LAB 2 REQUIREMENTS

Problem:

In this lab, you will be using Visual Studio to create an application where your program will randomly generate 10 test scores. Your form will contain 10 text boxes, 5 of them will generate random test scores within the range of [**50-100**] and the remaining 5 text boxes will generate random test scores within the range of [**30-100**]

The test score data type should be an Integer. Your program will then will compute the mean and the standard deviation. The formula for the standard deviation is provided for you with this requirements document.

PART A

Your form must contain the following controls:

- 2 group boxes, grpBoxScores1, grpBoxScores2
- 10 label controls to place each Test Score name, Test Score 1, Test Score 2,…
- 10 labels or textbox (set to read only as described below) control to display the test scores. These controls should be named, if you decide to use a label control name the first label control for first test score as lblTestScore1, etc. If you choose to use a text box, make sure to change the read only property of your text box to True and name each text box as txtTestScore1,…etc
- A button named as btnRandom, that, when clicked should display the 10 randomly generated test scores displayed in your labels (or read only text boxes). The Test scores should be integers. Refer to your class notes on how to use the Random object, Next method.
    - Hint: Make sure to declare your random object at class level and your 10 test scores variables at class level, as discussed during lectures.
- A button named as btnComputeStats to compute the mean and the standard deviation. You will be writing your code under its click event to calculate the mean and standard deviation. Remember that you will need to use variables to compute the **mean** and the **standard deviation**.
    - Calculate the sum of all test scores, using your 10 variables.
    - Calculate the sum of the squares of the scores (see below for the standard deviation formula), this should be completed by taking the square of each test score variable and adding them together, for example, SumofSquares= 1^2 + 2^2+ 3^2….
    - Calculate the mean. The mean is computed as the total of the test scores divided by number of test scores.
    - Calculate the standard deviation, use the formula provided for you in this document
- A button named as btnClear to clear all entries on your controls (see below for the sample run)
- A button named as btnExit to exit the application.

Recall that the standard deviation is found by:

$$\sqrt{\frac{\sum_{i=1}^{n}(x_i - \mu)^2}{n}}$$

where *n* is the number of samples selected by the user, x_i is the *i*-th sample, and μ is the mean or average of the samples.

Another way to compute the standard deviation can be derived from the above equation. The result of this derivation is shown below. Use the formula below to compute an 'intermediate' term and account for the mean after we've computed it as shown in class.

$$\sqrt{\frac{\sum\limits_{i=1}^{n}(x_i)^2}{n} - \mu^2}$$

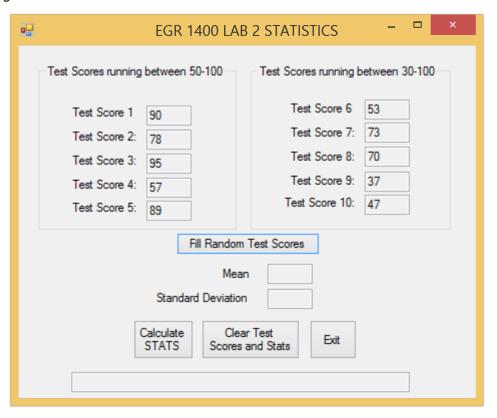Use the following code to define a random number generator:

```
int x1, x2;
Random rand = new Random();
x1 = rand.Next(50, 101);
x2 = rand.Next(50, 101);
```

Using this formula, the standard deviation can be computed by keeping a 'square-sum' in addition to the 'sum' that we kept to compute the mean. After the 'square-sum' has been computed, we can simply divide it by the number of samples, subtract the mean squared, and take the square root to obtain the standard deviation.
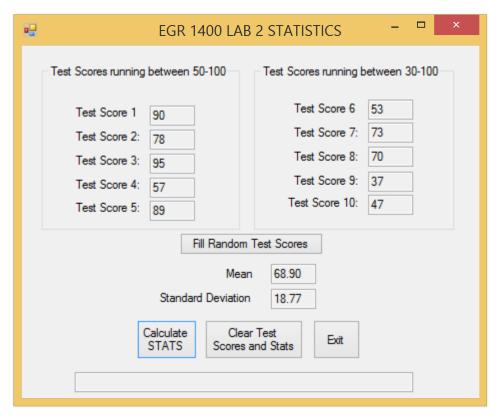
Here is an example form for this lab:

After clicking on the 'Fill Random Test Scores' button

EGR 1400 LAB 2 STATISTICS   — ▢ ✕

Test Scores running between 50-100

Test Score 1   90
Test Score 2:   78
Test Score 3:   95
Test Score 4:   57
Test Score 5:   89

Test Scores running between 30-100

Test Score 6   53
Test Score 7:   73
Test Score 8:   70
Test Score 9:   37
Test Score 10:   47

Fill Random Test Scores

Mean
Standard Deviation

Calculate STATS   Clear Test Scores and Stats   Exit

After the 'Calculate STATS' button is clicked

EGR 1400 LAB 2 STATISTICS   — ▢ ✕

Test Scores running between 50-100

Test Score 1   90
Test Score 2:   78
Test Score 3:   95
Test Score 4:   57
Test Score 5:   89

Test Scores running between 30-100

Test Score 6   53
Test Score 7:   73
Test Score 8:   70
Test Score 9:   37
Test Score 10:   47

Fill Random Test Scores

Mean   68.90
Standard Deviation   18.77

Calculate STATS   Clear Test Scores and Stats   Exit

After the 'Clear Test Scores and Stats' button is clicked

EGR 1400 LAB 2 STATISTICS

Test Scores running between 50-100

Test Score 1

Test Score 2:

Test Score 3:

Test Score 4:

Test Score 5:

Test Scores running between 30-100

Test Score 6

Test Score 7:

Test Score 8:

Test Score 9:

Test Score 10:

Fill Random Test Scores

Mean

Standard Deviation

Calculate STATS

Clear Test Scores and Stats

Exit

And the application will exit when clicked on Exit button ☺

STEPS FOR SUBMITTING YOUR LAB:

For each lab and following comments must be added at the beginning of your Visual C# code.

/*

'LAB #

'SEMESTER NAME

'STUDENT'S FIRST NAME, LAST NAME

'I fully understand the following statement.

'OU PLAGIARISM POLICY

'All members of the academic community at Oakland are expected to practice and uphold 'standards of academic integrity and honesty. An instructor is expected to inform and instruct 'students about the procedures and standards of research and documentation required of students 'in fulfilling course work. A student is expected to follow such instructions and be sure the rules 'and procedures are understood in order to avoid inadvertent misrepresentation of his/her work. 'Students must assume that individual (unaided) work on exams and lab reports and documentation 'of sources is expected unless the instructor specifically says that is not necessary.

'The following definitions are some examples of academic dishonesty:

- 'Plagiarizing from work of others. Plagiarism is using someone else's work or ideas without 'giving the other person credit; by doing this, a student is, in effect, claiming credit for 'someone else's thinking. Whether the student has read or heard the information she/he uses, 'the student must document the source of information. When dealing with written sources, 'a clear distinction would be made between quotations (which reproduce information from 'the source word-for-word within quotation marks) and paraphrases (which digest the 'source information and produce it in the student's own words). Both direct quotations and 'paraphrases must be documented. Just because a student rephrases, condenses or selects 'from another person's work, the ideas are still the other person's, and failure to give 'credit constitutes misrepresentation of the student's actual work and plagiarism of 'another's ideas. Naturally, buying a paper and handing it in as one's own work is 'plagiarism.
- 'Cheating on lab reports falsifying data or submitting data not based on student's own work.

*/

All labs will be submitted electronically, no paper copies will be given to Lab mentors.

Before submission:

- Please create a folder named as Lab2_FName_LName:
- **Place your solution file under this folder.**
- <u>Zip the folder</u> then upload it through Moodle. You will not be able to upload it unless you zip, 7zip or rar the folder.

GETTING READY FOR AN INTERVIEW with your Lab Mentor:

The interview is 40% of your lab grade. Make sure to be prepared for your mentor's questions about your program.

When it is your turn to explain your lab to your lab mentor follow these steps, make sure that your lab mentor sees the following steps

1. Log on to Moodle.
2. Find your submission link for this lab.
3. Download your Lab on your computer
4. Find your lab wherever you downloaded.
5. Make sure to Unzip, (or extract) your folder
6. Open the solution file to demo your lab.

You must follow these steps each time you are being graded for your lab. Your lab mentor must confirm that you downloaded what was submitted on Moodle. You should be graded on what was uploaded on Moodle not on a local copy obtained from your C drive or external drives (i.e. memory sticks).

HOW WILL YOU BE GRADED BY YOUR LAB MENTOR, AND WHAT IS THE GRADING CRITERIA?

1. The application works and was fully tested from what was downloaded and demonstrated from Moodle upload not from a local copy, or any external drive. (50 points)

2. Proper naming conventions were followed as explained in class (10 points)

3. Grade assigned based on oral examination of the students understanding of their solution and the overall quality of the solution (40 points)

GRADE: _____ out of 100