

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.

```
class First
{
    public static void main (String xx[])
    { System.out.println ("Java Programming"); }
}
o/p: Java Programming
```

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.

```
import java.util.Scanner
class Quadratic {
    public static void main (String ss[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println ("Enter a coefficient a:");
        double a = sc.nextDouble();
        System.out.println ("Enter a coefficient b:");
        double b = sc.nextDouble();
        System.out.println ("Enter a coefficient c:");
        double c = sc.nextDouble();
        double d = b*b - 4*a*c;
        if (d > 0) {
            double r1 = (-b + Math.sqrt(d)) / 2*a;
            double r2 = (-b - Math.sqrt(d)) / 2*a;
            System.out.println ("Roots are " + " " + r1 + " " + r2);
        }
        else if (d == 0) {
            double r1 = b/2*a;
            double r2 = b/2*a;
            System.out.println ("Roots are " + " " + r1 + " " + r2);
        }
    }
}
```

else if (d < 0)
System.out.
else {
System.out.
}
Enter a
1
Enter a
-2
Enter a
3
No real
② Develop
members
Include n
Calculate
import ja
class S
String
String
int E
int E
Student
int
Student
this.n
Credit
marks
}
void
Scan
System
Usn =
System
name
for (Sys

```

else if (d < 0) {
    System.out.println("roots are rational");
} else {
    System.out.println("INVALID INPUT!!!");
}

```

o/p:
 Enter a coefficient a:

1
 Enter a coefficient b:

-2

Enter a coefficient c:

3
 No real solutions

② Develop 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 {

```

```

    String usn;

```

```

    String name;

```

```

    int [] credits;

```

```

    int [] marks;

```

```

Student {

```

```

    int numberOfSubjects;

```

```

Student (int numberOfSubjects) {

```

```

    this.numberOfSubjects = numberOfSubjects;

```

```

    credits = new int [numberOfSubjects];

```

```

    marks = new int [numberOfSubjects];

```

```

}
void acceptDetails () {

```

```

    Scanner sc = new Scanner (System.in);

```

```

    System.out.println ("Enter usn:");

```

```

    usn = sc.nextLine();

```

```

    System.out.print ("Enter name:");

```

```

    name = sc.nextLine();

```

```

    for (int i = 0; i < numberOfSubjects; i++) {

```

```

        System.out.print ("Enter credits " + (i+1) + ":");
    }
}

```

```
import java.util.*;

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

        System.out.println("Enter coefficient of a:");
        double a = input.nextDouble();

        // Handling the case where 'a' is zero
        if (a == 0) {
            System.out.println("This is not a quadratic equation (a cannot be zero).");
            return; // Exit the program as the equation is invalid
        }

        System.out.println("Enter coefficient of b:");
        double b = input.nextDouble();

        System.out.println("Enter coefficient of c:");
        double c = input.nextDouble();

        // Calculating the discriminant
        double d = b * b - 4 * a * c;

        if (d > 0) {
            // Two real and distinct roots
            double r1 = (-b + Math.sqrt(d)) / (2 * a);
            double r2 = (-b - Math.sqrt(d)) / (2 * a);
            System.out.println("Roots are real and distinct: " + r1 + " and " + r2);
        } else if (d == 0) {
```

```

        // One real root
        double r1 = -b / (2 * a);
        System.out.println("Root is real and repeated: " + r1);
    } else {
        // Complex roots
        double realPart = -b / (2 * a);
        double imaginaryPart = Math.sqrt(-d) / (2 * a);
        System.out.println("Roots are complex: " + realPart + " + " + imaginaryPart + "i and "
+ realPart + " - " + imaginaryPart + "i");
    }
}
}

```

```
D:\24BMSCE>javac Quadratic.java
```

```
D:\24BMSCE>java Quadratic
```

```
Enter coefficient of a:
```

```
21
```

```
Enter coefficient of b:
```

```
23
```

```
Enter coefficient of c:
```

```
4
```

```
Roots are real and distinct: -0.21684657167976656 and -0.8783915235583286
```