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

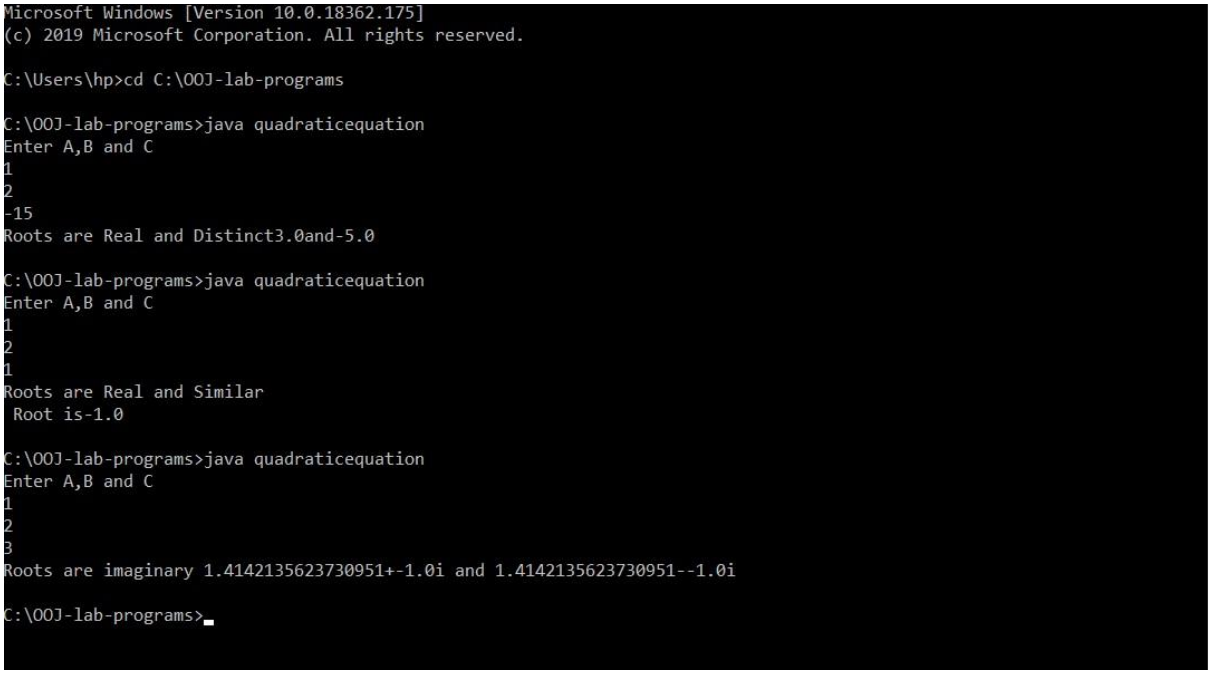
message stating that there are no real solutions.

Code:

```
import java.util.*; import java.lang.*;
class quadraticequation{ public
static void main(String args[])
{
Scanner in=new Scanner(System.in);
double a,b,c,d,root1,root2;
System.out.println("Enter A,B and C");
a=in.nextDouble(); b=in.nextDouble();
c=in.nextDouble(); d=b*b-4*a*c;
if(d==0)
System.out.println("Roots are Real and Similar \n Root is"+(-b)/(2*a)); if(d>0)
{
   root1=(-b+Math.sqrt(d))/(2*a);
root2=(-b-Math.sqrt(d))/(2*a);
   System.out.println("Roots are Real and Distinct"+root1+"and"+root2);
}
if(d<0)
{
        root1=-b/(2*a);
root2=Math.sqrt(-d)/(2*a);
        System.out.println("Roots are imaginary "+root1+"+"+root2+"i and "+root1+"-"+root2+"i");


}}}
```

Output:


Microsoft Windows [Version 10.0.18362.175]
(c) 2019 Microsoft Corporation. All rights reserved.
C:\Users\hp>cd C:\OOJ-lab-programs
C:\OOJ-lab-programs>java quadraticequation
Enter A,B and C
1
2
-15
Roots are Real and Distinct3.0and-5.0
C:\OOJ-lab-programs>java quadraticequation
Enter A,B and C
1
2
1
Roots are Real and Similar
Root is-1.0
C:\OOJ-lab-programs>java quadraticequation
Enter A,B and C
1
2
3
Roots are imaginary 1.4142135623730951+-1.0i and 1.4142135623730951--1.0i
C:\OOJ-lab-programs>

2. Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

CODE:

```
import     java.io.*;
import  java.lang.*;
import   java.util.*;
public class lab2
{
   int n;
   String usn;
String name;
   int credit[];
   double mark[];     public
static void read()
   {
      Scanner sc=new Scanner(System.in);
      System.out.println("Enter the Number Of Subjects");
      n=sc.nextInt();
credit=new int[n];
mark=new double[n];
      System.out.println("Enter the name of the Student");
name=sc.next();

      System.out.println("Enter the USN of The Student");
      usn=sc.next();

      System.out.println("Enter the Credits Of The Subject");
      for(int i=0;i<n;i++)
      {
         credit[i]=sc.nextInt();
```

```
    }
    System.out.println("Enter the Marks Of The Student In Corresponding Subjects");
    for(int i=0;i<n;i++)
    {
        mark[i]=sc.nextDouble();
    }
}

public static int grade(double marks)
{
    if(marks>=90&&marks<=100)
    {
        return 10;
    }
    else if(marks>=80&&marks<90)
    {
        return 9;
    }
    else if(marks>=70&&marks<80)
    {
        return 8;
    }
    else if(marks>=60&&marks<70)
    {
        return 7;
    }
    else if(marks>=50&&marks<60)
    {
        return 6;
    }
    else if(marks>=40&&marks<50)
```

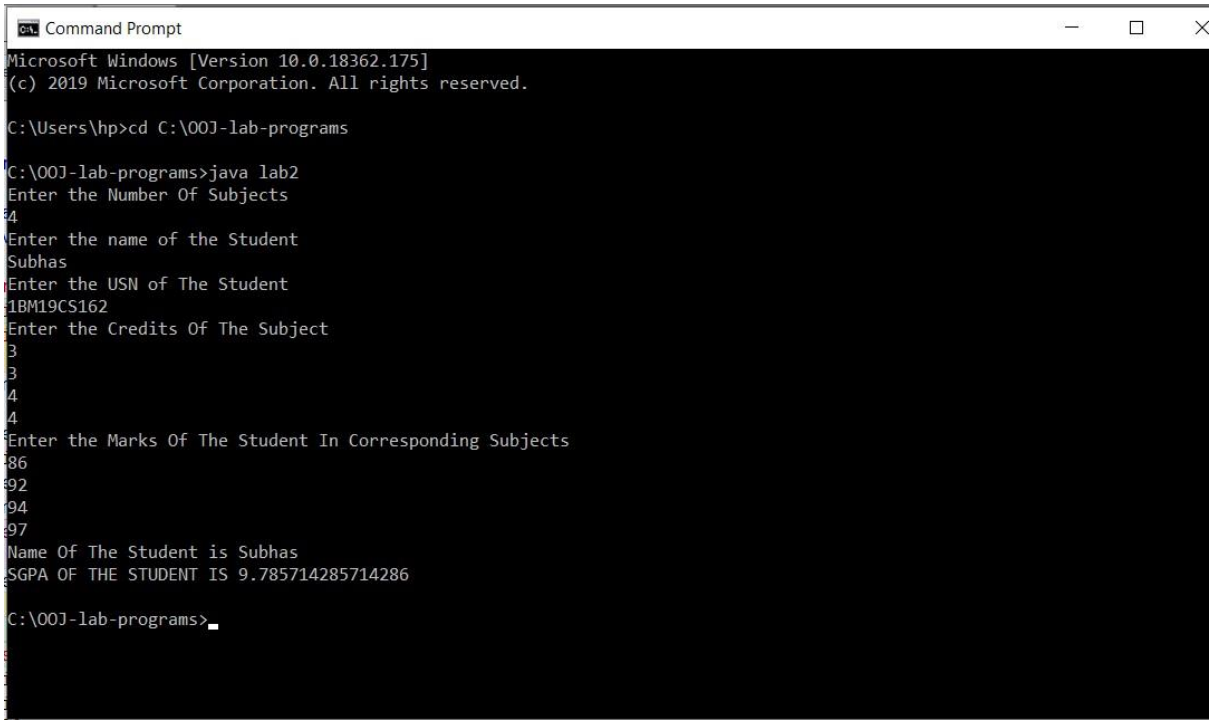
```
    {
      return 5;

    }
    else
    {
      System.out.println("You Have Failed In This Subject");
      return 0;
    }
  }

  public static double caclculate()
  {
    read();
    double sgpa;
double sum_credits=0;
double sum=0;
    int c;
    for(int i=0;i<n;i++)
    {
      c=grade(mark[i]);
sum_credits+=credit[i];
sum=sum+c*credit[i];
    }
    sgpa=(double)(sum/sum_credits);
    return sgpa;
  }
  public static void main(String[] args)
  {
    Scanner sc=new Scanner(System.in);
```

```
        double sgpa=caclculate();
        System.out.println("Name Of The Student is " + name);
        System.out.println("SGPA OF THE STUDENT IS " + sgpa);    }
}
```

OUTPUT:



3.Create BOOk

```
import  java.util.*;

//import java.lang.*;

public class lab3
{    public static String name;    public
static String author;      public static
double price;         public static int
no_of_page;          public static void
main(String[] args)
    {

        Scanner sc=new Scanner(System.in);
int n;

        System.out.println("Enter  the number of books");

n=sc.nextInt();

        lab_program3[] ob=new lab_program3[n];

for(int i=0;i<n;i++)

        {

            System.out.println("Enter  the name of the book " + (i+1));

name=sc.next();

            System.out.println("Enter  the author of the book " + (i+1));

author=sc.next();

            System.out.println("Enter  the price of the book " + (i+1));

price=sc.nextDouble();

            System.out.println("Enter  the number of pages of book " +

(i+1));

no_of_page=sc.nextInt();

            ob[i]= new lab_program3(name,author,price,no_of_page);

          //ob[i]=new lab_program3(name,author,price,)
```

```
        }         for(int
i=0;i<n;i++)
        {

            System.out.println("Displaying  the details of the book " +
(i+1));

            System.out.println();

            System.out.println(ob[i]);
        }
public class lab_program3
{     public String
name;     public String
author;     public
double price;     public
int no_of_pages;
public
lab_program3(String
n,String a,double
pri,int pages)
    {         name=n;

author=a;

price=pri;

no_of_pages=pages;
    }     @Override
public String toString()
    {

        return "Name of the book is: " + name + " ,\n Author Of The Book
Is: " + author +" ,\n Cost of the book is: " + price + " \n Number Of

Pages in the book is " + no_of_pages;
    }
}
```

Command Prompt

```
C:\Users\hp\Desktop>javac lab3.java

C:\Users\hp\Desktop>java lab3
Enter the number of books
3
Enter the name of the book 1
a
Enter the author of the book 1
a
Enter the price of the book 1
45
Enter the number of pages of book 1
67
Enter the name of the book 2
B
Enter the author of the book 2
b
Enter the price of the book 2
45
Enter the number of pages of book 2
78
Enter the name of the book 3
S
Enter the author of the book 3
s
Enter the price of the book 3
45
Enter the number of pages of book 3
67
Displaying the details of the book 1

Name of the book is: a ,
 Author Of The Book Is: a ,
 Cost of the book is: 45.0
 Number Of Pages in the book is 67
Displaying the details of the book 2

Name of the book is: B ,
 Author Of The Book Is: b ,
 Cost of the book is: 45.0
 Number Of Pages in the book is 78
Displaying the details of the book 3

Name of the book is: S ,
 Author Of The Book Is: s ,
 Cost of the book is: 45.0
 Number Of Pages in the book is 67

C:\Users\hp\Desktop>
```

Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea( ). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes containonly the method printArea( ) that prints the area of the given shape.

CODE:

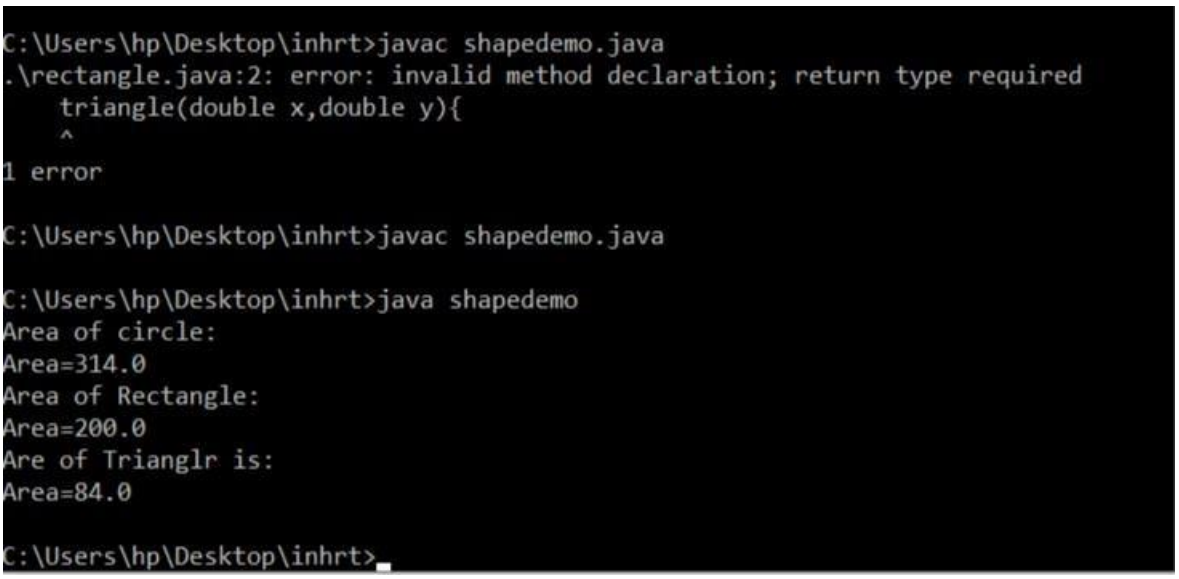
```
 abstract    class    shape{
double x;
    double y;    shape(double
x,double y){         this.x=x;
this.y=y;          }  abstract
double printArea();
}

class triangle extends shape{

triangle(double  x,double  y){
super(x,y);      }     double
printArea(){
        System.out.println("Are   of   Trianglr   is:");
return (x*y)/2;
    }
}  class rectangle extends shape{
rectangle(double    x,double    y){
super(x,y);         }        double
printArea(){
        System.out.println("Area    of    Rectangle:");
return (x*y);
    }
} class circle extends shape{
circle(double    x,double    y){
super(x,y);      }
    double printArea(){
        System.out.println("Area     of     circle:");
return (3.14*x*x);
    }
```

```
}
class shapedemo{
    public static void main(String[] args){
circle         c=new         circle(10,10);
rectangle      r=new      rectangle(10,20);
triangle       t=new       triangle(12,14);
shape s;          s=c;
        System.out.println("Area="+c.printArea());
s=r;
        System.out.println("Area="+r.printArea());
s=t;
        System.out.println("Area="+t.printArea());
    }
}
```

Ouput:



5.Create class bank

```
import java.util.*; class
Bank{

   Scanner sc = new Scanner(System.in);
}

class Account extends Bank{
   int A_no;
   String A_Name = new String();
int A_accType;

   void getAccData(){
      System.out.println("Enter the  Account Name : ");
      A_Name = sc.nextLine();
      System.out.println("Enter the Account Type : (1.for Savings account 2.Current account)");
      A_accType = sc.nextInt();
      System.out.println("Enter The Account number :");
      A_no = sc.nextInt();
   }
}
class sav_account extends account
{
      double a,cinterest;
      int r,t;
      Scanner in=new Scanner(System.in);
void withdrawal()
      {
            System.out.println("Enter amount to be  withdrawn:");
double  amtw=in.nextDouble();                  if(amtw<=amount)
amount=amount-amtw;
```

```
            else
                System.out.println("You dont have enough money to withdraw");
        }
        void cmp_interest()
        {
            System.out.println("Enter the rate and time:");
            r=in.nextInt();
t=in.nextInt();
            a=amount* Math.pow(1 + (r *0.01),t);
cinterest= a - amount;

        }
void display()
        {
            super.display();
            System.out.println("Compound Interest after " + t + " years: "+cinterest);
System.out.println("Amount after " + t + " years: "+a);
        }
}
import java.util.*; class
Current_acc extends account
{
        double min=5000;
void input()
        {
            super.input();
        }
        void service_charge()
        {
            if(amount<min)
amount=amount-200;        }
```

```
    void display()
    {
        super.display();
    }
}
import java.util.*;
class Bankdemo1
{
    public static void main(String args[])
    {
        Scanner in=new Scanner(System.in);
        System.out.println("**********Choose type of account*********");
        System.out.println("1.Savings account.");
System.out.println("2.Current account.");
        int choice=in.nextInt();

        if(choice==1)
        {
            sav_account b=new sav_account();
            b.type(choice);
            b.input();
            System.out.println("*************************\n1.Deposit.\n2.Withdraw\n*****
**********************");
            int ch=in.nextInt();
if(ch==1)
            b.deposit();
else if(ch==2)
            b.withdrawal();
            else
            System.out.println("Invalid choice");
            b.cmp_interest();
```

```
                b.display();
}
            else if(choice==2)
            {
                Current_acc b=new Current_acc();
                b.type(choice);
                b.input();
                b.deposit();
                b.service_charge();
                b.display();
                }
            else if(choice==2)
            {
                Current_acc b=new Current_acc();
                b.type(choice);
                b.input();
                b.deposit();
                b.service_charge();
                b.display();
}
            else
                System.out.println("Invalid choice");

      }
}
```

OUTPUT:

```
C:\Users\hp\Desktop\inhrt\lab4>java Bankdemo1
**********Choose type of account*********
1.Savings account.
2.Current account.
1
Enter the Name,Account number and Balance:
www
34567
4500
************************
1.Deposit.
2.Withdraw
************************
2
Enter amount to be withdrawn:
450
Enter the rate and time:
3
5
Name:www
Account number:34567
Type:Savings Account
balance:4050.0
Compound Interest after 5 years: 645.0600009150003
Amount after 5 years: 4695.060000915

C:\Users\hp\Desktop\inhrt\lab4>java Bankdemo1
**********Choose type of account*********
1.Savings account.
2.Current account.
2
Enter the Name,Account number and Balance:
aaa
345678
34000
Enter the amount to be deposited:
8000
Name:aaa
Account number:345678
Type:Current Account
balance:42000.0

C:\Users\hp\Desktop\inhrt\lab4>
```