

WEEK 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:

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

class solution
{
    public static void main(String args[])
    {
        Scanner s=new Scanner(System.in);
        System.out.println("Enter coefficients");

        float a=s.nextFloat();
        float b=s.nextFloat();
        float c=s.nextFloat();
        if(a!=0){
            double d=b*b-4*a*c;
            if(d==0){
                double r1=(-b)/(2*a);
                System.out.println("Roots are equal and is equal to "+r1);
            }else if(d<0){
                double r1=(Math.sqrt(Math.abs(d)))/(2*a);
                double r2=(-b)/(2*a);
                System.out.println("Imaginary roots.Roots are "+r2+"+i"+r1+"and "+r2+"-i"+r1);
            }else{
                double r1=(-b+Math.sqrt(d))/(2*a);
                double r2=(-b-Math.sqrt(d))/(2*a);
                System.out.println("Roots are real and distinct. Roots are "+r1+" and "+r2);
            }
        }
        else
        {
            System.out.println("Not a quadratic equation");
        }
    }
}
```

(1) Develop a program to take coefficients from user and display the real roots, display imaginary roots for non-real roots.

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

```
class Solution {
```

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

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

```
        System.out.println("Enter coefficients");
```

```
        float a = s.nextFloat();
```

```
        float b = s.nextFloat();
```

```
        float c = s.nextFloat();
```

```
        if (a != 0) {
```

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

```
            if (d < 0) {
```

```
                double r1 = (Math.sqrt(Math.abs(d)))/(2*a);
```

```
                double r2 = (-b)/(2*a);
```

```
                System.out.println("Imaginary
```

```
                roots are "+r2+" + "i" + r1 + "and "+r2+" - "i" + r1);
```

```
            }
```

```
        } else {
```

```
            if (d == 0) {
```

```
                double r1 = (-b)/(2*a);
```

```
                System.out.println("Roots are equal  
                and is equal to " + r1);
```

```
            }
```

```
        } else {
```

```
            double r1 = (-b + Math.sqrt(d))/(2*a);
```

```
            double r2 = (-b - Math.sqrt(d))/(2*a);
```

```
            System.out.println("Roots are real and distinct.  
            Roots are " + r1 + " and " + r2);
```

```
        }
```

```
    }
```

else {

System.out.println("Not a quadratic equation")

}

}

}

Output:

Enter coefficients

1 2 1

Roots are equal and is equal to -1.0

Enter coefficients

0 1 2

Not a quadratic equation

Enter coefficients

1 2 3

Imaginary roots - Roots are $-1.0 + i1.414213562373095$ and $-1.0 - i1.414213562373095$

Enter coefficients

2 5 2

Roots are real and distinct. Roots are -0.5 and -2.0

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OUTPUT:

```
Command Prompt
Imaginary roots. Roots are -0.5+i0.8660254037844386
C:\Users\bmscecse\Desktop\1BM21CS030>javac Quadratic.java
C:\Users\bmscecse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
1 1 1
Imaginary roots. Roots are -0.5+i0.8660254037844386 and -0.5-i0.8660254037844386
C:\Users\bmscecse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
1 2 3
Imaginary roots. Roots are -1.0+i1.4142135623730951 and -1.0-i1.4142135623730951
C:\Users\bmscecse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
2 5 2
Roots are real and distinct. Roots are -0.5 and -2.0
C:\Users\bmscecse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
0 1 2
Not a quadratic equation
C:\Users\bmscecse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
1 2 1
Roots are equal and is equal to -1.0
C:\Users\bmscecse\Desktop\1BM21CS030>
```