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

        double a=2.3, b=4, c=5.6;
        double root1, root2;

        double determinant = b * b - 4 * a * c;

        // condition for real and different roots
        if(determinant > 0) {
            root1 = (-b + Math.sqrt(determinant)) / (2 * a);
            root2 = (-b - Math.sqrt(determinant)) / (2 * a);

            System.out.format("root1 = %.2f and root2 = %.2f", root1 , root2);
        }
        // Condition for real and equal roots
        else if(determinant == 0) {
            root1 = root2 = -b / (2 * a);

            System.out.format("root1 = root2 = %.2f;", root1);
        }
        // If roots are not real
        else {
            double realPart = -b / (2 *a);
            double imaginaryPart = Math.sqrt(-determinant) / (2 * a);

            System.out.format("root1 = %.2f+%.2fi and root2 = %.2f-%.2fi", realPart,
                imaginaryPart, realPart, imaginaryPart);
            System.out.println("no real solutions");
        }
    }
}
```

```
$javac Quadratic.java

$java -Xmx128M -Xms16M Quadratic
root1 = -0.87+1.30i and root2 = -0.87-1.30i
```

2) program to find roots of quadratic equation.

=> public class Quadratic
{
public static void main (String args [])
{
double a = 2.3 ;
double b = 4 ;
double c = 5.6 ;
double root1, root2 ;
double determinant = b*b - 4*a*c ;
if (determinant > 0)
{
System.out.println("
root1 = (-b + Math.sqrt(determinant)) / (2*a) ;
root2 = (-b - math.sqrt(diterminant)) / (2*a) ;

System.out.println("root1 = %.2f and root2 = %.2f",
root1, root2) ;

else if (determinant == 0)
{
root1 = root2 = -b / (2*a) ;
System.out.println (" root1 = root2 = %.2f (root1) ;

else
{ double real part = -b / (2*a) ;
double imaginarypart = math.sqrt(-determinat) / (2*a) ;
Sqrt

System.out.println("root 1 = %.2f + %.2fi)
and root 2 = %2f - %.2fi, realpart.
imaginary part, realpart, imaginarypart);

Algorithm :-

quadratic determinant : $b^2 - 4ac$

where a, b, c are variably

$b^2 - 4ac = D$

$D < 0$	$D = 0$	$D > 0$
$\frac{-b \pm \sqrt{-D}}{2a}$	$\frac{-b}{2a}$	$\frac{-b + \sqrt{D}}{2a}$

Output :

root 1 = - 0.67 + 1.30i and.

root 2 = - 0.67 - 1.30i.

Lab program 2

Develop a java program to create a class Student with members, USN, Name, and array credits & an array marks. Include methods to accept & display details & a method to calculate SGPA of a student

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

class student
{
int USN;
String name = new String();
int credits[] = new int[5];
int marks[] = new int [5];
float SGPA ()
 {
float sum=0
for (int i=0;i<5;i++)
 {
sum = sum + (credits[i] * marks[i]);
}
return sum/5;
}
}
public class main
{
public static void main (string args[])
{
Scanner in = new Scanner (System.in);
```

```
Student Stud1 = new Student ();
System.out.println ("ENTER DETAILS");
System.out.println ("NAME :");

System.out.println ("Enter the credits);
for (int j=0 ;j<5 ; j++)
{
System.out.println ("subject " + (j+1));
 int cred= in.nextInt();
 Stud1.credits[j] = cred;
    }

System.out.println ("Enter the marks");
for(int j=0 ; j<5 ; j++)
  {
System.out.println (" subject" + (j+1));
 int mark = in.nextInt();
 stud1.marks[j] = mark;
}
System.out.println ("student Details :");
System.out.println (" Name : " + stud1.name);
System.out.println ("USn : " + stud1.usn);
System.out.println ("SGPA : " + stud1.SGPA());
  }
}
```

Output :

```
Enter details
NAME:
SHWETA
USN:
24
Enter the credits
subject 1
 4
subject 2
 4
subject 3
 4
subject 4
 4
subject 5
 4
Enter the marks
Subject 1
 89
Subject 2
 66
Subject 3
 76
Subject 4
 76
Subject 5
 80.
```

```
Student Details:
Name : SHWETA
USN  : 24
SGPA : 7.4.
```