

# LAB 01

Design a class Complex having a real part (x) and an imaginary part (y). Provide methods to perform the following on complex numbers:

- a) Add two complex numbers.
- b) Multiply two complex numbers.
- c) toString() method to display complex numbers in the form:  $x + i y$ .

## CODE:

```
Package Lab1;

import java.util.Scanner;

class complex {

    //Datatype declaration
    int real;
    int img;

    void input() {
        Scanner scn = new Scanner(System.in);

        System.out.println("Please enter the Real Part : ");
        real = scn.nextInt();

        System.out.println("Please enter the Imaginary Part : ");
        img = scn.nextInt();
    }

    //Addition
    void add(complex c2) {
        real = real + c2.real;
        img = img + c2.img;
    }

    //Multiplication
    void multiply(complex c2) {
        real = (real * c2.real) - (img * c2.img);
        img = (real * c2.img) + (img * c2.real);
    }

    //Overloading toString
    public String toString() {
        return real + " + " + img + "i";
    }
}

class lab1 {

    public static void main(String args[]) {

        complex c1 = new complex();
        complex c2 = new complex();

        c1.input();
        System.out.println("Entered Value : " + c1);
        c2.input();
        System.out.println("Entered Value : " + c2);
        System.out.println("Complex Number after Addition :");

        c1.add(c2);
        System.out.println(c1);
    }
}
```

```
        System.out.println("Complex Number after Multiplication : ");  
  
        c1.multiply(c2);  
        System.out.println(c1);  
    }  
}
```

## OUTPUT:

```
Please enter the Real Part :  
7  
Please enter the Imaginary Part :  
21  
Entered Value : 7 + 21i  
Please enter the Real Part :  
11  
Please enter the Imaginary Part :  
22  
Entered Value : 11 + 22i  
Complex Number after Addition :  
18 + 43i  
Complex Number after Multiplication :  
-748 + -15983i  
  
Process finished with exit code 0
```

# LAB 02

Create a class TwoDim which contains private members as x and y coordinates in package P1. Define the default constructor, a parameterized constructor and override toString() method to display the co-ordinates. Now reuse this class and in package P2 create another class ThreeDim, adding a new dimension as z as its private member. Define the constructors for the subclass and override toString() method in the subclass also. Write appropriate methods to show dynamic method dispatch. The main() function should be in a package P.

## CODE:

### PACKAGE P1

```
package P1;

public class TwoDim {
    private int x;
    private int y;

    public TwoDim() {
        this.x = 0;
        this.y = 0;
    }

    public TwoDim(int x, int y) {
        this.x = x;
        this.y = y;
    }

    public String toString() {
        return "Co-ordinates : x = " + x + "; y = " + y;
    }
}
```

### PACKAGE P2

```
package P2;

import P1.TwoDim;

public class ThreeDim extends TwoDim {

    private int z;

    public ThreeDim() {
        super(0, 0);
        this.z = 0;
    }

    public ThreeDim(int x, int y, int z) {
        super(x, y);
        this.z = z;
    }

    public String toString() {
        return super.toString() + "; z = " + z;
    }
}
```

## PACKAGE P

```
package P;

import P1.TwoDim;
import P2.ThreeDim;

public class Main {
    public static void main(String[] args) {

        TwoDim d1 = new TwoDim(7, 21);
        System.out.println(d1);

        ThreeDim d3 = new ThreeDim(7, 8, 6);
        System.out.println(d3);
    }
}
```

## OUTPUT:

```
Co-ordinates : x = 7; y = 21
Co-ordinates : x = 7; y = 8; z = 6

Process finished with exit code 0
```