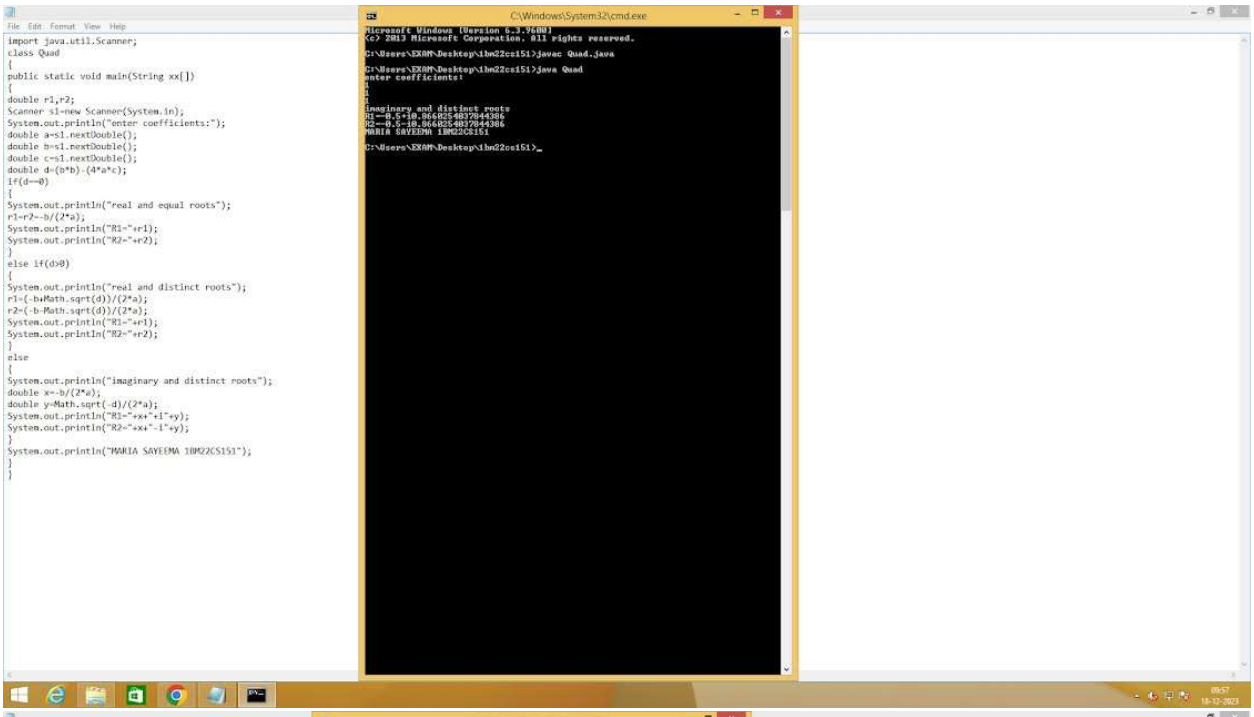
MARIA SAYEEMA

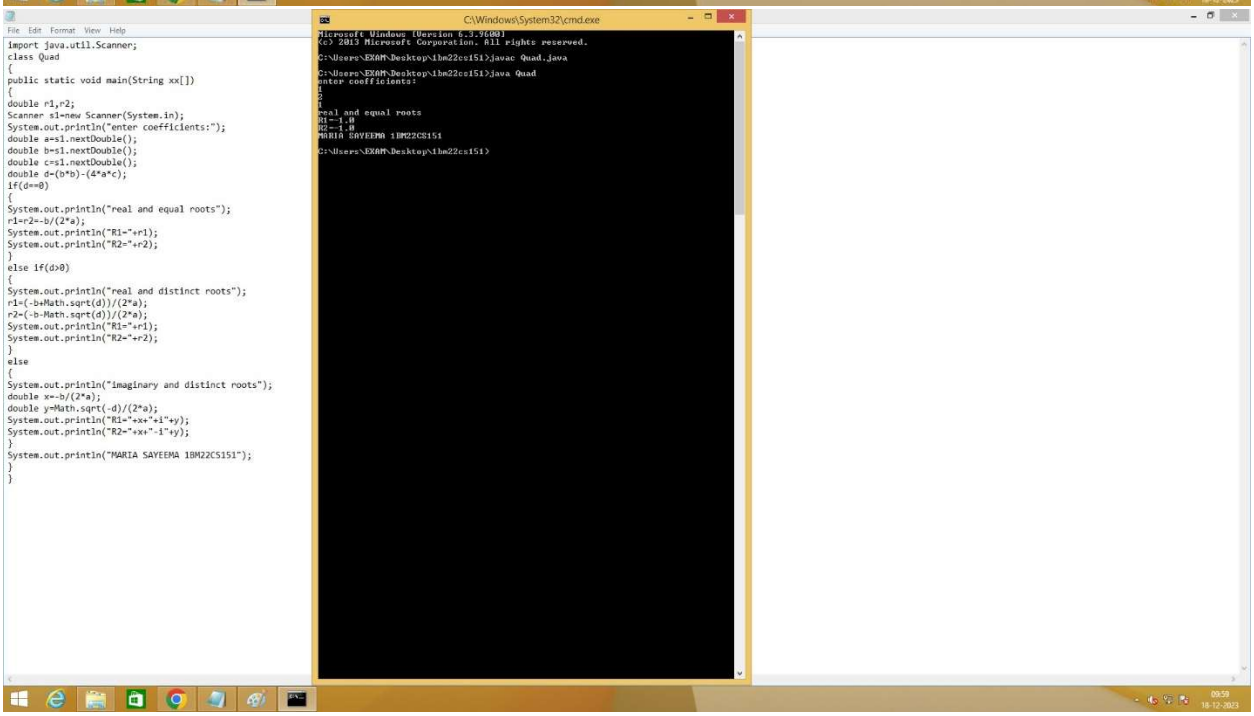
1BM22CS151

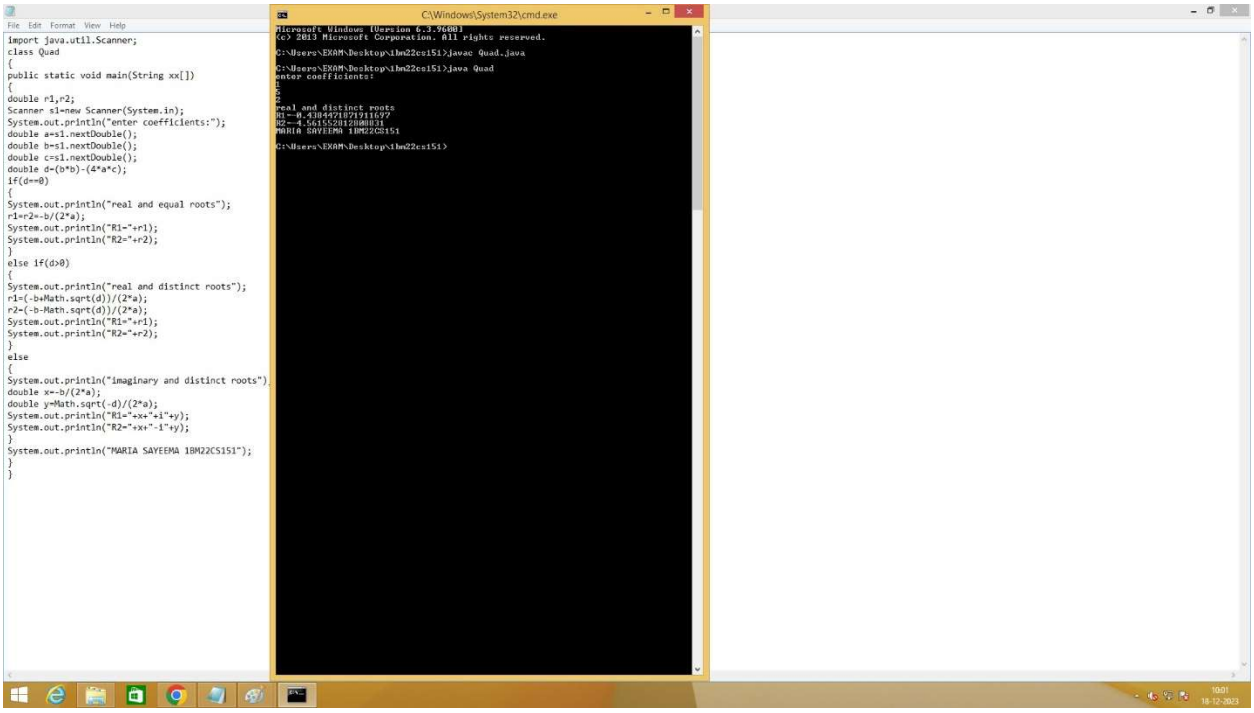
OOJ LAB

Program 1:

Develop a Java program that prints all real solutions to the quadratic equation ax^2 +bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminant b^2 -4ac is negative, display a message stating that there are no real solutions.


File Edit Format View Help
import java.util.Scanner;
class Quad
{
public static void main(String xx[])
{
double r1,r2;
Scanner s1=new Scanner(System.in);
System.out.println("enter coefficients:");
double a=s1.nextDouble();
double b=s1.nextDouble();
double c=s1.nextDouble();
double d=(b*b)-(4*a*c);
if(d==0)
{
System.out.println("real and equal roots");
r1=r2=-b/(2*a);
System.out.println("R1="+r1);
System.out.println("R2="+r2);
}
else if(d>0)
{
System.out.println("real and distinct roots");
r1=(-b+Math.sqrt(d))/(2*a);
r2=(-b-Math.sqrt(d))/(2*a);
System.out.println("R1="+r1);
System.out.println("R2="+r2);
}
else
{
System.out.println("imaginary and distinct roots");
double x=-b/(2*a);
double y=Math.sqrt(-d)/(2*a);
System.out.println("R1="+x+"+i"+y);
System.out.println("R2="+x+"-i"+y);
}
System.out.println("MARIA SAYEEMA 1BM22CS151");
}
}
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.
C:\Users\EXAM\Desktop\1bm22cs151>javac Quad.java
C:\Users\EXAM\Desktop\1bm22cs151>java Quad
enter coefficients:
1
1
1
imaginary and distinct roots
R1=-0.5+i0.8660254037844386
R2=-0.5-i0.8660254037844386
MARIA SAYEEMA 1BM22CS151
C:\Users\EXAM\Desktop\1bm22cs151>


File Edit Format View Help
import java.util.Scanner;
class Quad
{
public static void main(String xx[])
{
double r1,r2;
Scanner s1=new Scanner(System.in);
System.out.println("enter coefficients:");
double a=s1.nextDouble();
double b=s1.nextDouble();
double c=s1.nextDouble();
double d=(b*b)-(4*a*c);
if(d==0)
{
System.out.println("real and equal roots");
r1=r2=-b/(2*a);
System.out.println("R1="+r1);
System.out.println("R2="+r2);
}
else if(d>0)
{
System.out.println("real and distinct roots");
r1=(-b+Math.sqrt(d))/(2*a);
r2=(-b-Math.sqrt(d))/(2*a);
System.out.println("R1="+r1);
System.out.println("R2="+r2);
}
else
{
System.out.println("imaginary and distinct roots");
double x=-b/(2*a);
double y=Math.sqrt(-d)/(2*a);
System.out.println("R1="+x+"+i"+y);
System.out.println("R2="+x+"-i"+y);
}
System.out.println("MARIA SAYEEMA 1BM22CS151");
}
}
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.
C:\Users\EXAM\Desktop\1bm22cs151>javac Quad.java
C:\Users\EXAM\Desktop\1bm22cs151>java Quad
enter coefficients:
1
2
1
real and equal roots
R1=-1.0
R2=-1.0
MARIA SAYEEMA 1BM22CS151
C:\Users\EXAM\Desktop\1bm22cs151>


File Edit Format View Help
import java.util.Scanner;
class Quad
{
public static void main(String xx[])
{
double r1,r2;
Scanner s1=new Scanner(System.in);
System.out.println("enter coefficients:");
double a=s1.nextDouble();
double b=s1.nextDouble();
double c=s1.nextDouble();
double d=(b*b)-(4*a*c);
if(d==0)
{
System.out.println("real and equal roots");
r1=r2=-b/(2*a);
System.out.println("R1="+r1);
System.out.println("R2="+r2);
}
else if(d>0)
{
System.out.println("real and distinct roots");
r1=(-b+Math.sqrt(d))/(2*a);
r2=(-b-Math.sqrt(d))/(2*a);
System.out.println("R1="+r1);
System.out.println("R2="+r2);
}
else
{
System.out.println("imaginary and distinct roots");
double x=-b/(2*a);
double y=Math.sqrt(-d)/(2*a);
System.out.println("R1="+x+"+i"+y);
System.out.println("R2="+x+"-i"+y);
}
System.out.println("MARIA SAYEEMA 1BM22CS151");
}
}
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.
C:\Users\EXAM\Desktop\1bm22cs151>javac Quad.java
C:\Users\EXAM\Desktop\1bm22cs151>java Quad
enter coefficients:
1
2
3
real and distinct roots
R1=-0.4384471871911697
R2=-4.561552812808831
MARIA SAYEEMA 1BM22CS151
C:\Users\EXAM\Desktop\1bm22cs151>

PROGRAM 1: Quadratic Equation

```
import java.util.Scanner;
class Quad
{
public static void main(String xx[])
{
double r1, r2;
Scanner sl= new Scanner(System.in);
System.out.println("Enter coefficients:");
double a = sl.nextDouble();
double b = sl.nextDouble();
double c = sl.nextDouble();
double d = (b*b) - (4*a*c);
if(d==0)
{
System.out.println("real and equal roots");
r1=r2 = -b/(2*a);
System.out.println("R1="+r1);
System.out.println("R2="+r2);
}
else if(d>0)
{
System.out.println("real and distinct roots");
r1 = (-b + Math.sqrt(d))/(2*a);
r2 = (-b-Math.sqrt(d))/(2*a);
System.out.println("R1=" +r1);
System.out.println("R2=" +r2);
}
else
{
System.out.println("imaginary and distinct roots");
double x = -b/(2*a);
double y = Math.sqrt(d)/(2*a);
System.out.println("R1=" +x+"+i"+y);
System.out.println("R2=" +x+"-i"+y);
}
}
```

OUTPUT

① enter coefficients:
1
1
1
imaginary and distinct roots
R1 = -0.5 + i0.8660254037844386
R2 = -0.5 - i0.8660254037844386

② enter coefficients:
1
3
1
real and equal roots
R1 = -1.0
R2 = -1.0

③ enter coefficients:
1
5
2
real and distinct roots
R1 = -0.4384471871911697
R2 = -4.561552812808831

18/12/23

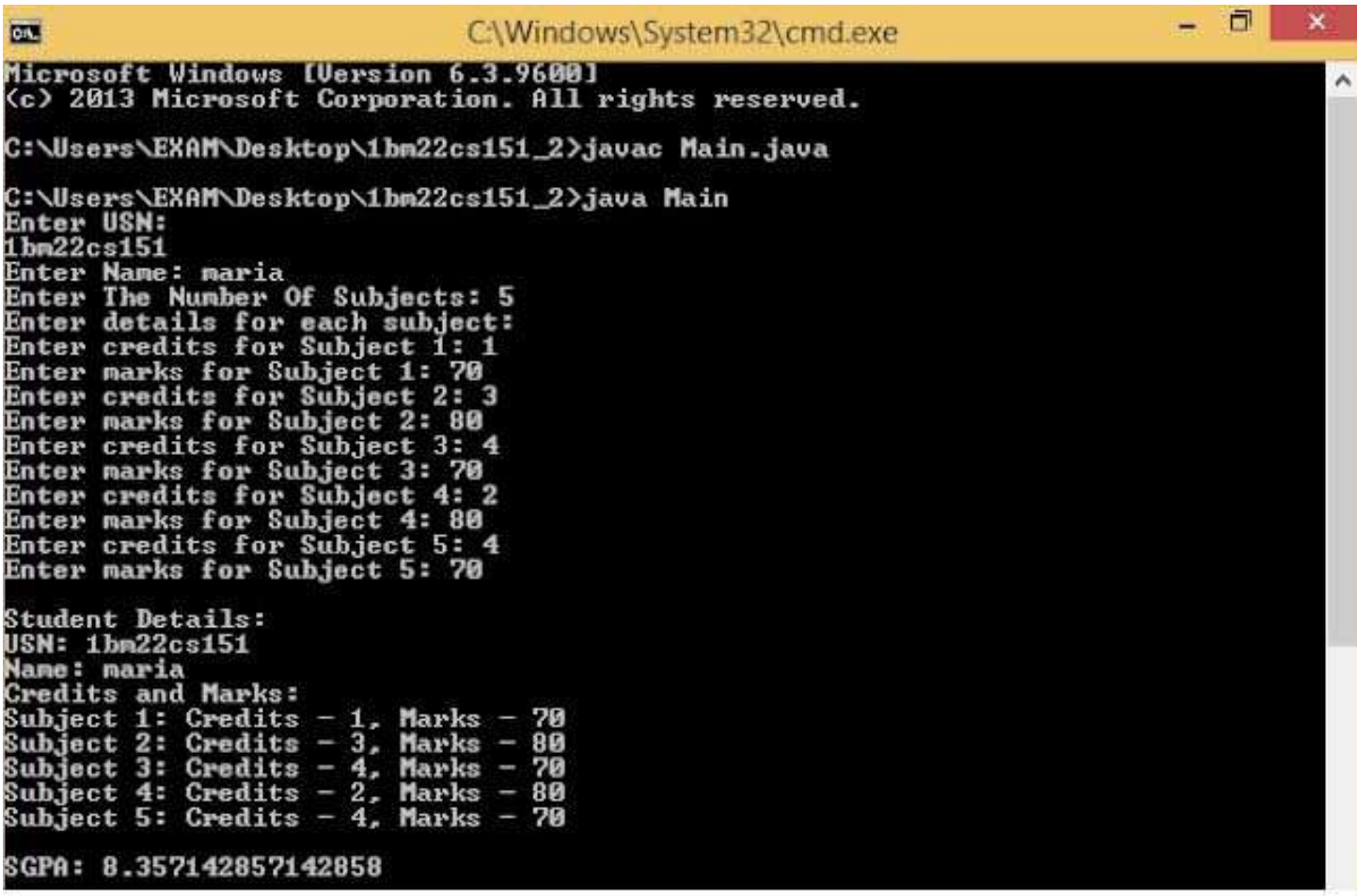
Program 2:

a Java program to create a class Student with members usn, name, an array
credits and an array marks. Include methods to accept and display details and
a method to calculate SGPA of a student.

```
import java.util.Scanner;

class Student {

    private String usn;
    private String name;
    private int[] credits;
    private int[] marks;
    int number;


    public Student(int numSubjects) {
        credits = new int[numSubjects];
        marks = new int[numSubjects];
    }


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

        System.out.println("Enter USN: ");
        usn = scanner.next();

        System.out.println("Enter Name: ");
        name = scanner.next();

        System.out.println("Enter The Number of Subjects: ");
        number = scanner.nextInt();
        credits=new int[number];
        marks=new int[number];
        System.out.println("Enter details for each subject: ");

        for (int i = 0; i < number; i++) {
            System.out.print("Enter credits for Subject " + (i + 1) + ": ");
            credits[i] = scanner.nextInt();

            System.out.print("Enter marks for Subject " + (i + 1) + ": ");
            marks[i] = scanner.nextInt();
        }
    }


    public void displayDetails() {
```

```
    public void displayDetails() {
        System.out.println("USN: " + usn);
        System.out.println("Name: " + name);

        System.out.println("Credits and marks:");
        for (int i = 0; i < number; i++) {
            System.out.println("Subject " + (i + 1) + ": Credits - " + credits[i] + ", Marks - " + marks[i]);
        }
    }


    public double calculateSGPA() {
        int totalCredits = 0;
        double weightedSum = 0.0;

        for (int i = 0; i < number; i++) {
            totalCredits += credits[i];
            weightedSum += calculateGradePoints(marks[i]) * credits[i];
        }

        return weightedSum / totalCredits;
    }


    private double calculateGradePoints(int marks) {
        if (marks >= 90) return 10.0;
        else if (marks >= 80) return 9.0;
        else if (marks >= 70) return 8.0;
        else if (marks >= 60) return 7.0;
        else if (marks >= 50) return 6.0;
        else return 0.0; // Failed
    }

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

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


        Student student = new Student(numSubjects);
```

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

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


        Student student = new Student(numSubjects);


        student.acceptDetails();
        System.out.println("\nDetails of the Student:");
        student.displayDetails();


        double sgpa = student.calculateSGPA();
        System.out.println("\nSGPA: " + sgpa);


    }
}
```


C:\Windows\System32\cmd.exe
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.
C:\Users\EXAM\Desktop\1bm22cs151_2>javac Main.java
C:\Users\EXAM\Desktop\1bm22cs151_2>java Main
Enter USN:
1bm22cs151
Enter Name: maria
Enter The Number Of Subjects: 5
Enter details for each subject:
Enter credits for Subject 1: 1
Enter marks for Subject 1: 70
Enter credits for Subject 2: 3
Enter marks for Subject 2: 80
Enter credits for Subject 3: 4
Enter marks for Subject 3: 70
Enter credits for Subject 4: 2
Enter marks for Subject 4: 80
Enter credits for Subject 5: 4
Enter marks for Subject 5: 70
Student Details:
USN: 1bm22cs151
Name: maria
Credits and Marks:
Subject 1: Credits - 1, Marks - 70
Subject 2: Credits - 3, Marks - 80
Subject 3: Credits - 4, Marks - 70
Subject 4: Credits - 2, Marks - 80
Subject 5: Credits - 4, Marks - 70
SGPA: 8.357142857142858

LAB PROGRAM : 2 : Develop a Java program to create class Student

1/1/24 with members usn, name, an array credits, an array marks. Include methods to accept and display details and method to calculate SGPA of a student :

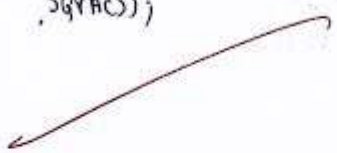
INPUT

```
import java.util.Scanner

class Student{
    private String usn;
    private String name;
    private int[] credits;
    private int[] marks;
    int number;
    public Student(String usn, String name, int[] credits, int[]
    marks){
        this.usn = usn;
        this.name = name;
        this.credits = credits;
        this.marks = marks;
    }

    public void acceptDetails(){
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter usn: ");
        usn = scanner.next();
        System.out.println("Enter name: ");
        name = scanner.next();
```

```
System.out.println("Enter The Number of Subjects");
number = scanner.nextInt();
credits = new int[number];
marks = new int[number];

System.out.println("Enter details for each subject:");
for(int i = 0; i < number; i++){
    System.out.println("Enter credits for subject " +
    (i+1) + ":");
    credits[i] = scanner.nextInt();
    System.out.println("Enter marks for subject" + (i+1) +
    ":");
    marks[i] = scanner.nextInt();
    }
}

public void displayDetails(){
    System.out.println("USN:" + usn);
    System.out.println("Name:" + name);
    System.out.println("Credits and marks:");
    for(i=0; i<number; i++){
        System.out.println("Subject" + (i+1) + ":credit-"
        + credits[i] + ", Marks-" + marks[i]);
    }
}
```

```
public double calculateSgPA() {

    double totalCredits = 0;
    double weightedSum = 0;

    for (i=0 ; i<number ; i++){
        totalCredits += Credits[i]
        weighted Sum+= calculated GradePoints (int marks[i])
        * Credits[i];
    }
    return weightedSum/totalCredits;
}
private double calculateGradePoints(int marks){
        if(marks >= 90){
            return 10.0;
        }
        else if (marks >=80){
            return 9.0;
        }
        else if (marks >= 70){
            return 8.0;
        }
        else if((marks >= 60){
            return 7.0;
        else if(marks >= 50){
            return 6.0;
```

```
        else{
            return 0.0;
        }
    }
}
public class Main{
    public static void main(String[] args){
        Student student = new Student("", "", null, null);
        student.acceptDetails();
        System.out.println("\n Student Details:");
        student.displayDetails();
        System.out.println("\nSGPA:" + student.calculate
        SGPA());
    }
}
```



OUTPUT

```
Enter USN:
1BM22CS151
Enter Name:
MARIA
Enter the Number of Subjects:
5
Enter details for each subject:
Enter credits for subject 1: 1
Enter marks for subject 1: 70
Enter credits for subject 2: 3
Enter marks for subject 2: 80
Enter Credits for subject 3: 4
Enter marks for subject 3: 70
Enter credits for subject 4: 2
Enter marks for subject 4: 80
Enter credits for subject 5: 4
Enter marks for subject 5: 70

Student Details:
Subject 1: Credits - 1 , Marks - 70
Subject 2: Credits - 3 , Marks - 80
Subject 3: Credits - 4 , Marks - 70
Subject 4: Credits - 2 , Marks - 80
Subject 5: Credits - 4 , Marks - 70

SGPA : 8.357142857142858
```

Program 3:

Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to
set and get the details of the objects. Include a toString( ) method that
could display the complete details of the book. Develop a Java program to
create n book objects.

```
 import java.util.Scanner;
class Book{
        private String name;
        private String author;
        private double price;
        private int numpages;
        public Book(String name,String author,double price,int numpages){
                this.name=name;
                this.author=author;
                this.price=price;
                this.numpages=numpages;
        }
        public void setDetails(String name,String author,double price,int numpages){
                this.name=name;
                this.author=author;
                this.price=price;
                this.numpages=numpages;
        }
        public String getDetails(){
                return "Name:"+name+"\nAuthor:"+author+"\nPrice:$"+price+"\nNumber of pages:"+numpages;
        }
        public String toString(){
                return getDetails();
        }
}
public class BookTest{
        public static void main(String args[]){
                Scanner sc=new Scanner(System.in);
                System.out.println("Enter the number of books:");
                int n=sc.nextInt();
                Book[] b=new Book[n];
                for(int i=0;i<n;i++){
                        System.out.println("Enter the details for book"+(i+1)+":");
                        System.out.println("Name:");
                        String name=sc.next();
                        System.out.println("Author:");
                        String author=sc.next();
                        System.out.println("Price:$");
                        double price=sc.nextDouble();
                        System.out.println("Number of pages:");
                        int numpages=sc.nextInt();
                        b[i]=new Book(name,author,price,numpages);
                }
                System.out.println("\nDetails of books:");
```

```
        }
}
public class BookTest{
        public static void main(String args[]){
                Scanner sc=new Scanner(System.in);
                System.out.println("Enter the number of books:");
                int n=sc.nextInt();
                Book[] b=new Book[n];
                for(int i=0;i<n;i++){
                        System.out.println("Enter the details for book"+(i+1)+":");
                        System.out.println("Name:");
                        String name=sc.next();
                        System.out.println("Author:");
                        String author=sc.next();
                        System.out.println("Price:$");
                        double price=sc.nextDouble();
                        System.out.println("Number of pages:");
                        int numpages=sc.nextInt();
                        b[i]=new Book(name,author,price,numpages);
                }
                System.out.println("\nDetails of books:");
                for(int i=0;i<n;i++){
                        System.out.println("\nbooks"+(i+1)+":\n"+b[i]);
                }
        }
}
```

```
Enter the number of books:
2
Enter the details for book1:
Name:
maths
Author:
rakesh
Price:$
25
Number of pages:
156
Enter the details for book2:
Name:
java
Author:
ritu
Price:$
52
Number of pages:
1698

Details of books:

books1:
Name:maths
Author:rakesh
Price:$25.0
Number of pages:156

books2:
Name:java
Author:ritu
Price:$52.0
Number of pages:1698
```

1/11/24

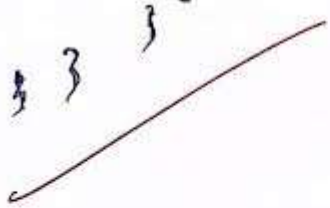
LAB-03 Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set values for the members. Include methods to set and get values for the details of the object. Include toString() method to display complete details of the book.

INPUT

```
import java.util.Scanner;
class Book{
    private String name;
    private String author;
    Private double price;
    private int numPages;
    public Book(String name, String author, double price,
    int numPages){
        this.name=name;
        this.author = author;
        this.price = price;
        this.numPages=numPages;
    }
    Public void setDetails(String name, String author, double price,
    int numPages){
        this.name = name;
        this.author = author;
        this.price =price;
        this.numPages=numPages;
    }
```

```
Hopable void String getDetails(){
        return "Name:" +name+ "\nAuthor: "+author
        + "\nPrice :Rs" + price +"\n Number of pages : "+
        numPages;
    }

    public String toString(){
        return getDetails()
    }
}
public class BookTest{
    Public static void main(String[] args){
        Scanner scanner = new Scanner (System.in);
        System.out.println("Enter the number of books :");
        int n = scanner.nextInt();
        Book[] books = newB.Book[n];
        for(i=0;int i=0; i<n;i++){
            System.out.println("\nEnter details for book "
            +(i+1)+":");
            System out.println("Name:");
            String name = scanner.next()
            System.out.println("Author:")
            String author = scanner.next();
```

```
        System.out.println("Price: Rs");
        double price = scanner.nextDouble();
        System.out.println("Number of Pages: ");
        int numPages = scanner.nextInt();

        book[i] = new Book(name, author, price, numPages);
    }
    System.out.println("\nDetails of Books:");
    for(int i=0; i<n; i++){
        System.out.printf("\nBook " + (i+1) + ":\n" + book[i]);
    }
}
}
```



OUTPUT

```
Enter no number of Books
2
Enter no details for book1:
Name:
maths
Author:
rakesh
Price:$
25
Number of Pages:
456
Enter no details for book2
Name:
java
Author:
ram
Price:$
56
Number of Pages:
259
Details of books:
books1:
Name: maths
Author: rakesh
Price: $25.0
Number of Pages: 456
```

OUTPUT

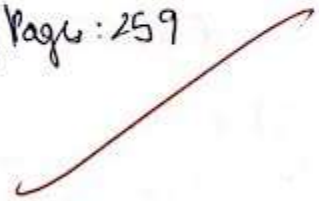
book2

Name: java

Author: ram

Price : 560

Number of Page : 259



Program 4:

Develop a Java program to create abstract class shape that contains 2 integers and an empty methos printArea(). Provide 3 classes Rectab\ngle,Triangle,Circle,each extends class Shape. Each class contains only the methos printArea() that prints area of a given shape

```java
abstract class Shape {

public int dimension1;
   public
 int dimension2;

    public Shape(int dimension1, int dimension2) {
        this.dimension1 = dimension1;
        this.dimension2 = dimension2;
    }


    public abstract void printArea();
}
class Rectangle extends Shape {

    public Rectangle(int length, int width) {
        super(length, width);
    }


    public void printArea() {
        int area = dimension1 * dimension2;
        System.out.println("Area of Rectangle: " + area);
    }
}

class Triangle extends Shape {

    public Triangle(int base, int height) {
        super(base, height);
    }


    public void printArea() {
        double area = 0.5 * dimension1 * dimension2;
        System.out.println("Area of Triangle: " + area);
    }
}

class Circle extends Shape {

    public Circle(int radius) {
        super(radius, 0);
    }


    public void printArea() {
        double area = Math.PI * dimension1 * dimension1;
        System.out.println("Area of Circle: " + area);
    }
}


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

        Rectangle rectangle = new Rectangle(5, 10);
        Triangle triangle = new Triangle(4, 8);
        Circle circle = new Circle(6);

        rectangle.printArea();
        triangle.printArea();
        circle.printArea();
    }
}
```

```
Microsoft Windows [Version 10.0.22621.3007]
(c) Microsoft Corporation. All rights reserved.

C:\Users\maria\OneDrive\Desktop\1BM22CS151>javac Rect.java

C:\Users\maria\OneDrive\Desktop\1BM22CS151>java Rect
Area of Rectangle: 50
Area of Triangle: 16.0
Area of Circle: 113.09733552923255
```

8/01/25

Develop a java program to create abstract class shape that contains 2 integers and empty method printArea(). Provide 3 classes Rectangle, Triangle, Circle, each extends class Shape. Each class contain only the method printArea() that prints area of given shape.

INPUT

```
abstract class Shape {
    protected int dimension1;
    protected int dimension2;
    }
    public abstract void printArea();
}
class Rectangle extends Shape{
    public Rectangle(int length, int width){
        super(length, width);
    }
    public void printArea(){
        int area = dimension1 * dimension2;
        System.out.println("Area of Rectangle: " +area);
    }
}
class Triangle extends Shape{
    public Triangle(int base, int height){
        super(base, height);
    }
    public void PrintArea(){
        double area = 0.5 * dimension1 * dimension2;
        System.out.println("Area of Triangle: "+area);
    }}
}
```

```
class Circle extends Shapes{
  public Circle (int radius){
    super(radius,0);
  }
  public void printArea(){
    double area = Math.PI * dimension1 * dimension1;
    System.out.println("Area of Circle : "+area);
  }
}

public class Rect{
  public static void main(String[] args){
    Rectangle rectangle = new Rectangle(5,10);
    Triangle triangle = new Triangle(5,7);
    Circle circle = new Circle(5);
    rectangle.printArea();
    triangle.printArea();
    circle.printArea();
  }
}
```