Assignment 3

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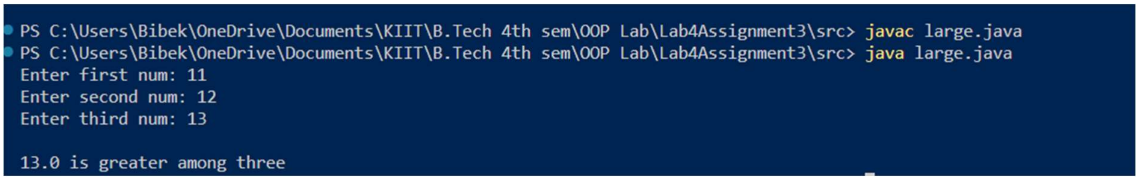
Q.1) Write a program in Java to find the largest among 3 user entered nos. through command line.

```
import java.util.Scanner;

public class large {
    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in);
        System.out.print("Enter first num: ");
        double num1 = scan.nextDouble();
        System.out.print("Enter second num: ");
        double num2 = scan.nextDouble();
        System.out.print("Enter third num: ");
        double num3 = scan.nextDouble();
        System.out.print("\n");
        if (num1 > num2 && num1 > num3) {
            System.out.println(num1 + " is greater among three");
        } else if (num2 > num1 && num2 > num3) {
            System.out.println(num2 + " is greater among three");
        } else if (num3 > num1 && num3 > num2) {
            System.out.println(num3 + " is greater among three");
        } else {
            System.out.println("Please enter a valid number sequence:)");
        }
        scan.close();
    }
}
```

Output



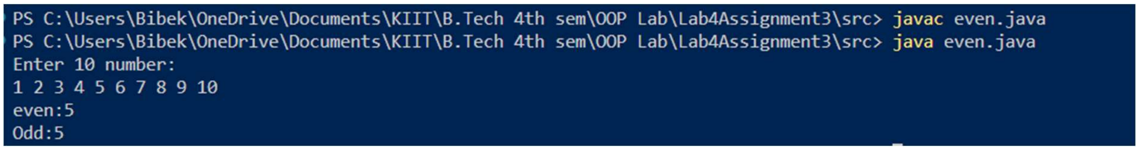
```
PS C:\Users\Bibek\OneDrive\Documents\KIIT\B.Tech 4th sem\OOP Lab\Lab4Assignment3\src> javac large.java
PS C:\Users\Bibek\OneDrive\Documents\KIIT\B.Tech 4th sem\OOP Lab\Lab4Assignment3\src> java large.java
Enter first num: 11
Enter second num: 12
Enter third num: 13

13.0 is greater among three
```

Q.2) Write a program in Java to accept 10 numbers from command line and check how many of them are even and how many odd.

```
import java.util.*;
public class even {
    public static void main(String args[]) {
        int even_count = 0;
        int odd_count = 0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter 10 number:");
        int num[] = new int[10];
        for (int i = 0; i <= 9; i++) {
            num[i] = sc.nextInt();
        }
        for (int i = 0; i <= 9; i++) {
            if (num[i] % 2 == 0) {
                even_count++;
            } else {
                odd_count++;
            }
        }
        sc.close();
        System.out.println("even:" + even_count);
        System.out.println("Odd:" + odd_count);
    }
}
```

Output



```
PS C:\Users\Bibek\OneDrive\Documents\KIIT\B.Tech 4th sem\OOP Lab\Lab4Assignment3\src> javac even.java
PS C:\Users\Bibek\OneDrive\Documents\KIIT\B.Tech 4th sem\OOP Lab\Lab4Assignment3\src> java even.java
Enter 10 number:
1 2 3 4 5 6 7 8 9 10
even:5
Odd:5
```

Q.3)
Write a program in Java to create a class – Box with three data members (length, width, height) and a method volume (). Also implement the application class Demo where an object of the box class is created withuser entered dimensions and volume is printed.

```
import java.util.*;

class Box {
    int length;
    int width;
    int height;

    void volume() {
        System.out.println(length * width * height);
    }
}

public class BoxDimension {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        Box b1 = new Box();
        System.out.print("Enter length :- ");
        b1.length = sc.nextInt();
        System.out.print("Enter width :- ");
        b1.width = sc.nextInt();
        System.out.print("Enter height :- ");
        b1.height = sc.nextInt();
        b1.volume();
        sc.close();
    }
}
```

Output

```
Enter length :- 10
Enter width :- 11
Enter height :- 12
1320
```

Q.4) Write a program in Java to overload subtract method with various parameters in a class.

```
class subtractOverload {
    public int subtract(int a, int b) {
        return a - b;
    }

    public int subtract(int a, int b, int c) {
        return a - b - c;
    }
}

public class Subtract {
    public static void main(String[] args) {
        subtractOverload s1 = new subtractOverload();
        System.out.println("Subtract of 2 integers:" + s1.subtract(3, 6));
        System.out.println("Subtract of 3 integers:" + s1.subtract(4, 6, 7));

    }
}
```

output

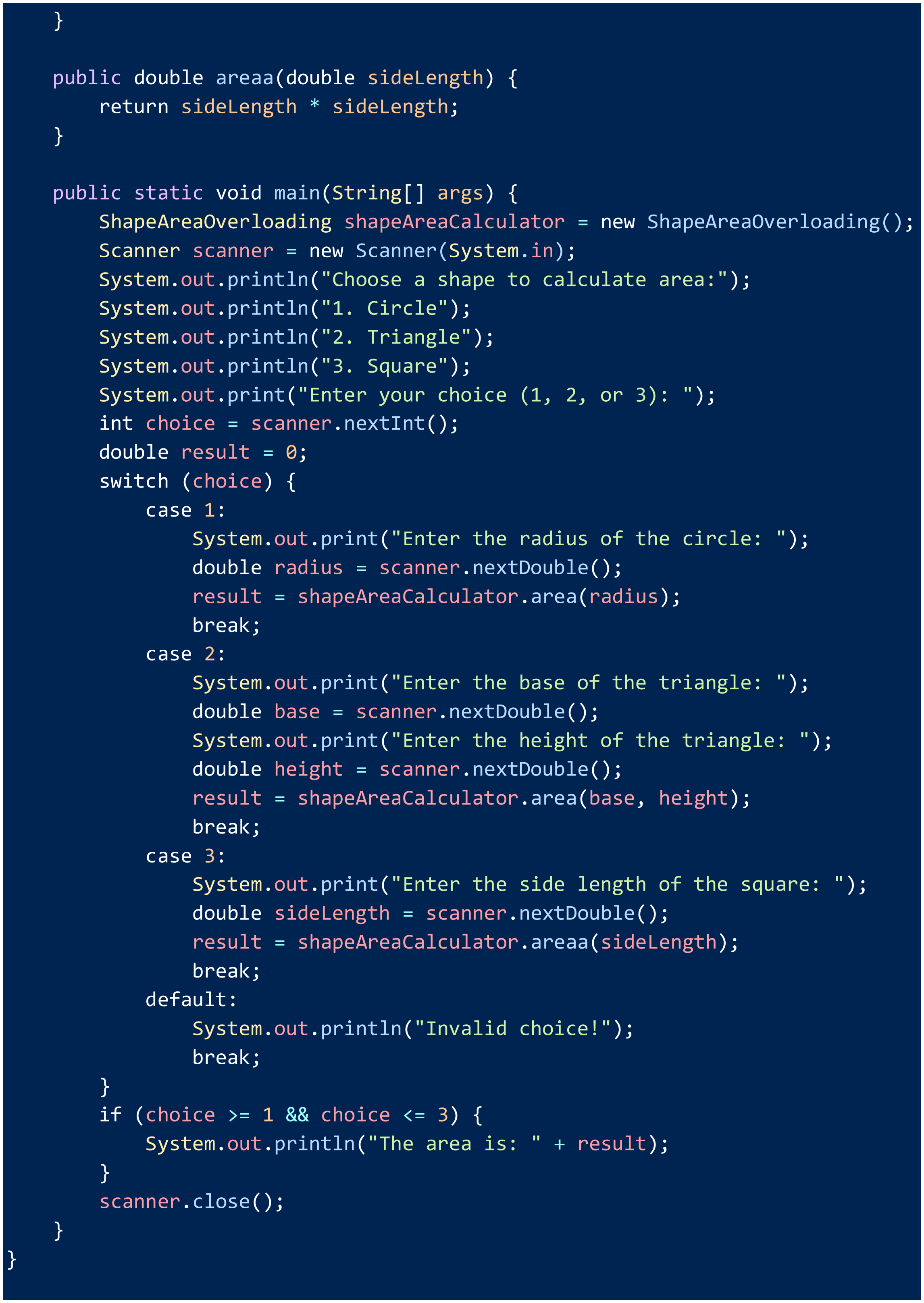
```
Subtract of 2 integers:-3
Subtract of 3 integers:-9
```

Q.5)Write a program in Java which will overload the area () method and display the area of a circle, triangle and square as per user choice and user entered dimensions.

```
import java.util.Scanner;

public class ShapeAreaOverloading {
    public double area(double radius) {
        return Math.PI * radius * radius;
    }

    public double area(double base, double height) {
        return 0.5 * base * height;
```



```
    }

    public double areaa(double sideLength) {
        return sideLength * sideLength;
    }

    public static void main(String[] args) {
        ShapeAreaOverloading shapeAreaCalculator = new ShapeAreaOverloading();
        Scanner scanner = new Scanner(System.in);
        System.out.println("Choose a shape to calculate area:");
        System.out.println("1. Circle");
        System.out.println("2. Triangle");
        System.out.println("3. Square");
        System.out.print("Enter your choice (1, 2, or 3): ");
        int choice = scanner.nextInt();
        double result = 0;
        switch (choice) {
            case 1:
                System.out.print("Enter the radius of the circle: ");
                double radius = scanner.nextDouble();
                result = shapeAreaCalculator.area(radius);
                break;
            case 2:
                System.out.print("Enter the base of the triangle: ");
                double base = scanner.nextDouble();
                System.out.print("Enter the height of the triangle: ");
                double height = scanner.nextDouble();
                result = shapeAreaCalculator.area(base, height);
                break;
            case 3:
                System.out.print("Enter the side length of the square: ");
                double sideLength = scanner.nextDouble();
                result = shapeAreaCalculator.areaa(sideLength);
                break;
            default:
                System.out.println("Invalid choice!");
                break;
        }
        if (choice >= 1 && choice <= 3) {
            System.out.println("The area is: " + result);
        }
        scanner.close();
    }
}
```

Output

```
Choose a shape to calculate area:
1. Circle
```

```
2. Triangle
3. Square
Enter your choice (1, 2, or 3): 3
Enter the side length of the square: 5
The area is: 25.0
```

Q.6) Write a program in Java to define a class Rectangle having data member: length and breadth; to calculate the area and perimeter of the rectangle. Use constructor to read, and member functions to calculate and display.

```java
import java.util.Scanner;
class Rectangle {
    private double length;
    private double breadth;
    public Rectangle(double length, double breadth) {
        this.length = length;
        this.breadth = breadth;
    }
    public double calculateArea() {
        return length * breadth;
    }
    public double calculatePerimeter() {
        return 2 * (length + breadth);
    }
    public void display() {
        System.out.println("Area: " + calculateArea());
        System.out.println("Perimeter: " + calculatePerimeter());
    }
}
public class RectangleDimension {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the length of the rectangle: ");
        double length = scanner.nextDouble();
        System.out.print("Enter the breadth of the rectangle: ");
        double breadth = scanner.nextDouble();
        Rectangle rectangle = new Rectangle(length, breadth);
        rectangle.display();
        scanner.close();
    }
}
```

Output

```
Enter the length of the rectangle: 5
Enter the breadth of the rectangle: 7
Area: 35.0
Perimeter: 24.0
```

Q.7) Write a program in java to input the details of a student having roll, name, full_mark and secured_mark as data members using constructor, then calculate the CGPA and display the details of student with CGPA.

```
import java.util.Scanner;
public class StudentCGPA {
    private int roll;
    private String name;
    private int fullMarks;
    private int securedMarks;
    private double cgpa;
    public StudentCGPA(int roll, String name, int fullMarks, int securedMarks)
{
        this.roll = roll;
        this.name = name;
        this.fullMarks = fullMarks;
        this.securedMarks = securedMarks;
    }
    public void calculateCGPA() {
        cgpa = (securedMarks * 100.0) / fullMarks;
    }
    public void displayDetails() {
        System.out.println("Roll: " + roll);
        System.out.println("Name: " + name);
        System.out.println("Full Marks: " + fullMarks);
        System.out.println("Secured Marks: " + securedMarks);
        System.out.println("CGPA: " + cgpa);
    }
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter student roll: ");
        int roll = input.nextInt();
        System.out.print("Enter student name: ");
        String name = input.next();
        System.out.print("Enter full marks: ");
        int fullMarks = input.nextInt();
        System.out.print("Enter secured marks: ");
        int securedMarks = input.nextInt();
        StudentCGPA student = new StudentCGPA(roll, name, fullMarks,
securedMarks);
        student.calculateCGPA();
        student.displayDetails();
        input.close();
    }
}
```

Output

```
Enter student roll: 4029
Enter student name: Bibek
Enter full marks: 92
Enter secured marks: 89
Roll: 4029
Name: Bibek
Full Marks: 92
Secured Marks: 89
CGPA: 96.73913043478261
```

Q.8) Write a program in Java to create a class MyVolume with required data members and find the volume of cube, cuboid and sphere using constructor overloading.

```java
import java.util.Scanner;
class MyVolume {
    private double volume;
    public MyVolume(double side) {
        volume = Math.pow(side, 3);
    }
    public MyVolume(double length, double width, double height) {
        volume = length * width * height;
    }
    public MyVolume(double radius, String shape) {
        if (shape.equalsIgnoreCase("sphere")) {
            volume = (4.0 / 3.0) * Math.PI * Math.pow(radius, 3);
        } else {
            System.out.println("Invalid shape provided for volume
calculation.");
        }
    }
    public void displayVolume() {
        System.out.println("Volume: " + volume);
    }
}
public class MyVolumes {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter side length of the cube: ");
        double cubeSide = scanner.nextDouble();
        MyVolume cubeVolume = new MyVolume(cubeSide);
        System.out.print("Volume of Cube - ");
        cubeVolume.displayVolume();
        System.out.print("\nEnter length of the cuboid: ");
        double cuboidLength = scanner.nextDouble();
        System.out.print("Enter width of the cuboid: ");
        double cuboidWidth = scanner.nextDouble();
        System.out.print("Enter height of the cuboid: ");
        double cuboidHeight = scanner.nextDouble();
        MyVolume cuboidVolume = new MyVolume(cuboidLength, cuboidWidth,
cuboidHeight);
        System.out.print("Volume of Cuboid - ");
        cuboidVolume.displayVolume();
        System.out.print("\nEnter radius of the sphere: ");
        double sphereRadius = scanner.nextDouble();
        MyVolume sphereVolume = new MyVolume(sphereRadius, "sphere");
        System.out.print("Volume of Sphere - ");
        sphereVolume.displayVolume();
        scanner.close();
    }
}
```

Output

```
Enter side length of the cube: 3
Volume of Cube - Volume: 27.0

Enter length of the cuboid: 3
Enter width of the cuboid: 5
Enter height of the cuboid: 6
Volume of Cuboid - Volume: 90.0

Enter radius of the sphere: 5
Volume of Sphere - Volume: 523.5987755982989
```

Q.9) A plastic manufacturer sells plastic in different shapes like 2D sheet and 3D box. The cost of sheet is Rs 40/ per square ft. and the cost of box is Rs 60/ per cubic ft. Implement it in Java to calculate the cost of plastic as per the dimensions given by the user where 3D inherits from 2D.

```
abstract class Plastic {
    double costPerUnitArea;
    Plastic(double costPerUnitArea) {
        this.costPerUnitArea = costPerUnitArea;
    }
    abstract double calculateCost(double[] dimensions);
    double calculateCost(double dimension) {
        return costPerUnitArea * dimension;
    }
}
class PlasticSheet extends Plastic {
    PlasticSheet() {
        super(40);
    }
    @Override
    double calculateCost(double[] dimensions) {
        double length = dimensions[0];
        double width = dimensions[1];
        return costPerUnitArea * length * width;
    }
}
```

```
class PlasticBox extends Plastic {
    PlasticBox() {
        super(60);
    }
    @Override
    double calculateCost(double[] dimensions) {
        double length = dimensions[0];
        double width = dimensions[1];
        double height = dimensions[2];
        return costPerUnitArea * length * width * height;
    }
}
public class PlasticCostCalculator {
    public static void main(String[] args) {
        PlasticSheet sheet = new PlasticSheet();
        double[] sheetDimensions = {10.0, 15.0};
        double sheetCost = sheet.calculateCost(sheetDimensions);
        System.out.println("Cost of plastic sheet: " + sheetCost);
        PlasticBox box = new PlasticBox();
        double[] boxDimensions = {12.0, 8.0, 6.0};
        double boxCost = box.calculateCost(boxDimensions);
        System.out.println("Cost of plastic box: " + boxCost);
    }
}
```

Output

```
Cost of plastic sheet: 6000.0
Cost of plastic box: 34560.0
```

Q. 10) SOLVE THE PROBLEM AVAILABLE IN THE ATTACHMENT.

a) Implement a class Triangle having data members a,b,c as it's sides. Include the following methods:

i. set Dim(): is used to initialize the data members a,b and c.
ii. boolean is_Triangle(): is used to check whether the sides are permissible values to form triangle or not.
iii. float_find_area(): this method is only invoked if is_Triangle() is true otherwise appropriate message is displayed.
iv. float_find_perimeter(): this method is only invoked if is_Triangle() is true otherwise appropriate message is displayed.
v. void show(): is used to display the sides, area and perimeter of the triangle.

Write down the application class Triangle_Demo where the functionality of the Triangle class is tested.

```
import java.util.Scanner;
class Triangle {
    private float a, b, c;
    public void setDim(float sideA, float sideB, float sideC) {
        a = sideA;
        b = sideB;
        c = sideC;
    }
    public boolean is_Triangle() {
        return (a + b > c) && (b + c > a) && (c + a > b);
    }
    public float find_area() {
        if (is_Triangle()) {
            float s = (a + b + c) / 2;
            return (float) Math.sqrt(s * (s - a) * (s - b) * (s - c));
        } else {
            System.out.println("Invalid sides for a triangle. Cannot calculate
area.");
            return -1;
        }
    }
    public float find_perimeter() {
        if (is_Triangle()) {
            return a + b + c;
        } else {
            System.out.println("Invalid sides for a triangle. Cannot calculate
perimeter.");
            return -1;
        }
    }
    public void show() {
        System.out.println("Sides of the triangle: a=" + a + ", b=" + b + ",
c=" + c);
        System.out.println("Area of the triangle: " + find_area());
        System.out.println("Perimeter of the triangle: " + find_perimeter());
    }
}
public class TriangleDimension {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Triangle triangle = new Triangle();
        System.out.println("Enter the sides of the triangle:");
        System.out.print("Enter side a: ");
        float sideA = scanner.nextFloat();
        System.out.print("Enter side b: ");
        float sideB = scanner.nextFloat();
        System.out.print("Enter side c: ");
        float sideC = scanner.nextFloat();
        triangle.setDim(sideA, sideB, sideC);
        if (triangle.is_Triangle()) {
            triangle.show();
        } else {
            System.out.println("Invalid sides for a triangle.");
        }
        scanner.close();
    }
}
```

Output

```
Enter the sides of the triangle:
Enter side a: 5
Enter side b: 3
Enter side c: 6
Sides of the triangle: a=5.0, b=3.0, c=6.0
Area of the triangle: 7.483315
Perimeter of the triangle: 14.0
```

b) Implement a class Number having data members value. Include the following predicate methods:

i. boolean is_Even():(): is used to check whether the value is even or not.
ii. boolean is_Prime():(): is used to check whether the value is prime or not.
iii. boolean is_Perfect():(): is used to check whether the value is Perfect or not.
iv. int fin_Factorial(): recursive method to find the factorial.

Write down the application class Number_Demo where the functionality of the Number class is tested.

```
import java.util.Scanner;
class Number {
    private int value;
    public void setValue(int value) {
        this.value = value;
    }
    public boolean isEven() {
        return value % 2 == 0;
    }
    public boolean isPrime() {
        if (value <= 1) {
            return false;
        }
        for (int i = 2; i <= Math.sqrt(value); i++) {
            if (value % i == 0) {
                return false;
            }
        }
        return true;
    }
    public boolean isPerfect() {
        int sum = 1;
        for (int i = 2; i <= value / 2; i++) {
            if (value % i == 0) {
                sum += i;
            }
        }
        return sum == value;
    }
    public int findFactorial() {
        if (value < 0) {
            System.out.println("Factorial is not defined for negative
numbers.");
            return -1;
        }
        return recursiveFactorial(value);
    }
    private int recursiveFactorial(int n) {
        if (n == 0 || n == 1) {
            return 1;
        } else {
            return n * recursiveFactorial(n - 1);
        }
    }
}
public class Numbers {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Number number = new Number();
        System.out.print("Enter a number: ");
        int inputValue = scanner.nextInt();
        number.setValue(inputValue);
        System.out.println("Number is even: " + number.isEven());
        System.out.println("Number is prime: " + number.isPrime());
        System.out.println("Number is perfect: " + number.isPerfect());
        System.out.println("Factorial of the number: " +
number.findFactorial());
        scanner.close();
    }
}
```

Output

```
Enter a number: 3
Number is even: false
Number is prime: true
Number is perfect: false
Factorial of the number: 6
```

c) Implement a Point class for three diemensional point(x,y,z). Include appropriate constructors :

Point(), Point(int,int,int) and Point(Point). Include the following methods

i. float find_distance(): distance from the origin (0,0,0).
ii. float find_distance(int x1, int y2, int z2): distance between (x,y,z) and (x1,y1,z1).
iii. float find_distance(Point P1): distance between two points.
iv. boolean is_Equal(Point P1): equality between two points.
v. void show(): shows the description about the point object.

Write down the application class Point Demo where the functionality of the Point class is tested.

```
import java.util.Scanner;
class Point {
    private int x, y, z;
    public Point() {
        x = 0;
        y = 0;
        z = 0;
    }
    public Point(int x, int y, int z) {
        this.x = x;
        this.y = y;
        this.z = z;
    }
    public Point(Point point) {
        this.x = point.x;
        this.y = point.y;
        this.z = point.z;
    }
    public float find_distance() {
        return (float) Math.sqrt(x * x + y * y + z * z);
    }
    public float find_distance(int x1, int y1, int z1) {
        return (float) Math.sqrt(Math.pow(x1 - x, 2) + Math.pow(y1 - y, 2) +
Math.pow(z1 - z, 2));
    }
    public float find_distance(Point P1) {
        return (float) Math.sqrt(Math.pow(P1.x - x, 2) + Math.pow(P1.y - y, 2)
+ Math.pow(P1.z - z, 2));
    }
    public boolean is_Equal(Point P1) {
        return x == P1.x && y == P1.y && z == P1.z;
    }
    public void show() {
        System.out.println("Point coordinates: (" + x + ", " + y + ", " + z +
")");
    }
}
```

```
public class Points {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Point originPoint = new Point();
        Point userPoint = new Point(3, 4, 5);
        Point copiedPoint = new Point(userPoint);
        System.out.println("Distance from origin: " +
originPoint.find_distance());
        System.out.println("Distance from user-defined point: " +
userPoint.find_distance());
        System.out.println("Distance between user-defined point and (0,0,0): "
+ userPoint.find_distance(0, 0, 0));
        System.out.println(
                "Distance between user-defined point and copied point: " +
userPoint.find_distance(copiedPoint));
        System.out.println("Equality between user-defined point and copied
point: " + userPoint.is_Equal(copiedPoint));
        originPoint.show();
        userPoint.show();
        copiedPoint.show();
        scanner.close();
    }
}
```

Output

```
Distance from origin: 0.0
Distance from user-defined point: 7.071068
Distance between user-defined point and (0,0,0): 7.071068
Distance between user-defined point and copied point: 0.0
Equality between user-defined point and copied point: true
Point coordinates: (0, 0, 0)
Point coordinates: (3, 4, 5)
Point coordinates: (3, 4, 5)
```