Lab 1

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.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

1) Develop a java program to solve a Quadratic equation accepting the input ~~get~~ from the users display ~~imaginary~~ invalid 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 r1: -0.438 r2: -4.562
Enter the values of a, b, c:
0 1 3
Invalid Input

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Enter the values of a, b, c:
1 2 3
Roots are Imaginary.

Output images