Enter sample #2: 31
Enter sample #3: 32

Enter numbers for Trial 3
Enter sample #1: 25
Enter sample #2: 26
Enter sample #3: 27

Enter numbers for Trial 4
Enter sample #1: 15
Enter sample #2: 16
Enter sample #3: 17

      Sample #     Trial 1      Trial 2      Trial 3      Trial 4
```

```
      1           50          30          25          15
      2           49          31          26          16
      3           51          32          27          17
      ------------------------------------------------------------
Averages:         50          31          26          16

Min Average: 16
Max Average: 50

The trials do NOT concur!
----------------------------------------SAMPLE RUN 7----------------------------------------
Please enter the sample size: 10
Enter numbers for Trial 1
Enter sample #1: 50
Enter sample #2: 51
Enter sample #3: 52
Enter sample #4: 53
Enter sample #5: 54
Enter sample #6: 55
Enter sample #7: -2
Enter sample #8: -5
Enter sample #9: -10
Enter sample #10: 112

Enter numbers for Trial 2
Enter sample #1: 45
Enter sample #2: 43
Enter sample #3: 46
Enter sample #4: 42
Enter sample #5: 47
Enter sample #6: -1
Enter sample #7: -4
Enter sample #8: -10
Enter sample #9: 43
Enter sample #10: 159

Enter numbers for Trial 3
Enter sample #1: 135
Enter sample #2: 36
Enter sample #3: 32
Enter sample #4: 34
Enter sample #5: -4
Enter sample #6: 34
Enter sample #7: -34
Enter sample #8: 45
Enter sample #9: -45
Enter sample #10: 177

Enter numbers for Trial 4
Enter sample #1: 110
Enter sample #2: 19
Enter sample #3: 18
Enter sample #4: 17
Enter sample #5: 16
Enter sample #6: 15
Enter sample #7: 14
Enter sample #8: 13
Enter sample #9: 12
Enter sample #10: 176
```

```
      Sample #     Trial 1      Trial 2      Trial 3      Trial 4
      1            50           45           135          110
      2            51           43           36           19
      3            52           46           32           18
      4            53           42           34           17
      5            54           47           -4           16
      6            55           -1           34           15
      7            -2           -4           -34          14
      8            -5           -10          45           13
      9            -10          43           -45          12
      10           112          159          177          176
      ------------------------------------------------------------
Averages:          41.0         41.0         41.0         41.0

Min Average: 41.0
Max Average: 41.0

The trials match EXACTLY!
```

What to hand in

When you are done with this project, submit all your work through CatCourses.

Before you submit, make sure you have done the following:

1. Attached the `DataAnalyze.java` file.
2. Filled in your collaborator's name (if any) in the "Comments…" text-box (if any) at the submission page.

Also, remember to demonstrate your code to the TA or instructor before the end of the demo period.