② Quadratic Equation

```
import java.util.scanner;
import java.lang.math;
class quadratic {
public static void main (String XX[]) {
 int a, b, c;
 System.out.println ("enter the values of a,b,c
respectively \n");
 Scanner s1 = new Scanner (system.in);
  a = s1.nextInt ();
  b= s1.nextInt ();
  c= s1.nextInd();
  double d = b*b - 4*a*c;
  System.out.println ("a= " +a+ "b = " +b+"
  c= " +c);
  if (a ==0) {
  System.out.println ("not a quadratic equation");}
  else if (d>0) {
  System.out.println ("the equation has two real &
  different solutions");
  double r1= (-b + Math.sqrt (d)) / (2*a);
  double r2 = (-b - Math.sqrt (d)) / (2*a);
  System.out.println ("r1 = " + r1);
  System.out.println ("r2 = " + r2); }

  else if (d==0) {
  System.out.println ("the equation has real &
  equal solutions");
```

```
double r1 = -b / (2*a);
double r2 = -b / (2*a);
System.out.println("r1 = " + r1);
System.out.println("r2 = " + r2);}

elseif (d<0){
System.out.println("the equation has unreal
solutions");}
}
}
```

output:

```
Enter value of a: 1
Enter value of b: 1
Enter value of c: 1
Roots are not real.

Enter value of a: 1
Enter value of b: 9
Enter value of c: 1
Roots are: -0.1125 & -8.887.
Roots are real & distinct.
```

QUADRATIC ROOTS

```
import java.util.Scanner;
class Quad{
int a,b,c;
double d,r1,r2;
void input(){
Scanner sc=new Scanner(System.in);
System.out.println("Enter coefficients");
a=sc.nextInt();
b=sc.nextInt();
c=sc.nextInt();
}
void calc(){
double d=(b*b)-(4*a*c);
if(a==0||b==0||c==0){
System.out.println("invalid inputs");
}
else 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);
System.out.println("r2="+r2);
}
else if(d==0){
    System.out.println("Roots are real and equal");
r1=r2=-b/(2*a);
System.out.println("r1="+r1);
System.out.println("r2="+r2);
}
else{
System.out.println("Roots are imaginary");
r1=-b/(2*a);
r2=Math.sqrt(-d)/(2*a);
System.out.println("r1="+r1+"+i"+r2);
System.out.println("r2="+r1+"-i"+r2);
}
}
}

class QuadMain{
public static void main(String args[]){
Quad q=new Quad();
q.input();
```

QUADRATIC ROOTS

```
q.calc();
}
}
```

Output:

```
Enter coefficients
10 0 5
invalid inputs.

Enter coefficients
1 5 2
roots are real and distinct
r1=-2.9384471871911697
r2=-7.061552812808831

Enter coefficients
10 2 20
Roots are imaginary
r1=0.0+i1.4106735979665885
r2=0.0-i1.4106735979665885

Enter coefficients
1 2 1
Roots are real and equal
r1=-1.0
r2=-1.0
```