LAB 01:

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.

Q. Develop a Java Program that prints all real solution 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.

```java
import java.util.scanner

class quadratic {
public static void main (string ss [J] {
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.next Double ();
System.out.println ("Enter a coefficient c:");
double c = sc.nextDouble ();
double d = b*b - 4* a *c;
if (d >0) {
double x1 = (-b + Math.sqrt (d)) /2* a;
double x2 = (-b - Math.sqrt (d))/2 *a;
System.out.println ("Roots are" + " " + x1 + " " + x2 );
}
else if (d == 0) {
double x1 = b/2 *a;
double x2 = b/2 * a;
System.out.println (" Roots are " + " " + x1 + " " + x2 );
}
else if (d < 0) {
System.out.println (" roots are reational "); }
else {
System.out.println (" Invalid Input !!! "); }
}
}
```

Output

Enter a coefficient a:
1

Enter a coefficient b:
-3

Enter a coefficient c:
2

Roots are real and distinct 2.0 and 1.0 (Distinct Real Roots)

Enter a coefficient a:
1

Enter a coefficient b:
-2

Enter a coefficient c:
1

Roots are real and equal : 1.0 and 1.0 (Equal real roots)

Enter a coefficient a:
1

Enter a coefficient b:
2

Enter a coefficient c:
6

Roots are imaginary (Imaginary Roots)

```java
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) {
```

```java
        // 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");

    }

  }

}
```

Output:

```
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
```