LAB PRG - 1
QUADRATIC EQUATION

Program ::

```java
import java.util.Scanner;
class Quad
{
    double a,b,c;
    Quad (double a, double b, double c)
    {
        this.a = a;
        this.b = b;
        this.c = c;
    }

    void calc()
    {
        double d = b*b - 4*a*c;
        double root1;
        double root2;

        if (a == 0)
        {
            System.out.println ("Please enter valid
                                 quadratic equation");
        }
        else
        {
            if (d == 0)
            {
                System.out.println (" Roots are real & equal");
                root1 = (-b)/(2*a); System.out.println (root1);
            }
```

```java
        else if (d > 0)
        {
            System.out.println("Roots are real and distinct");
            root1 = (-b + Math.sqrt(d))/(2*a);
            root2 = (-b - Math.sqrt(d))/(2*a);
            System.out.println(root1 + "  " + root2);
        }


        else
        {
            root1 = (-b)/(2*a);
            root2 = Math.abs(d)/(2*a);
            System.out.println("Roots are imaginary");
            System.out.println(root1 + "+i " + root2);
            System.out.println(root1 + "-i " + root2);
        }
    }
}


class QuadRun
{
    public static void main(String[] args)
    {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter value of a: ");
        double a = input.nextDouble();
        System.out.print("Enter value of b: ");
        double b = input.nextDouble();
        System.out.print("Enter value of c: ");
        double c = input.nextDouble();
        Quad quadratic = new Quad(a, b, c);
        quadratic.calc(); input.close();
    }
}
```

Output :

① Enter value of a : 2
Enter value of b : 4
Enter value of c : 2
Roots are real and equal
Roots -4.0

② Enter value of a : 1
Enter value of b : 5
Enter value of c : 6
Roots are real and distinct
-2.0 -3.0

③ Enter value of a : 3
Enter value of b : 1
Enter value of c : 4
Roots are imaginary
-0.16666666 + i 7.833333
-0.16666666 - i 7.833333

④ Enter value of a : 0
Enter value of b : 4
Enter value of c : 5

Please enter valid quadratic equation.

```java
import java.util.Scanner;

class Quad
{
double a,b,c;

Quad(double a,double b,double c)
{
this.a=a;
this.b=b;
this.c=c;
}

void calc()
{
double d=b*b-4*a*c;
double root1,root2;

if(a==0)
{
System.out.println("Please enter valid quadratic equation");
}

else
{
if(d==0)
{
System.out.println("Roots are real and equal:");
System.out.println("Root1 = Root2: "+(-b/2*a));
}
```

```java
else if(d>0)

{

System.out.println("Roots are real and distinct:");

root1=(-b+Math.sqrt(d))/(2*a);

root2=(-b-Math.sqrt(d))/(2*a);

System.out.println("Root1: "+root1+"\nRoot2: "+root2);


}
else
{

root1=(-b)/(2*a);

root2=Math.abs(d)/(2*a);

System.out.println("Roots are imaginary: ");

System.out.println("Root1: "+root1+" +i "+root2);

System.out.println("Root2: "+root1+" -i "+root2);


}
}
}
}


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

System.out.print("Enter value of a: ");

double a=input.nextDouble();

System.out.print("Enter value of b: ");

double b=input.nextDouble();

System.out.print("Enter value of c: ");
```

```java
double c=input.nextDouble();

Quad quadratic=new Quad(a,b,c);

quadratic.calc();

input.close();

}

}
```

OUTPUTS:

Enter value of a: 1

Enter value of b: 5

Enter value of c: 6

Roots are real and distinct:

Root1: -2.0

Root2: -3.0

Enter value of a: 1

Enter value of b: 5

Enter value of c: 6

Roots are real and distinct:

Root1: -2.0

Root2: -3.0

Enter value of a: 3

Enter value of b: 1

Enter value of c: 4

Roots are imaginary:

Root1: -0.16666666666666666 +i 7.833333333333333

Root2: -0.16666666666666666 -i 7.833333333333333

Enter value of a: 0

Enter value of b: 4

Enter value of c: 5

Please enter valid quadratic equation