UMass

Electrical and Computer Engineering Department

ECE 264, Object-Oriented Software Development

Lab Assignment 5

Lab 5 :: 100 points (see Grading Notes for details) ::
Wednesday lab session (March 6) Due March 8, Friday by 5:00 pm
Monday lab session (March 11) Due March 13, Wednesday by 5:00 pm

1. Lab Objectives

This lab was designed to reinforce programming concepts from Chapter 3 of *C++ How To Program, 8th Edition*.
In this lab, you will practice:
- Creating new data types by writing class definitions.
- Defining member functions of programmer-defined classes.
- Instantiating objects from programmer-defined classes.
- Calling member functions of programmer-defined classes

2. Deliverables

Create "lab5" sub-directory on your M:\ drive. Submit your file to this sub-directory on the M:\ drive. Call your project *lab5_ Number.* You should place all the source files (.h and .cpp) on the"lab5" sub-directory. Failure to meet this specification will reduce your grade, as described in the ECE 264 lab grading handout, which you are strongly encouraged to read before starting the lab.

3. Description of the Problem (*lab5_ Number)*

Create a class called **Complex** for performing arithmetic with complex numbers. Write a program to test your class. Complex numbers have the form

realPart + imaginaryPart * *i*

where *i* is

$$\sqrt{-1}$$

Use double variables to represent the private data of the class. Provide a constructor that enables an object of this class to be initialized when it is declared. The constructor should contain default values in case no initializers are provided. Provide public member functions that perform the following tasks:

a) Adding two **Complex** numbers: The real parts are added together and the imaginary parts are added together.
b) Subtracting two **Complex** numbers: The real part of the right operand is subtracted from the real part of the left operand and the imaginary part of the right operand is subtracted from the imaginary part of the left operand.
c) Printing **Complex** numbers in the form (a, b) where a is the real part and b is the imaginary part.

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Sample Output

```
(1, 7) + (9, 2) = (10, 9)
(10, 1) - (11, 5) = (-1, -4)
```

Problem-Solving Tips

* In this lab, you must write the definition for class **Complex**.
* Remember to use member-access specifiers **public** and **private** to specify the access level of data members and functions. Carefully consider which access specifier to use for each class member. In general, data members should be private and member functions should be public.

4. Testing Your Program

- For this program, there is no user input so the only way to test your program is to run it and see if it displays all of the information correctly.
- In all of your programs, but especially a program where there isn't any user input, you should focus on making the output easy to read. One of the most difficult things for a user of your program to deal with is poorly formatted output. The easier your output is to read, the easier it is to identify the relevant information that you're producing.