

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

classmate

Date _____

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(1) Quadratic Equations

```
import java.lang.Math;
import java.util.Scanner;
class Quad
```

```
{
    public static void main(String arr[])
```

```
{
    Scanner s = new Scanner(System.in);
```

```
    System.out.println("Enter the coefficients a, b, c");
```

```
    double a = s.nextInt();
```

```
    double b = s.nextInt();
```

```
    double c = s.nextInt();
```

```
    double x1, x2, d;
```

```
    d = b*b - 4*a*c;
```

```
    double res = Math.sqrt(d);
```

```
    if(a == 0)
```

```
        System.out.println("Invalid input for a");
```

```
    else
```

```
{
```

```
        if(d > 0)
```

```
        {
            System.out.println("The roots are real and distinct");
```

```
x1 = (-b + Math.sqrt(d)) / (2*a);
```

```
        x1 = (-b + res) / (2*a);
```

```
        x2 = (-b - res) / (2*a);
```

```
        System.out.println("The roots are: " + x1 + " " + x2);
```

```
    }
    else if(d == 0)
```

```
{
```



```

x1 = x2 = (-b)/(2*a);
System.out.println("The roots are real
and equal");
System.out.println("Roots are x1 = x2 = " + x1);
}
else
{
x1 = -b/(2*a);
x2 = (math.sqrt(math.abs(d)))/(2*a);
System.out.println("The roots have no real
solution and are imaginary");
System.out.println(x1 + " + i" + x2 + " + " + x1 + " - i"
+ x2);
}
}
}
}

```

Output:-

Enter the coefficients a, b, c

0

1

2

Invalid input for a

Enter the coefficients a, b, c

1

2

3

The roots have no real solution and are imaginary

-1.0 + i 1.41421356

1.41421356 - i 1.41421356

Enter The coefficients a, b, c

1

2

1

The roots are real and equal

Roots are $x_1 = x_2 = -1.0$

Enter The coefficients a, b, c

1

4

1

The roots are real and distinct

The roots are: 0.2679491924 -3.7320508075

Command Prompt

```
C:\Users\nbrij>cd C:\Engg\3rd sem\JAVA lab
```

```
C:\Engg\3rd sem\JAVA lab>javac quad.java
```

```
C:\Engg\3rd sem\JAVA lab>java Quad
```

```
Enter the coefficients a,b,c
```

```
0
```

```
1
```

```
2
```

```
Invalid input for a
```

```
C:\Engg\3rd sem\JAVA lab>java Quad
```

```
Enter the coefficients a,b,c
```

```
1
```

```
2
```

```
3
```

```
The roots have no real solution and are imaginary
```

```
-1.0+i1.4142135623730951
```

```
1.4142135623730951-i1.4142135623730951
```

```
C:\Engg\3rd sem\JAVA lab>java Quad
```

```
Enter the coefficients a,b,c
```

```
1
```

```
2
```

```
1
```

```
The roots are real and equal
```

```
Roots are r1=r2=-1.0
```

```
C:\Engg\3rd sem\JAVA lab>java Quad
```

```
Enter the coefficients a,b,c
```

```
1
```

```
4
```

```
1
```

```
The roots are real and distinct
```

```
The roots are:-0.2679491924311228    -3.732050807568877
```

```
C:\Engg\3rd sem\JAVA lab>_
```