

CSC 2430  
**Lab #1 – Array Statistics**  
Due: Wednesday, January 13, 2016

The purpose of this assignment is to jog your memory in working with arrays and functions and to give you practice working with the .NET C++ compiler. Be sure to implement a clean, well-designed, and commented C++ program solution. Every program that you write must have a comment-heading at the beginning that identifies you and gives a brief synopsis of the purpose of the program. Each function must have a comment in front of its definition that states the purpose of the function, a brief description of the input parameters required by the function, and a clear description of what values the function returns, if any.

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If  $\bar{x}$  denotes the mean (average) of a sequence of numbers  $x_0, x_1, \dots, x_{n-1}$  the **variance** is the average of the squares of the deviations of the numbers from the mean. In other words,

$$\text{variance} = ((x_0 - \bar{x})^2 + (x_1 - \bar{x})^2 + \dots + (x_{n-1} - \bar{x})^2) / n$$

The **standard deviation** is the square root of the *variance*.

Write a program to input an array of 10 real numbers. The program will output the *mean* and the *standard deviation* of the numbers. Input the array values and display the *mean* and *standard deviation* in the `main()` function. The `main()` function must call a function to calculate and return the *mean* and another function to calculate and return the *standard deviation*.

Use the following numbers for a test case:

2.54, 7.0, 5.367, 1.2, 3.85, 2.453, 4.5, 6.34, 3.738, 5.23

Be sure to test your program and use a calculator to check your answers.

Guidelines:

- All of this program input and output should occur in `main()`.
- Your program should be trivial to modify for a different size array and data table.
- Design functions to have parameters for all necessary data values.  
For example: for this program, each function should have 2 parameters (an array parameter and another parameter specifying the number of elements in the array).
- Well-designed functions try to minimize the assumptions necessary in the `main()` program to call them properly. In software systems, this is called "coupling" between modules or functions, and a design goal is to "minimize coupling requirements".  
For example, it should be possible for a `main()` program to call the *standard deviation* function without having to first call the *mean* function. The *standard deviation* function should be designed to call the *mean* function itself to determine the  $\bar{x}$  value.
- Well-designed programs generally avoid using global variables.

**Turn in:**

- 1) Print out of source code.
- 2) Print out of sample run using the test case data.  
(screen shot of the execution window is OK)