Ques1: Write a class file – 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 with user entered dimensions and volume is printed.

```java
import java.util.Scanner;

class Box {

    public double length;
    public double width;
    public double height;

    public Box(double length, double width, double height) {
        this.length = length;
        this.width = width;
        this.height = height;
    }

    public double volume() {
        return length * width * height;
    }
}

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

        Scanner scanner = new Scanner(System.in);

        System.out.println("Enter the dimensions of the box:");

        System.out.print("Length: ");
        double length = scanner.nextDouble();

        System.out.print("Width: ");
        double width = scanner.nextDouble();

        System.out.print("Height: ");
        double height = scanner.nextDouble();

        Box myBox = new Box(length, width, height);

        System.out.println("Volume of the box: " + myBox.volume());

        scanner.close();
    }
}
```

Ques2: Write a program in Java to create a class Rectangle having data members length and breadth and three methods called read, calculate and display to read the values of length and breadth, calculate the area and perimeter of the rectangle and display the result respectively.

```java
import java.util.Scanner;

class Rectangle {

    public double length;
    public double breadth;

    public void read() {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter length: ");
        length = scanner.nextDouble();

        System.out.print("Enter breadth: ");
        breadth = scanner.nextDouble();

        scanner.close();
    }

    public void calculate() {
        double area = length * breadth;
        double perimeter = 2 * (length + breadth);

        display(area, perimeter);
    }

    public void display(double area, double perimeter) {
        System.out.println("Area of the rectangle: " + area);
        System.out.println("Perimeter of the rectangle: " + perimeter);
    }
}

public class program2 {
    public static void main(String[] args) {

        Rectangle myRectangle = new Rectangle();

        myRectangle.read();

        myRectangle.calculate();
    }
}
```

Ques3: Write a program in java to input and display the details of n number of students having roll, name and cgpa as data members. Also display the name of the student having lowest cgpa.

```java
import java.util.Scanner;

class Student {
    int roll;
    String name;
    double cgpa;

    public Student(int roll, String name, double cgpa) {
        this.roll = roll;
        this.name = name;
        this.cgpa = cgpa;
    }
}

public class program3 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the number of students: ");
        int n = scanner.nextInt();

        Student[] students = new Student[n];

        for (int i = 0; i < n; i++) {
            System.out.println("Enter details for student " + (i + 1) + ":");
            System.out.print("Roll: ");
            int roll = scanner.nextInt();
            scanner.nextLine();
            System.out.print("Name: ");
            String name = scanner.nextLine();
            System.out.print("CGPA: ");
            double cgpa = scanner.nextDouble();

            students[i] = new Student(roll, name, cgpa);
        }

        System.out.println("\nDetails of students:");
        for (Student student : students) {
            System.out.println("Roll: " + student.roll + ", Name: " +
student.name + ", CGPA: " + student.cgpa);
        }

        Student lowestCGPAStudent = students[0];
        for (int i = 1; i < n; i++) {
            if (students[i].cgpa < lowestCGPAStudent.cgpa) {
                lowestCGPAStudent = students[i];
```

```
            }
        }

        System.out.println("\nStudent with the lowest CGPA:");
        System.out.println("Roll: " + lowestCGPAStudent.roll + ", Name: " +
lowestCGPAStudent.name + ", CGPA: "
                + lowestCGPAStudent.cgpa);

        scanner.close();
    }
}
```

Ques4: Write a program to overload subtract method with various parameters in a class in Java. Write the driver class to use the different subtract methods using object.

```
class Calculator {

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

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

    public int subtract(int[] numbers) {
        int result = numbers[0];
        for (int i = 1; i < numbers.length; i++) {
            result -= numbers[i];
        }
        return result;
    }

    public double subtract(double[] numbers) {
        double result = numbers[0];
        for (int i = 1; i < numbers.length; i++) {
            result -= numbers[i];
        }
        return result;
    }
}

public class program4 {
    public static void main(String[] args) {
        Calculator calculator = new Calculator();

        int resultInt = calculator.subtract(10, 5);
```

```
        System.out.println("Subtraction of two integers: " + resultInt);

        double resultDouble = calculator.subtract(7.5, 3.2);
        System.out.println("Subtraction of two doubles: " + resultDouble);

        int[] numbersInt = { 20, 3, 5 };
        resultInt = calculator.subtract(numbersInt);
        System.out.println("Subtraction of an array of integers: " +
resultInt);

        double[] numbersDouble = { 15.5, 2.5, 4.8 };
        resultDouble = calculator.subtract(numbersDouble);
        System.out.println("Subtraction of an array of doubles: " +
resultDouble);
    }
}
```

Ques5: Write a program 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;

class ShapeAreaCalculator {

    public double area(double radius) {
        double circleArea = 3.14 * radius * radius;
        System.out.println("Area of the circle with radius " + radius + " is:
" + circleArea);
    return circleArea;
    }

    public void area(double base, double height) {
        double triangleArea = 0.5 * base * height;
        System.out.println("Area of the triangle with base " + base + " and
height " + height + " is: " + triangleArea);
    }

    public float area(int sideLength) {
        int squareArea = sideLength * sideLength;
        System.out.println("Area of the square with side length " + sideLength
+ " is: " + squareArea);
    return squareArea;
    }
}

public class program5 {
    public static void main(String[] args) {
```

```
        Scanner scanner = new Scanner(System.in);
        ShapeAreaCalculator calculator = new ShapeAreaCalculator();

        System.out.println("Choose a shape to calculate the area:");
        System.out.println("1. Circle");
        System.out.println("2. Triangle");
        System.out.println("3. Square");

        System.out.print("Enter your choice (1/2/3): ");
        int choice = scanner.nextInt();

        switch (choice) {
            case 1:
                System.out.print("Enter the radius of the circle: ");
                double radius = scanner.nextDouble();
                calculator.area(radius);
                break;
            case 2:
                System.out.print("Enter the base length of the triangle: ");
                double base = scanner.nextDouble();
                System.out.print("Enter the height of the triangle: ");
                double height = scanner.nextDouble();
                calculator.area(base, height);
                break;
            case 3:
                System.out.print("Enter the side length of the square: ");
                double sideLength = scanner.nextInt();
                calculator.area(sideLength);
                break;
            default:
                System.out.println("Invalid choice! Please choose 1, 2, or
3.");
        }

    }
}
```

Ques6: Write a program in java using constructor overloading concept to calculate the area of a rectangle having data member as length and breadth. Use default constructor to initialize the value of the data member to zero and parameterized constructor to initialize the value of data member according to the user input.

```
public class program6 {
    private double length;
    private double breadth;
```

```
    public program6() {
        length = 0;
        breadth = 0;
    }


    public program6(double length, double breadth) {
        this.length = length;
        this.breadth = breadth;
    }


    public double calculateArea() {
        return length * breadth;
    }

    public static void main(String[] args) {

        program6 defaultRectangle = new program6();
        System.out.println("Area of default rectangle: " +
defaultRectangle.calculateArea());


        program6 customRectangle = new program6(5.0, 3.0);
        System.out.println("Area of custom rectangle: " +
customRectangle.calculateArea());
    }
}
```