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

```
import java.util.Scanner;
class QuadraticEquation
{  public static void main(String x[])
{  Scanner input = new Scanner(System.in);
   System.out.println("Enter the value of the
   coefficients\n Enter the value of a: ");
   double a = input.nextDouble();
   System.out.println("Enter the value of b: ");
   double b = input.nextDouble();
   System.out.println("Enter the value of c: ");
   double c = input.nextDouble();
   double d = b*b - 4.0*a*c;
   if (a==0) { System.out.println("The value
    of a can't be 0"); }
   else {  if (d>0.0) }
            { double r1= (-b+Math.sqrt(d))/(2.0*a);
              double r2 = (-b-Math.sqrt(d))/(2.0*a);
              System.out.println("The roots are
              real and distinct and are "+r1+"
              and "+r2);
            }
   else if (d==0.0)
    {  double r1 = -b/(2.0*a);
System.out.println("The roots are real and equal
 and are "+r1+" and "+r1);
}
```

```
else {  double r1 = (-b/(2.0*a));
        double r2 = (+Math.sqrt(Math.abs(d))/(2.0*a));
        double r3 = (-Math.sqrt(Math.abs(d))/(2.0*a));
        System.out.println("The roots are imaginary and are "+r1+"+"+r2+"i" and "+r1+"+"+r3+"i");
    }
}
```

1) Quadratic Equation Ex output.

→ Enter the value of the coefficients
Enter the value of a: 1
Enter the value of b: 1
Enter the value of c: 1
The roots are imaginary and are -0.5 + i0.8660254037844386 and -0.5 - i0.8660254037844386

→ Enter the value of the coefficients:
Enter the value of a: 4
Enter the value of b: -4
Enter the value of c: 1
The roots are real and equal and are 0.5 and 0.5

→ Enter the value of the coefficients
Enter the value of a: 1
Enter the value of b: 4
Enter the value of c: 3
The roots are real and distinct and are -1.0 and -3.0

→ Enter the value of the coefficients
Enter the value of a: 0
Enter the value of b: 2
Enter the value of c:
The value of x can't be 0

```
Enter the value of the coefficients
 Enter the value of a:
1
Enter the value of b:
1
Enter the value of c:
1
The roots are imaginary and are -0.5 +i0.8660254037844386 and -0.5 -i0.8660254037844386

C:\Users\Aditi Suhrut\Documents\Aditi\Java>java QuadraticEquation
Enter the value of the coefficients
 Enter the value of a:
4
Enter the value of b:
-4
Enter the value of c:
1
The roots are real and equal and are 0.5 and 0.5

C:\Users\Aditi Suhrut\Documents\Aditi\Java>java QuadraticEquation
Enter the value of the coefficients
 Enter the value of a:
1
Enter the value of b:
4
Enter the value of c:
3
The roots are real and distinct and are -1.0 and -3.0
```