This lab is an exercise in reading data from a file into an array, and performing calculations on that data.

Due Date

You must *submit* the source code for the solution to this lab exercise to *Moodle* by

Tuesday, July 1, 2025

in order to receive full credit for this work. You must also *demonstrate* the solution to the instructor during class, at the earliest opportunity.

REMINDER: you may NOT use any code-generating software (such as **ChatGPT**) for this assignment. You may NOT download any code from the Internet for this assignment.

Lab Setup

1. Create the project using *Visual Studio* (or whichever tool set you are using).
2. Download the ZIP file for **Lab07a** from *Moodle*.
3. Copy the sample input files, **`numbers.txt`**, and **`fiveNumbers.txt`** from the ZIP file to the same folder where your source file (`*.cpp`) is located.

Programming Exercise

You must write a program that contains several functions (as described below).

The "**main**" function must:

- Define an **array** of 100 integers (do **NOT** use a vector for this lab exercise):

```
const int ARRAY_SIZE = 100;
int numbers[ARRAY_SIZE];
```

- Output a prompt to the screen, asking the **user** to specify the input file name. (The program must work correctly for ***any*** file name that the user chooses.) Open this file for input. The file contains integers (one per line).
- Read the contents of the file into the array.
- Call four *separate* functions: **getLowest**, **getHighest**, **getSum**, and **getAverage,** and display the value that each function returned. Format the output in a manner similar to the sample output on the next page of this document.

The **getLowest**, **getHighest**, and **getSum** functions must each contain a **loop** that scans the data in the array and returns the appropriate result:

- The **getLowest** function returns the lowest number in the array.
- The **getHighest** function returns the highest number in the array.
- The **getSum** function returns the total of the numbers in the array.

The **getAverage** function must call the **getSum** function, and use its return value to calculate the average of the numbers in the array. The **getAverage** function returns the average value to its caller.

Design Restriction

For this lab exercise you must use an **array** of integers, ***not*** a vector of integers. We will use vectors later in the course, but for now we need to use only arrays.

Submit and Demonstrate the Working Program

- Submit the source code file (`*.cpp`) for the working program to *Moodle.*
- Demonstrate the working program to the instructor during class.

Sample Data Files and Sample Program Output

The ZIP file, which can be downloaded from Moodle, contains two text files. These should be used to test your program. (They are also shown below.) The sample data and sample program output are provided below. (In the sample program output shown in this document, text typed by the user is shown in **BOLD** font. In actuality, all text will be displayed in the same font.)

Input file: numbers.txt

```
53
22
87
103
-3
75
220
1
64
543
98
44
```

Output from processing the numbers.txt file

```
Enter name of input file: numbers.txt
12 numbers read from input file.
The highest value is 543
The lowest value is -3
The sum of the numbers is 1307
The average of the numbers is 108.917
```

Input file: fiveNumbers.txt

```
-53
-22
-87
-103
-3
```

Output from processing the fiveNumbers.txt file

```
Enter name of input file: fiveNumbers.txt
5 numbers read from input file.
The highest value is -3
The lowest value is -103
The sum of the numbers is -268
The average of the numbers is -53.6
```