

Lab 1

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.

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

class solution
{
    public static void main(String args[])
    {
        Scanner S = new Scanner(System.in);
        double a,b,c,r1,r2;
        System.out.println("Enter the values of a,b,c:");
        a = S.nextDouble();
        b = S.nextDouble();
        c = S.nextDouble();
        if (a != 0){
            double d = b*b - 4*a*c;

            if(d > 0){
                System.out.println("Roots are real and distinct");
                r1 = (-b + Math.sqrt(d))/(2*a);
                r2 = (-b - Math.sqrt(d))/(2*a);
                System.out.println("r1 : " + r1 + "r2 : " + r2);
            }
            else if(d == 0){
                System.out.println("Roots are real and equal");
                r1 = (-b)/(2*a);
                System.out.println("roots are : "+ r1);
            }
            else{
                System.out.println("Roots are imaginary");
                r1 = -b/(2*a);
                r2 = Math.sqrt(Math.abs(d))/(2*a);
                System.out.println("Roots are Imaginary");
                System.out.println("r1 : " + r1 + "i" + r2 + "r2 : " + r1 + "-i" + r2);
            }
        }
        else{
            System.out.println("Invalid Input");
        }
    }
}
```

Observation Book

Develop a Java program to solve a Quadratic equation accepting the input from the user and display appropriate input for imaginary roots.

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

class Solution

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

```
{  
    Scanner S = new Scanner(System.in);  
    double a, b, c, r1, r2;
```

```
    System.out.println("Enter the values of a, b, c:");
```

```
    a = S.nextDouble();
```

```
    b = S.nextDouble();
```

```
    c = S.nextDouble();
```

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

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

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

```
        {  
            System.out.println("Roots are Real and Distinct");
```

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

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

```
            System.out.println("r1: " + r1 + " r2: " + r2);
```

```
        }
```

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

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

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

```
            System.out.println("Roots are: " + r1);
```

```
        }
```

```

else {
    system.out.println("Roots are Imaginary");
}
}
else {
    system.out.println("Invalid Input");
}
}
}

```

Output

Enter the values of a, b, c:

1 2 1

Roots are real and equal

roots are : -1.0

Enter the values of a, b, c:

1 5 2

Roots are real and distinct

roots are $r_1: -0.38$ $r_2: -4.62$

Enter the values of a, b, c:

0 1 3

Invalid Input

Enter the values of a, b, c:

1 2 3

Roots are Imaginary

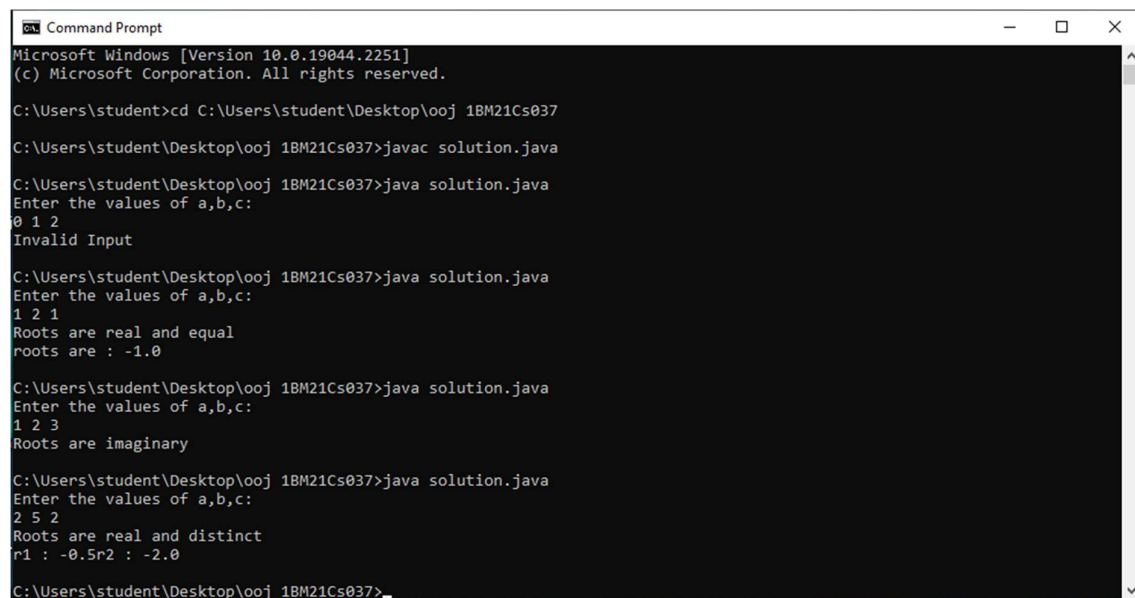
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Output images



```
Microsoft Windows [Version 10.0.19045.2251]
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C:\Users\bmsce>cd C:\Users\bmsce\Desktop\1BM21CS047\week-1
C:\Users\bmsce\Desktop\1BM21CS047\week-1>javac qe.java
C:\Users\bmsce\Desktop\1BM21CS047\week-1>java qe
Enter values of a,b and c
1 2 3
Roots are imaginary
R1:-1.0+i1.4142135623730951 R2:-1.0-i1.4142135623730951
C:\Users\bmsce\Desktop\1BM21CS047\week-1>
```



```
Microsoft Windows [Version 10.0.19044.2251]
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C:\Users\student>cd C:\Users\student\Desktop\ooj 1BM21Cs037
C:\Users\student\Desktop\ooj 1BM21Cs037>javac solution.java
C:\Users\student\Desktop\ooj 1BM21Cs037>java solution.java
Enter the values of a,b,c:
0 1 2
Invalid Input

C:\Users\student\Desktop\ooj 1BM21Cs037>java solution.java
Enter the values of a,b,c:
1 2 1
Roots are real and equal
roots are : -1.0

C:\Users\student\Desktop\ooj 1BM21Cs037>java solution.java
Enter the values of a,b,c:
1 2 3
Roots are real and distinct
r1 : -0.5r2 : -2.0
C:\Users\student\Desktop\ooj 1BM21Cs037>
```