

# Roots of Quadratic equations

```
import java.util. Scanner ;
```

```
class roots {
```

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

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

```
        System.out.println ("Enter three number");
```

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

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

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

```
        double determinant = (b*b) - (4*a*c);
```

```
        double sqrt = Math.sqrt (determinant);
```

```
        if (determinant > 0) {
```

```
            double firstroot = (-b + sqrt) / (2*a);
```

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

```
            System.out.println ("Roots are different and real");
```

```
            System.out.printf ("Roots are = %.2f and %.2f",  
                                firstroot, secondroot);
```

```
        } else if (determinant == 0) {
```

```
            System.out.println ("Roots are real & equal");
```

```
            System.out.printf ("Root is = %.2f", (-b + sqrt) / (2*a));
```

```
        } else {
```

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

```
            double imaginarypart = Math.sqrt (determinant) / (2*a);
```

```

System.out.println("Roots are imaginary");
System.out.printf("Root 1 = %.2f + %.2fi and\n",
    Root 2 = %.2f - %.2fi",
    realpart, imaginary part,
    realpart, imaginary part);
    }
    }
}

```

### Algorithm

- i] Input value  $a, b, c$
- ii] Calculate ~~determinant~~<sup>discriminant</sup>  $= b^2 - 4ac$  and sqrt of determinant.
- iii] if (determinant  $> 0$ )  
 Roots are real & different  
 $r_1 = (-b + \text{sqrt}) / (2 * a);$   
 $r_2 = (-b - \text{sqrt}) / (2 * a);$
- iv]. else if (determinant  $= 0$ )  
 Roots are equal;  
 $r_1 = +(-b + \text{sqrt}) / (2 * a);$
- iv]. else  
 Roots are imaginary.  
 Real part  $= -b / (2 * a);$   
 imaginary part  $= \text{Math.sqrt}(-\text{determinant}) / (2 * a);$



$$R_1 \text{ Root } 1 = 1.2j + 1.2ji$$

$$\text{Root } 2 = -1.2j - 1.2ji$$

v] Print  $R_1$  &  $R_2$ .

vi] End.

Administrator: Command Prompt

Microsoft Windows [Version 6.1.7601]  
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C:\Users\shakti>cd C:\Program Files\Java\jdk1.8.0\_261\bin\lab\_2020

C:\Program Files\Java\jdk1.8.0\_261\bin\lab\_2020>javac roots.java

C:\Program Files\Java\jdk1.8.0\_261\bin\lab\_2020>java roots

Enter three number  
2.3  
4  
5.6

Roots are imaginary  
Root1 :-0.8695652173913044i and Root2 :-0.8695652173913044-1.2956229935435948i  
Root1 = -0.87+1.30i and Root2 = -0.87-1.30i

C:\Program Files\Java\jdk1.8.0\_261\bin\lab\_2020>

Window Snip

C:\Program Files\Java\jdk1.8.0\_261\bin\lab\_2020\roots.java - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

```
Project2.html x style.css x array.java x roots.java x style.css x project1.html x
1 import java.util.Scanner;
2 class roots{
3     public static void main(String[] args){
4         Scanner s=new Scanner(System.in);
5         System.out.println("Enter three number");
6         double a=s.nextDouble();
7         double b=s.nextDouble();
8         double c=s.nextDouble();
9
10        double determinant = (b*b)-(4*a*c);
11        double sqrt = Math.sqrt(determinant);
12
13        if(determinant>0){
14            double firstroot = (-b+sqrt)/(2*a);
15            double secondroot = (-b-sqrt)/(2*a);
16            System.out.println("Roots are real and differnt");
17            System.out.println("Roots are : "+ firstroot+ "and" + secondroot);
18            System.out.printf("Roots are = %.2f and %.2f", firstroot, secondroot);
19
20        }else if(determinant==0){
21            System.out.println("Roots are real and equal");
22            System.out.println("Root is : "+(-b+sqrt)/(2*a));
23            System.out.printf("Root is = %.2f",(-b+sqrt)/(2*a));
24
25        } else{
26            double realpart = b/(2*a);
27            double imaginarypart = Math.sqrt(-determinant)/(2*a);
28            System.out.println("Roots are imaginary");
29            System.out.println("Root1 : "+ realpart + imaginarypart+"i" + "and Root2 : "+ realpart + "-" +imaginarypart+"i");
30            System.out.printf("Root1 = %.2f+%.2fi and Root2 = %.2f-%.2fi", realpart, imaginarypart, realpart, imaginarypart);
31        }
32    }
33 }
```