

LAB 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.

CODE:

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Lab Program 1

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```
import java.util.Scanner;
import java.util.*;
import java.math.*;
class Quadratic
{
    public static void main(String[] args)
    {
        Scanner ss = new Scanner(System.in);
        System.out.print("Enter the value of a:");
        double a = ss.nextDouble();
        System.out.println("Enter the value of b:");
        double b = ss.nextDouble();
        System.out.println("Enter the value of c:");
        double c = ss.nextDouble();
        double d = ((b*b) - (4*a*c));
        if(a!=0)
        {
            if(d>0)
            {
                double d1 = ((-b + Math.sqrt(d))/(
                    (2.0*a)));
                double d2 = ((-b - Math.sqrt(d))/(
                    (2.0*a)));
                System.out.println("The Roots are
real and distinct\n");
            }
        }
    }
}
```

```
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System.out.println ("The Roots are :"  
+ d1 + " \t " + d2);  
}  
  
else if (d == 0.0)  
{  
    double rr = ((-b + Math.pow (d, 0.5)) /  
        (2.0 * a)); // real root  
    System.out.println ("The Roots are  
real and equal");  
    System.out.println ("The Root is " + rr);  
}  
  
else if (d < 0)  
{  
    double ir = ((-b / (2.0 * a)));  
    double img = (Math.pow (Math.abs (d),  
        0.5) / (2.0 * a));  
    System.out.println ("The Roots are  
Imaginary");  
    System.out.println ("Roots are :" + ir +  
        " + i " + img + " and " + ir + " - i " + img);  
}  
  
else  
    System.out.println ("INVALID INPUTS.  
TRY AGAIN!");  
}  
  
else  
    System.out.println ("INVALID INPUTS.  
TRY AGAIN!");  
}  
}
```

Output:

① Enter the value of a : 50

Enter the value of b : 100

Enter the value of c : 50

The Roots are real and equal

The Root is : -1.0

② Enter the value of a : 1

Enter the value of b : 50

Enter the value of c : 50

The Roots are real and distinct

The Roots are : -1.0208423834 and

-48.9791516156

③ Enter the value of a : 1

Enter the value of b : 2

Enter the value of c : 3

The Roots are imaginary

~~11/11~~ The Roots are $-1 + i1.414213$ and $-1 - i1.414213$

④ Enter the value of a : 0

Enter the value of b : 45

Enter the value of c : 5

INVALID INPUTS. TRY AGAIN

OUTPUT:

```
cmd Command Prompt
Microsoft Windows [Version 10.0.22000.1219]
(c) Microsoft Corporation. All rights reserved.

C:\Users\dhiks>cd C:\Users\dhiks\Desktop

C:\Users\dhiks\Desktop>javac Quadratic.java

C:\Users\dhiks\Desktop>java Quadratic
Enter the value of a:50
Enter the value of b:100
Enter the value of c:50
The Roots are real and equal

The Root is:-1.0

C:\Users\dhiks\Desktop>javac Quadratic.java

C:\Users\dhiks\Desktop>java Quadratic
Enter the value of a:1
Enter the value of b:50
Enter the value of c:50
The Roots are real and distinct

The Roots are:-1.0208423834364027      -48.9791576165636

C:\Users\dhiks\Desktop>javac Quadratic.java

C:\Users\dhiks\Desktop>java Quadratic
Enter the value of a:1
Enter the value of b:2
Enter the value of c:3
The Roots are imaginary

Roots are:-1.0+i1.4142135623730951 and-1.0-i1.4142135623730951

C:\Users\dhiks\Desktop>javac Quadratic.java

C:\Users\dhiks\Desktop>java Quadratic
Enter the value of a:0
Enter the value of b:45
Enter the value of c:5
INVALID INPUTS. TRY AGAIN!

C:\Users\dhiks\Desktop>
```