**Name:**

**Java Programming**

**Lab Exercise 11/15/2023**

**Complex Number Class**

Consider the following class definition

public class Complex

{

double real = 0;

double imag = 0; // real, imag are instance variables

public Complex() { } // use default value 0 + i0

public Complex(double r, double i)

{

real = r;

imag = i;

}

public void conjugate()

{

imag = -imag;

}

public Complex add(Complex c)

{

/\* result is also complex so need to introduce another variable of type Complex \*/

Complex sum = new Complex();

sum.real = real + c.real;

sum.imag = imag + c.imag;

return sum;

}

public Complex multiply(Complex c)

{

Complex product = new Complex();

product.real = real\*c.real - imag\*c.imag;

product.imag = real\*c.imag + imag\*c.real;

return product;

}

public String toString()

{

// note example of method overriding

if (imag >= 0)

return real + " + i" + Math.abs(imag);

else

return real + " - i" + Math.abs(imag);

}

}

1. List the fields
2. List the methods

Now let’s see how we can use this class in an application program.

public class ComplexApp

{

public static void main(String[] args)

{

Complex a = new Complex(3.0, 1.0); // complex number 3 + i1

Complex b = new Complex(1.0,-1.0); // complex number 1 - i1

System.out.println(a); // print a using a.toString()

System.out.println(b); // print b using b.toString()

Complex sum = b.add(a); // add a to b

System.out.println(sum); // print sum

Complex product = b.multiply(a); // multiply b by a

System.out.println(product); // print product

a.conjugate(); // complex conjugate of a

System.out.println(a);

}

}

Type in the above programs and save them in a folder as *Complex.java* and *ComplexApp.java*.

Compile and run them.

1. Modify the ComplexTest.java class to use the Scanner class to get input from the keyboard.
2. Add a Subtract and Divide method to your Complex class.
3. Submit your final code for both your Complex and ComplexTest classes.