

Objectives: The objective of this lab was to understand object-oriented programming, write classes and test them. In this lab, I need to create a class called complex to perform arithmetic with complex numbers, including adding 2 complex numbers, subtracting 2 complex numbers, and multiplying 2 complex numbers. Then print the result in a Message Dialog Box. Thus, in order to perform the lab, I need to know how to create a class, provide a constructor that enables an object of this class to be initialized when it is declared, and how to write a method and call it in the program.

**Program:**

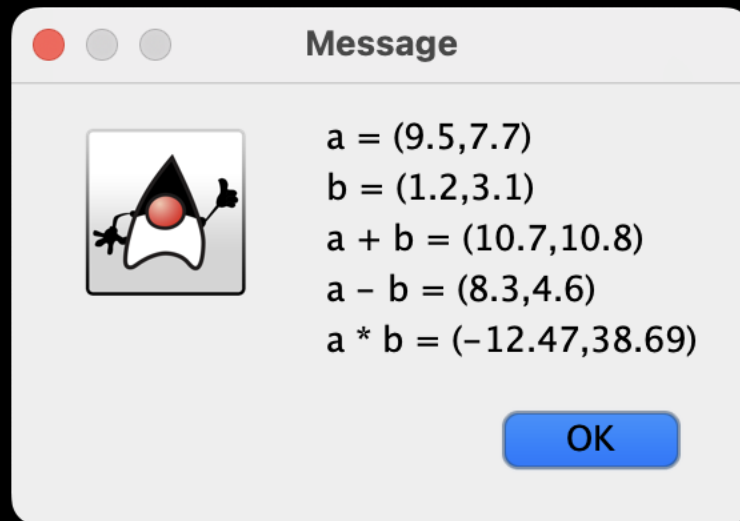
```
1 import javax.swing.JOptionPane;
2
3 public class Complex {
4     double real;
5     double imaginary;
6
7     public Complex(double r, double i) {
8         this.real = r;
9         this.imaginary = i;
10    }
11    public static Complex add(Complex n1, Complex n2) {
12        Complex sum = new Complex(0, 0);
13        sum.real = n1.real + n2.real;
14        sum.imaginary = n1.imaginary + n2.imaginary;
15        return sum;
16    }
17    public static Complex subtract(Complex n1, Complex n2) {
18        Complex diff = new Complex(0, 0);
19        diff.real = n1.real - n2.real;
20        diff.imaginary = n1.imaginary - n2.imaginary;
21        return diff;
22    }
23    public static Complex multiply(Complex n1, Complex n2) {
24        Complex prod = new Complex(0, 0);
25        prod.real = (n1.real * n2.real) - (n1.imaginary * n2.imaginary);
26        prod.imaginary = (n1.real * n2.imaginary) + (n1.imaginary * n2.real);
27        return prod;
28    }
29    public static void printDialog(Complex n1, Complex n2, Complex sum, Complex diff, Complex prod) {
30        JOptionPane.showMessageDialog(null, "a = " + "(" + n1.real + "," + n1.imaginary + ")" + "\n" +
31            "b = " + "(" + n2.real + "," + n2.imaginary + ")" + "\n" +
32            "a + b = " + "(" + sum.real + "," + sum.imaginary + ")" + "\n" +
33            "a - b = " + "(" + diff.real + "," + diff.imaginary + ")" + "\n" +
34            "a * b = " + "(" + prod.real + "," + prod.imaginary + ")");
35    }
36
37    public static void main(String[] args) {
38        Complex com1 = new Complex(9.5, 7.7);
39        Complex com2 = new Complex(1.2, 3.1);
40        Complex sum = add(com1, com2);
41        Complex diff = subtract(com1, com2);
42        Complex prod = multiply(com1, com2);
43        printDialog(com1, com2, sum, diff, prod);
44    }
45 }
```

**Results:**

- The console log executes and the message dialog shows the output

```
st@st Lab 6 % javac Complex.java
st@st Lab 6 % java Complex
```

```
█
```

**Conclusion:**

During the coding process, I have some problems with writing the methods for complex numbers since they need to be declared with 2 attributes of the real and imaginary part. I also understand more about how to create and call a method of a class and understand about how a constructor initializes a class attribute. As a result, my program can create a Complex class to perform arithmetic with complex numbers, including adding 2 complex numbers, subtracting 2 complex numbers, and multiplying 2 complex numbers, then printing the result in a Message Dialog Box. So, the objective of lab 6 has been done.