Program 1

Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions.

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

      // Input coefficients
      System.out.print("Enter coefficient a: ");
      double a = scanner.nextDouble();
      System.out.print("Enter coefficient b: ");
      double b = scanner.nextDouble();
      System.out.print("Enter coefficient c: ");
      double c = scanner.nextDouble();

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

      // Determine the nature of the roots
      if (discriminant > 0) {
         // Two distinct real roots
         double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
         double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
         System.out.println("The roots are real and different.");
         System.out.println("Root 1: " + root1);
         System.out.println("Root 2: " + root2);
      } else if (discriminant == 0) {
         // One real root
         double root = -b / (2 * a);
         System.out.println("The roots are real and the same.");
         System.out.println("Root: " + root);
      } else {
         // Complex roots
         double realPart = -b / (2 * a);
         double imaginaryPart = Math.sqrt(-discriminant) / (2 * a);
         System.out.println("The roots are complex and different.");
         System.out.println("Root 1: " + realPart + " + " + "("+imaginaryPart +")"+ "i");
         System.out.println("Root 2: " + realPart + " - " + "("+ imaginaryPart + ")"+ "i");
      }

      scanner.close();
   }
}
```

```
C:\1BM23CS333>javac Book.java

C:\1BM23CS333>java QuadraticEquationSolver
Enter coefficient a: 1
Enter coefficient b: 1
Enter coefficient c: 1
The roots are complex and different.
Root 1: -0.5 + (0.8660254037844386)i
Root 2: -0.5 - (0.8660254037844386)i

C:\1BM23CS333>
```

Q: Java program to solve a quadratic equation.

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

        // Input coefficients
        System.out.println("Enter coefficient a: ");
        double a = scanner.nextDouble();
        System.out.println("Enter coefficient b: ");
        double b = scanner.nextDouble();
        System.out.println("Enter coefficient c: ");
        double c = scanner.nextDouble();

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

        // Determine the nature of the roots
        if (discriminant > 0) {
            double root1 = (-b + Math.sqrt(discriminant))/(2*a);
            double root2 = (-b - Math.sqrt(discriminant))/(2*a);
            System.out.println("The roots are real and different");
            System.out.println("Root 1: " + root1);
            System.out.println("Root2: " + root2);
        }
        else if (discriminant == 0){
            double root = -b/(2*a);
            System.out.println("The roots are real & same");
            System.out.println("Root: " + root);
        }
```

```java
else {
    double realpart = -b / (2*a);
    double imaginarypart = Math.sqrt(-discriminant) / (2*a);
    System.out.println("The roots are complex and different");
    System.out.println("Root 1: " + realpart + " + " + imaginarypart
                       + "i");
    System.out.println("Root 2: " + realpart + " - " + imaginarypart + "i");
}
scanner.close();
}
}
```

Output:

```
Enter coefficient a: 1
Enter coefficient b: 1
Enter coefficient c: 1
The roots are complex and different.
Root 1: -0.5 + (0.8660254037844386)i
Root 2: -0.5 - (0.8660254037844386)i
```

Result

24/10/24