```java
import java.util.Scanner;

public class LabProgram1 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the coefficients of quadratic equation:");
        int a = sc.nextInt();
        int b = sc.nextInt();
        int c = sc.nextInt();
        double r1, r2;

        if(a == 0){
            System.out.println("Please enter valid value");
            return;
        }
        else{
            int d = b * b - 4 * a * c;
            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("Roots are: " + r1 + " and " + r2);
            }
            else if(d < 0){
                System.out.println("Imaginary roots.");
                d = Math.abs(d);
                r1 = (-b + Math.pow(d, 0.5)) / (2 * a);
                r2 = (-b - Math.pow(d, 0.5)) / (2 * a);
                System.out.println("Roots are: " + r1 + " and " + r2);
            }
            else{
                System.out.println("Real and Equal roots.");
                r1 = r2 = (-b) / (2 * a);
                System.out.println("Roots are: " + r1 + " and " + r2);
            }
        }
    }
}
```

```
Enter the coefficients of quadratic equation:
2
-8
Real and Distinct roots.
Roots are: 3.58113883008419 and 0.41886116991581024
PS C:\Users\Sarim Ali\OneDrive\Desktop\OOPs> cd "c:\Users\Sarim Ali\OneDrive\Desktop\OOPs\" ; if ($?) { javac LabProgram1.java } ; if ($?) {
 java LabProgram1 }
Enter the coefficients of quadratic equation:
1
-4
4
Real and Equal roots.
Roots are: 2.0 and 2.0
PS C:\Users\Sarim Ali\OneDrive\Desktop\OOPs> cd "c:\Users\Sarim Ali\OneDrive\Desktop\OOPs\" ; if ($?) { javac LabProgram1.java } ; if ($?) {
 java LabProgram1 }
Enter the coefficients of quadratic equation:
1
1
1
Imaginary roots.
Roots are: 0.3660254037844386 and -1.3660254037844386
PS C:\Users\Sarim Ali\OneDrive\Desktop\OOPs>
```

Lab-Program-1

26/09/2024

2. 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 discriminate b^2-4ac is negative, display a message stating that there are no real solutions.

```
import java.util.Scanner;
public class QuadraticEquationSolver {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter coefficient a: ");
        int a = sc.nextInt();
        System.out.println("Enter coefficient b: ");
        int b = sc.nextInt();
        System.out.println("Enter coefficient c: ");
        int c = sc.nextInt();

        if (a==0) {
            System.out.println("Please enter valid value");
            return;
        }
        double d = b*b-4*a*c;
        if (d>0) {
            System.out.println("Real and distenct roots");
            double x1 = (-b + Math.sqrt(d)) / (2*a);
```

```
        double r2 = (-b - Math.sqrt(d))/(2*a);
        System.out.println("Roots are: " + r1 + " and " + r2);
    }
    else if (d==0){
        System.out.println("Roots are real and equal");
        double r = -b/(2*a);
        System.out.println("Root = " + r);
    }
    else{
        System.out.println("Equation has no real solution");
    }
}
}
```

Output: (i) Enter coefficient a: 2
Enter coefficient b: -8
Enter coefficient c: 3
Real and distinct roots
Roots are: 3.58 and 0.42

(ii) Enter coefficient a: 1
Enter coefficient b: 4
Enter coefficient c: 4
Roots are real and equal
Roots: 2

(iii) Enter coefficend a: 1
Enter coefficient b: 1
Enter coefficient c: 1
Equation has no real solution.

21/9/24