

PROGRAM-1

a) 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;
```

```
class quadratic {
```

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

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

```
        System.out.println("Enter the  
        coefficients of the quadratic  
        equation ( $ax^2 + bx + c = 0$ ): ");
```

```
        System.out.print("Enter a: ");  
        double a = scanner.nextDouble();
```

```
        System.out.print("Enter b: ");  
        double b = scanner.nextDouble();
```

```
        System.out.print("Enter c: ");  
        double c = scanner.nextDouble();
```

```
        double discriminant =  $b^2 - 4ac$ ;
```

```
if (a == 0) {
    system.out.print("Not a quadratic equation");
}
```

```
else {
    double discriminant = (b*b) - (4*a*c);
```

```
if (discriminant > 0) {
```

```
    double root1 = (-b + Math.sqrt(discriminant)) / (2*a);
```

```
    double root2 = (-b - Math.sqrt(discriminant)) / (2*a);
```

```
    system.out.println("The roots are real and different");
```

```
    system.out.println("Root 1:" + root1);
```

```
    system.out.println("Root 2:" + root2);
```

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

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

```
    system.out.println("The roots are real and equal");
```

```
    system.out.println("Root 1/2" + root);
```

```
} else {
```

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

```
    double imaginaryPart = Math.sqrt(-discriminant) / (2*a);
```



```

system.out.println("The roots
are complex and different");
system.out.println("Root 1: "
+ realPart + "+" + imaginaryPart + "i");
system.out.println("Root 2: "
+ realPart + "-" + imaginaryPart + "i");
}
}
scanner.close();

```

Enter the coefficients of the quadratic equation ( $ax^2 + bx + c = 0$ ):

Enter a: 5  
Enter b: 7  
Enter c: 9

The roots are complex and different  
Root 1:  $-0.7 + 1.1445523142259597i$   
Root 2:  $-0.7 - 1.1445523142259597i$

Enter the coefficients of the quadratic equation ( $ax^2 + bx + c = 0$ ):

Enter a: 0  
Enter b: 5  
Enter c: 9

Not a quadratic equation