Lab 5

# Program that randomly generates complex numbers and performs operations (+, -, \*, /) on them.

## Definitions

java.util.Random – It is a library that contains methods to generate random integers, doubles, etc. We use it by initializing an object of type random

Random rand = new Random();

We can then use this object to generate random numbers by calling methods of the Random class.

rand.nextDouble() – This method generates a random number. We specify the range by passing it as a parameter. For instance if we want a random number < 100, we call

rand.nextDouble(100);

We can assign this to a double variable and use it in the future.

## Code

/\* Program to randomly generate

   complex numbers and perform

   operations on them \*/

import java.util.Random;

class Complex {

    private double Re, Im;

    Random rand = new Random();

    public Complex() {

        Re = rand.nextDouble(100);

        Im = rand.nextDouble(100);

    }

    public void printComplex() {

        System.out.printf("%.2f + %.2fi", this.Re, this.Im);

    }

    public static void sum(Complex A, Complex B) {

        Complex C = new Complex();

        C.Re = A.Re + B.Re;

        C.Im = A.Im + B.Im;

        System.out.print("(");

        A.printComplex();

        System.out.print(") + (");

        B.printComplex();

        System.out.print(") = ");

        C.printComplex();

    }

    public static void difference(Complex A, Complex B) {

        Complex C = new Complex();

        C.Re = A.Re - B.Re;

        C.Im = A.Im - B.Im;

        System.out.print("(");

        A.printComplex();

        System.out.print(") - (");

        B.printComplex();

        System.out.print(") = ");

        C.printComplex();

    }

    public static void product(Complex A, Complex B) {

        Complex C = new Complex();

        C.Re = A.Re \* B.Re - A.Im \* B.Im;

        C.Im = A.Re \* B.Im - B.Re \* A.Im;

        System.out.print("(");

        A.printComplex();

        System.out.print(") \* (");

        B.printComplex();

        System.out.print(") = ");

        C.printComplex();

    }

    public static void quotient(Complex A, Complex B) {

        Complex C = new Complex();

        C.Re = (A.Re \* B.Re - A.Im \* B.Im) / (B.Re \* B.Re + B.Im \* B.Im);

        C.Im = (A.Re \* B.Im + A.Im \* B.Re) / (B.Re \* B.Re + B.Im \* B.Im);

        System.out.print("(");

        A.printComplex();

        System.out.print(") / (");

        B.printComplex();

        System.out.print(") = ");

        C.printComplex();

    }

}

public class Lab5 {

    public static void main(String[] args) {

        //Creating 2 random complex numbers

        Complex C1 = new Complex();

        C1.printComplex();

        System.out.println();

        Complex C2 = new Complex();

        C2.printComplex();

        System.out.println();

        System.out.println();

        //Performing operations on them

        Complex.sum(C1, C2);

        System.out.println();

        Complex.difference(C1, C2);

        System.out.println();

        Complex.product(C1, C2);

        System.out.println();

        Complex.quotient(C1, C2);

        System.out.println();

    }

}

## Explanation

In this program, we create a class Complex. When we create an object of this class, the constructor is called, and it generates a random complex number. 2 double values are generated which form the real and imaginary parts of our complex number.

We can perform the +, -, \*, / operations on our complex number using the methods in the complex class. They print the 2 complex numbers being operated on, separated by the appropriate operator, and then print the result.

## Output

