Object Oriented Programming – Fall 22

(BS-CS-F22)

Lab-6

Lab Instructor: Mam Sanam Ahmad

Instructions:

- **Indent your code properly.**
- **Use meaningful variable and function names.**
- **Use the camelCase notation.**
- **Use meaningful prompt lines/labels for all input/output.**
- **Do NOT use any GLOBAL variable(s). However, global named constants may be used.**
- **This is an individual lab, you are strictly NOT allowed to discuss your solution with fellow colleagues, even not allowed to ask how is he/she is doing, it may result in negative marking. You can ONLY discuss with your TAs or with me. • Anyone caught in an act of plagiarism would be awarded an "F" grade in this Lab.**

Do Validations on inputs where required otherwise 1 mark will be deducted for every wrong validation.

TASK-1: Total Marks(50)

You have studied complex numbers in your elementary classes. Recall that complex numbers are of the form $x+yi$ where x and y are real numbers and i is the imaginary unit equal to $\sqrt{-1}$ and $i^2 = -1$. You are required to create **a class**, Complex Numbers such that the class should contain two data members, real and imaginary, both of type double. It should also have the following member functions:

1. **Complex ():** The default constructor that sets both real and imaginary to zero. **(marks 02)**

2. **Complex (double r):** An overloaded constructor that sets real to *r* and imaginary to zero. **(marks 02)**

3. **Complex (double r, double i):** Another overloaded constructor that sets real to *r* and imaginary to *i*. **(marks 02)**
4. **Complex (const Complex & c):** The copy constructor **(marks 04)**
5. **Complex add (Complex c):** This function adds the complex numbers and returns a new complex number that represents their sum. **(marks 05)**
6. **Complex subtract (Complex c):** This function subtracts the two complex numbers. **(marks 05)**
7. **Complex multiply (Complex c):** This function multiplies the two complex numbers. **(marks 05)**
8. **Complex divide (Complex c):** This function divides the complex number c by this. **(marks 05)**
9. **Complex conjugate (Complex c):** This function returns the complex conjugate of c. The complex conjugate of a complex number $z = x + iy$ is defined to be $z = x - iy$. **(marks 02)**
10. **void print ():** The function that prints the complex number object. For eg., if, for the given object, the value of real is 2.4 and that of imaginary is 3.7, this function should print 2.4 + 3.7i on the console. **(marks 02)**
11. Apart from these functions, you should also define the getter and setter functions: **getReal**, **getImag**, **setReal** and **setImag**. **(marks 04)**

Test the program by writing the **main () function.** You should always implement destructors in case of dynamic memory. After coding the program, test your program for various inputs to make sure your program is correct **(marks 12)**