EXERCISE 1

Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions.

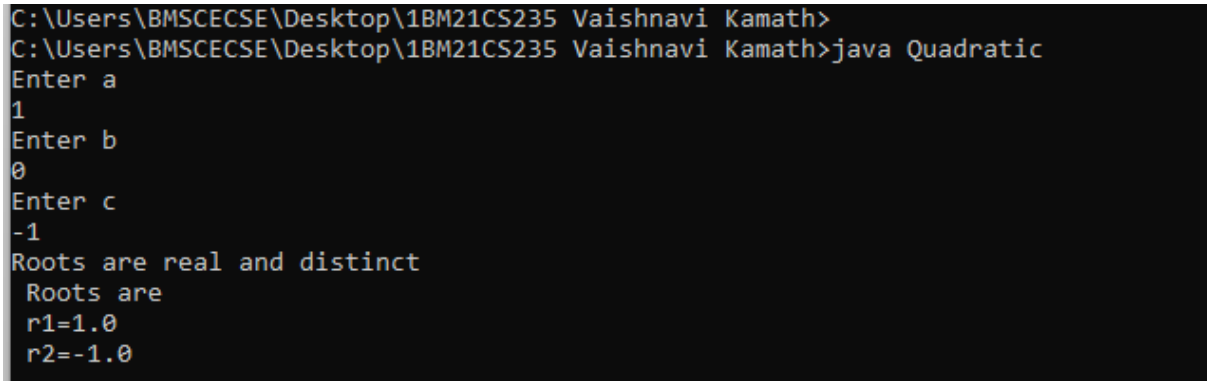
```
import java.util.*;
import java.lang.Math.*;
public class Quadratic
{
  public static void main(String args[])
    {
     Scanner in=new Scanner(System.in);
     System.out.println("Enter a");
     double a=in.nextDouble();

     System.out.println("Enter b");
     double b=in.nextDouble();
     System.out.println("Enter c");
     double c=in.nextDouble();
     if(a==0)
     {
      System.out.println("Invalid Inputs \n ");
     }
     else
     {
     double d=b*b-4*a*c;
     if(d>0.0)
     {
       double r1=(-b+(Math.sqrt(d)/(2.0*a)));
       double r2=(-b-(Math.sqrt(d)/(2.0*a)));
       System.out.println("Roots are real and distinct \n Roots are \n r1="+r1+"\n r2="+r2);
```

```
    }
    else if(d==0.0)
    {
    double r1=-b/(2*a);
    System.out.println("Roots are real and equal and each root is equal to"+r1);
    }
    else
    {
    System.out.println("Roots are imaginary and distinct. \n Roots are\n");
    double r1=-b/(2.0*a);
    double r2=(Math.sqrt(Math.abs(d)))/(2.0*a);
    System.out.println("r1= "+r1+"+i"+r2+"\n"+"r2= "+r1+"-i"+r2);
    }
  }
}
}
```

SAMPLE OUTPUTS:

1.Real and Distinct



2. Imaginary and distinct

```
C:\Users\BMSCECSE\Desktop\1BM21CS235 Vaishnavi Kamath>javac Quadratic.java

C:\Users\BMSCECSE\Desktop\1BM21CS235 Vaishnavi Kamath>java Quadratic
Enter a
1
Enter b
2
Enter c
3
Roots are imaginary and distinct.
 Roots are

r1= -1.0+i1.4142135623730951
r2= -1.0-i1.4142135623730951
```

3.Real and Equal

```
C:\Users\BMSCECSE\Desktop\1BM21CS235 Vaishnavi Kamath>java Quadratic
Enter a
2
Enter b
4
Enter c
2
Roots are real and equal and each root is equal to-1.0
```

4.Invalid Inputs

```
C:\Users\BMSCECSE\Desktop\1BM21CS235 Vaishnavi Kamath>java Quadratic
Enter a
0
Enter b
1
Enter c
2
Invalid Inputs
```