Assignment #2: Complex **Due:** Wed. Sept. 13th **(midnight)**

Program files:
Code: complex.cpp
Output: a2.txt

Objective:
For this assignment you will create a C++ program that will utilize a structure to represent a complex number. A complex number is a number that is made up a two parts; an 'imaginary' part and a 'real' part. A complex number takes the following form: $a + bi$ or $a - bi$ or $-a + bi$

Program Overview:
As mentioned, this program will utilize a **structure** to represent a complex number. This abstract data type will be named **Complex** and will contain two data members of type **int**. The two data members will be named **imaginary** and **real**.

As with other types of numbers, basic operations such as addition, subtraction and multiplication can be performed on complex numbers. Here are the formulas for carrying out two of these operations:

- Addition
  - (3 + 4i) + (8 + 6i)
  - Add the 'real' parts together, then add the 'imaginary' parts together
  - Resulting in the answer which is a new complex number: (11 + 14i)
- Subtraction
  - (4 + 10i) - (2 + 6i)
  - Subtract the 'real' parts, then subtract the 'imaginary' parts
  - Resulting in the answer which is a new complex number: (2 + 4i)

Program Requirements:
First, your program may NOT contain any global variables. Main() will be responsible for calling functions. Therefore, main() will be a series of function calls along with any necessary variable declarations you will need for you program.

This program should prompt the user to enter two complex numbers. Once the two complex numbers have been entered, the program will add the two complex numbers and display the result then subtract the two complex numbers and also display that result. The results should go to the **console** and to the **external file**, **a2.txt**.

Function Prototypes and Descriptions:

- **void getData(Complex &c1, Complex &c2)**
  - This function will receive two empty Complex number structures by reference and prompt the user for the data and load each of the Complex numbers
  - This program should also welcome the user and explain to the user what they should enter and what the program will do with the data once entered.
- **void addComplex(Complex c1, Complex c2, Complex &sum)**
  - This function will receive three Complex numbers. The two numbers the user entered and one complex number by reference. The function will determine the sum of the first two and store the result in sum.
- **void subtractComplex(Complex c1, Complex&c2, Complex &diff)**
  - This function will receive three Complex numbers. The two numbers the user entered and one complex number by reference. The function will determine the differnce of the first two and store the result in diff.
- **void outputData(Complex c1, Complex c2, Complex sum, Complex diff)**
  - This function will receive all four complex numbers and report on the results. All results will go to both the console and an external file named **a2.txt**.
  - Your output should look similar to the output that follows.

main()

Your main() function should perform the following tasks:

- Declare/define all necessary variables
- Call the **getData** function
- Call the **addComplex** function
- Call the **subtractComplex** function
- Call the **outputData** function

You will run your program 3 times, using the following data:

- First run: (5 + 9i) (12 + 8i)
- Second run: (10 + 5i) (3 + 4i)
- Third run: (2 + 8i) (7 + 13i)

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PROGRAM RESULTS:

The complex numbers:

(5 + 9i) (12 + 8i)
Added together equal: (17 + 17i)
Subtracted equal:     (-7 + 1i)

(10 + 5i) (3 + 4i)
Added together equal: (13 + 9i)
Subtracted equal:     (7 + 1i)

(2 + 8i) (7 + 13i)
Added together equal: (9 + 21i)
Subtracted equal:     (-5 + -5i)
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Please make sure you include the appropriate program header information at the top of the first page of your program (see the department guidelines). When you are finished, compile, and then run the program. If it does not compile, fix any errors and try again. When your program is working, submit your **complex.cpp** file along with your output file, **a2.txt** by midnight on **WEDNESDAY, SEP. 13TH.**