

Develop a Java program that prints all real solutions to the quadratic equation

$ax^2+bx+c = 0$. Read in a, b, c and use the quadratic formula. If the discriminate b^2

$-4ac$ is negative, display a message stating that there are no real solutions.

CODE:

```
import java.util.Scanner;
class quadratic_equation
{
    public static void main(String args[])
    {
        double a,b,c,d,r1,r2;
        System.out.println("Enter the value of coefficients: ");
        Scanner scan=new Scanner(System.in);
        a=scan.nextDouble();
        b=scan.nextDouble();
        c=scan.nextDouble();
        d=b*b-4*a*c;
        if(d>0)
        {
            r1=(-b+Math.pow(d,0.5)/(2.0*a));
            r2=(-b-Math.pow(d,0.5)/(2.0*a));
            System.out.println("Roots are real and distinct"+" "+r1+" "+r2);
        }
        else if(d==0)
        {
            r1=-b/2.0*a;
            System.out.println("Roots are real and equal"+" "+r1);
        }
        else
        {
            System.out.println("Roots are imaginary");
            r1=-b/2.0*a;
            r2=Math.pow(Math.abs(d),0.5);
            System.out.println(r1+"+"+"i"+r2);
            System.out.println(r1+"-"++"i"+r2);
        }
    }
}
```

OUTPUT:

```
C:\Users\bmsce\Desktop\1BM21CS057>javac quadratic_equation.java

C:\Users\bmsce\Desktop\1BM21CS057>java quadratic_equation
??nter the value of coefficients:
1 2 1
Roots are real and equal -1.0

C:\Users\bmsce\Desktop\1BM21CS057>javac quadratic_equation.java

C:\Users\bmsce\Desktop\1BM21CS057>java quadratic_equation
??nter the value of coefficients:
2 3 4
Roots are not real

C:\Users\bmsce\Desktop\1BM21CS057>javac quadratic_equation.java

C:\Users\bmsce\Desktop\1BM21CS057>java quadratic_equation
??nter the value of coefficients:
4 6 2
Roots are real and distinct -5.75 -6.25

C:\Users\bmsce\Desktop\1BM21CS057>javac quadratic_equation.java

C:\Users\bmsce\Desktop\1BM21CS057>java quadratic_equation
??nter the value of coefficients:
4 6 2
Roots are real and distinct -5.75 -6.25

C:\Users\bmsce\Desktop\1BM21CS057>javac quadratic_equation.java

C:\Users\bmsce\Desktop\1BM21CS057>java quadratic_equation
??nter the value of coefficients:
1 2 3
Roots are imaginary
-1.0+i2.8284271247461903
-1.0-i2.8284271247461903
```

QUESTION:

2/ Develop a Java program to create a class student with members User, name, an array of credits & array of marks. Include methods to accept & display details and method to calculate Sgpa of a student.

CODE:

```
class Student
{
    String user(10);
    String name(20);
    int marks[] = new int[5];
    int credits[] = new int[5];
    double result = 0; int total;
    void accept()
    {
        Scanner scan = new Scanner(System.in);
        //for user
        System.out.println("Enter user");
        user = scan.nextLine();
        System.out.println("Enter name");
        name = scan.nextLine();
        System.out.println("Enter marks");
        //for marks
        for(int i=0; i<5; i++)
        {
            marks[i] = scan.nextInt();
        }
        System.out.println("Enter credits");
        for(int i=0; i<5; i++)
        {
            credits[i] = scan.nextInt();
        }
    }
    void display()
    {
        System.out.println(user);
        System.out.println(name);
    }
}
```

OUTPUT:

```
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>javac LAB2.java
```

```
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>java sgpa
```

```
enter name and usn of the student
```

```
Dhruva 1BM21CS057
```

```
enter number of courses
```

```
5
```

```
credit of the subject1:
```

```
4
```

```
marks of the subject1:
```

```
98
```

```
credit of the subject2:
```

```
3
```

```
marks of the subject2:
```

```
90
```

```
credit of the subject3:
```

```
1
```

```
marks of the subject3:
```

```
89
```

```
credit of the subject4:
```

```
1
```

```
marks of the subject4:
```

```
88
```

```
credit of the subject5:
```

```
3
```

```
marks of the subject5:
```

```
94
```

```
usn of the student: 1BM21CS057
```

```
name of the student: Dhruva
```

```
sgpa is 9.833333333333334
```

```

for (i=0; i<5; i++)
{
    System.out.println(marks[i]);
    System.out.println(credits[i]);
}

float calc_sgra ( )
{
    float sgra;
    for (i=0; i<5; i++)
    {
        if (marks[i] >= 90 && marks[i] <= 100)
            result += 10 * credits[i];
        else if (marks[i] >= 80 && marks[i] < 90)
            result += 9 * credits[i];
        else if (marks[i] >= 70 && marks[i] < 80)
            result += 8 * credits[i];
        else if (marks[i] >= 60 && marks[i] < 70)
            result += 7 * credits[i];
        else if (marks[i] >= 50 && marks[i] < 60)
            result += 6 * credits[i];
        else if (marks[i] >= 40 && marks[i] < 50)
            result += 5 * credits[i];
        else
            result = 0;
    }

    for (i=0; i<5; i++)
        total = total + credits[i];
    sgra = result / total;
}

```

```

class Egbac {
    psvm (String ss[])
    {
        Student s1 = new Student();
        s1.accept();
        s1.display();
        s1.calc_sgra(); s1.calc_sgra();
    }
}

```

QUESTION:

3) Create a book which contains four members: name, author, price, num. of pages. Include the constructor to set the values for the members. Include methods to add & get the details of objects. Include a toString() method that could display the complete book details. Develop a java program to create n' book objects.

CODE:

```
import java.util.Scanner;
import java.io.*;
class Book
{
    String name, author;
    float price;
    int num_pages;
}

void getval()
{
    Scanner s = new Scanner(System.in);
    System.out.println("Enter book name");
    name = s.next();
    System.out.println("Enter author name");
    author = s.next();
    System.out.println("Enter price");
    price = s.nextFloat();
    System.out.println("Enter no. of pages");
    num_pages = s.nextInt();
}

public String toString()
{
    return name + " " + author + " " + price + " " +
        num_pages + " ";
}
```

```

void display (Book o)
{
    System.out.println(o);
}

class Book_vtk
{
    public static void main (String[] args)
    {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter no. of book objects");
        int n = s.nextInt();
        Book[] ob = new Book[n];
        for (int i=0; i<n; i++)
            ob[i] = new Book();
        for (int i=0; i<n; i++)
            ob[i].getdata();
        for (int i=0; i<n; i++)
            ob[i].display(ob[i]);
    }
}

```

OUTPUT:

```

C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>javac LAB3.java

C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>java Book_vtk
Enter the no. of book objects
2
Enter book name
lotr
Enter author name
Tolkien
Enter price
1000
Enter No. of pages
999
Enter book name
harryPotter
Enter author name
jkRowling
Enter price
880
Enter No. of pages
456
Name: lotr Author: Tolkien price: 1000 Number of pages: 999
Name: harryPotter Author: jkRowling price: 880 Number of pages: 456

```


4) 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 contain only the method printArea() that prints the area of the given shape.

```
import java.util.Scanner;
abstract class Shape
{
    int x, y;
    double area;
    abstract void printArea();
}

class Rectangle extends Shape
{
    void printArea()
    {
        area = x * y;
        System.out.println("Area of rectangle is: " + area);
    }
}

class Triangle extends Shape
{
    void printArea()
    {
        area = 0.5 * x * y;
        System.out.println("Area of triangle is: " + area);
    }
}
```



```
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>javac Area.java

C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>java Area
Enter the shape whose area is to be found out: rectangle
Enter length:
3
Enter breadth:
4
Area of rectangle is: 12.0
Enter the shape whose area is to be found out: triangle
Enter height:
4
Enter breadth:
5
Area of triangle is: 10.0
Enter the shape whose area is to be found out: circle
Enter radius:
4
Area of circle is: 50.24

C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>_
```

```

57 Bank program -
import java.util.Scanner;
import java.lang.*;
class Account
{
    String name, type;
    int accno;
    double balance;
    void setDC()
    {
        Scanner s = new Scanner(System.in);
        S.O.P("Enter account name: ");
        name = s.next();
        S.O.P("Enter type of account: ");
        type = s.next();
        S.O.P("Enter accno: ");
        accno = s.nextInt();
        S.O.P("Enter bank balance: ");
        balance = s.nextDouble();
    }
    void display()
    {
        S.O.P(name + " " + type + " " + accno + " " + balance);
    }
    void deposit()
    {
        S.O.P("Enter amt to be deposited: ");
        Scanner s = new Scanner(System.in);
        double amt = s.nextDouble();
        balance += amt;
    }
}

```

```

class Sav_acc extends Account
{
    double interest;
    void confInt()
    {
        int time_in_years;
        float int_rate_in_per;
        int n; Scanner s = new Scanner(System.in);
        S.O.P("Enter time in years: "); time_in_years = s.nextInt();
        S.O.P("Enter interest rate: "); int_rate_in_per = s.nextFloat();
        S.O.P("Enter no. of times interest is compounded for year: "); n = s.nextInt();
        interest = balance * (Math.pow(1 + int_rate_in_per/n), (n * time_in_years));
        balance += interest;
    }
    void withdrawal()
    {
        S.O.P("Enter amt to be withdrawn: "); Scanner s = new Scanner(System.in);
        double amt = s.nextDouble();
        if (balance > amt) { balance -= amt; }
        else { S.O.P("Insufficient balance"); }
    }
}

class Cur_acc extends Account
{
    void min_balance()
    {
        if (balance < 1000)
        {
            S.O.P("Refill 1000 pronto");
            balance += 100;
        }
        else { S.O.P("No refill"); }
    }
}

```

```

void withdraw()
{
    S.O.P("Enter amount to be withdrawn");
    double amt = S.getAmount();
    if (balance > amt) { balance = amt; }
    else { S.O.P("Insuff. balance"); }
}

class Bank
{
    P.SUM (Total) = 0;

    Scanner S = new Scanner(System.in);
    String op1, op2;
    int acc = 1;
    int cur = 1;
    while (true)
    {
        S.O.P("Enter choice: \n 1. a - for balance of savings\n 2. b - display \n 3. c - deposit \n 4. d - withdraw\n 5. e - exit \n");
        op1 = S.next();
        switch (op1)
        {
            case "1a": S.setD(1); break;
            case "2b": S.setD(2); break;
            case "3c": S.setD(3); break;
            case "4d": S.withdraw(); break;
            case "5e": System.out(0); break;
        }
    }
}

```

```

S.O.P("Enter choice (Current acc) : \n 2a - Savings \n 2b - display \n 2c - deposit \n 2d - min balance \n 2e - exit \n");
op2 = S.next();
switch (op2)
{
    case "2a": C1.setD(1); break;
    case "2b": C1.display(); break;
    case "2c": C1.deposit(); break;
    case "2d": C1.minBalance(); break;
    case "2e": C1.withdraw(); break;
    case "2f": System.out(0); break;
}
}

```

C++
q.12 p.02

Output:

```
C:\Users\dhru2>cd C:\Users\dhru2\OneDrive\Desktop\1BM21CS057
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>javac Bank.java
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>java Bank
Enter the choice:
1a.Set the values for savings acc
1b. display
1c. deposit
1d. Interest
1e. Withdraw
1f. exit
1a
Enter customer name: dhruva
Enter type of account: saving
Enter account number: 34
Enter bank balance: 34000
Enter the choice:
2a.Set the values for current account
2b. display
2c. deposit
2d. transferCheck
2e. Withdraw
2f. exit
2a
Enter customer name: dhruva
Enter type of account: current
Enter account number: 333
Enter bank balance: 67000
Enter the choice:
1a.Set the values for savings acc
1b. display
1c. deposit
1d. Interest
1e. Withdraw
1f. exit
1b
Customer name is: dhruva
Customer account type is: saving
Customer account number is: 34
Current balance is: 34000.0
```

```
Enter the choice:
2a.Set the values for current account
2b. display
2c. deposit
2d. transferCheck
2e. Withdraw
2f. exit
2b
Customer name is: dhruva
Customer account type is: current
Customer account number is: 333
Current balance is: 67000.0
Enter the choice:
1a.Set the values for savings acc
1b. display
1c. deposit
1d. Interest
1e. Withdraw
1f. exit
1c
Enter the amount to be deposited: 34000
Enter the choice:
2a.Set the values for current account
2b. display
2c. deposit
2d. transferCheck
2e. Withdraw
2f. exit
2c
Enter the amount to be deposited: 30000
Enter the choice:
1a.Set the values for savings acc
1b. display
1c. deposit
1d. Interest
1e. Withdraw
1f. exit
1d
Enter time in yrs:
2
Enter rate of interest:
10
Enter the number of times interest is compounded per year:
3
```



```
Enter the choice:
2a.Set the values for current account
2b. display
2c. deposit
2d. transferCheck
2e. Withdraw
2f. exit
2b
Customer name is: dhruva
Customer account type is: current
Customer account number is: 333
Current balance is: 97000.0
Enter the choice:
1a.Set the values for savings acc
1b. display
1c. deposit
1d. Interest
1e. Withdraw
1f. exit
1b
Customer name is: dhruva
Customer account type is: saving
Customer account number is: 34
Current balance is: 4.5030512967112005E8
Enter the choice:
2a.Set the values for current account
2b. display
2c. deposit
2d. transferCheck
2e. Withdraw
2f. exit
2d
Enter the check amount: 45600
Rupees 45600.0 debited
Enter the choice:
1a.Set the values for savings acc
1b. display
1c. deposit
1d. Interest
1e. Withdraw
1f. exit
1b
Customer name is: dhruva
Customer account type is: saving
Customer account number is: 34
Current balance is: 4.5030512967112005E8
```

```
Enter the choice:
2a.Set the values for current account
2b. display
2c. deposit
2d. transferCheck
2e. Withdraw
2f. exit
2b
Customer name is: dhruva
Customer account type is: current
Customer account number is: 333
Current balance is: 6400.0
```

WEEK 6: FATHER SON EXCEPTION PROBLEM

```
6/
import java.util.Scanner;
class FatherException extends Exception {
    public String toString() {
        return ("Father's age is less than 0");
    }
}

class SonException extends Exception {
    int a;
    SonException(int a) {
        a = a;
    }
    public String toString() {
        if (a < 0)
            return ("Son's age is less than 0");
        else
            return ("Son's age is more than father's age");
    }
}

class Father {
    int age;
    Scanner in = new Scanner(System.in);
    father() {
        System.out.println("Enter Father's age: ");
        age = in.nextInt();
    }
}
```

```

    void ask() throws IOException
    {
        if (age < 0)
            throw new IOException();
    }
}

class Son extends Father
{
    int age;
    Son()
    {
        System.out.println("Enter son's age:");
        age = in.nextInt();
    }

    void ask() throws IOException
    {
        if (age < 0 || age > 120)
            throw new IOException();
    }
}

class except
{
    public static void main(String args[])
    {
        Son s = new Son();
        try
        {
            s.ask();
        }
        catch (IOException e)
        {
            System.out.println(e);
        }
    }
}

```

OUTPUT:

```

Command Prompt
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>java except
Enter the father's age:
23
Enter the age of son:
45
Son's age is more than father's age
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>

```

7) Write a program which creates two threads. one thread displaying "BMS College of Engineering" and another thread displaying "C++" for 10 seconds.

```

class One extends Thread
{
    synchronized public void run()
    {
        try
        {
            int i=0;
            while(i<5)
            {
                sleep(1000);
                io.println("BMSCE");
                i++;
            }
        }
        catch(Exception e){}
    }
}

class Two extends Thread
{
    synchronized public void run()
    {
        try
        {
            int i=0;
            while(i<5)
            {
                sleep(1000);
                io.println("C++");
                i++;
            }
        }
        catch(Exception e){}
    }
}

```

```

class ThreadDemo
{
    public static void main(String args[])
    {
        try
        {
            Bms t = new Bms();
            Cse t1 = new Cse();
            t.start();
            t1.start();
        }
        catch(Exception e){}
    }
}

```

o/p:-

Cse
Cse
Cse
Cse
Cse

BMSCE
BMSCE
BMSCE
BMSCE
BMSCE

```
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>javac ThreadDem.java
```

```
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>java ThreadDem
```

```
Cse
```

```
Cse
```

```
Cse
```

```
Cse
```

```
BMS college of engineering
```

```
Cse
```

```
BMS college of engineering
```

```
BMS college of engineering
```

```
BMS college of engineering
```

```
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>javac ThreadDem.java
```

```
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>java ThreadDem
```

```
Cse
```

```
Cse
```

```
Cse
```

```
Cse
```

```
BMS college of engineering
```

```
Cse
```

```
BMS college of engineering
```

```
BMS college of engineering
```

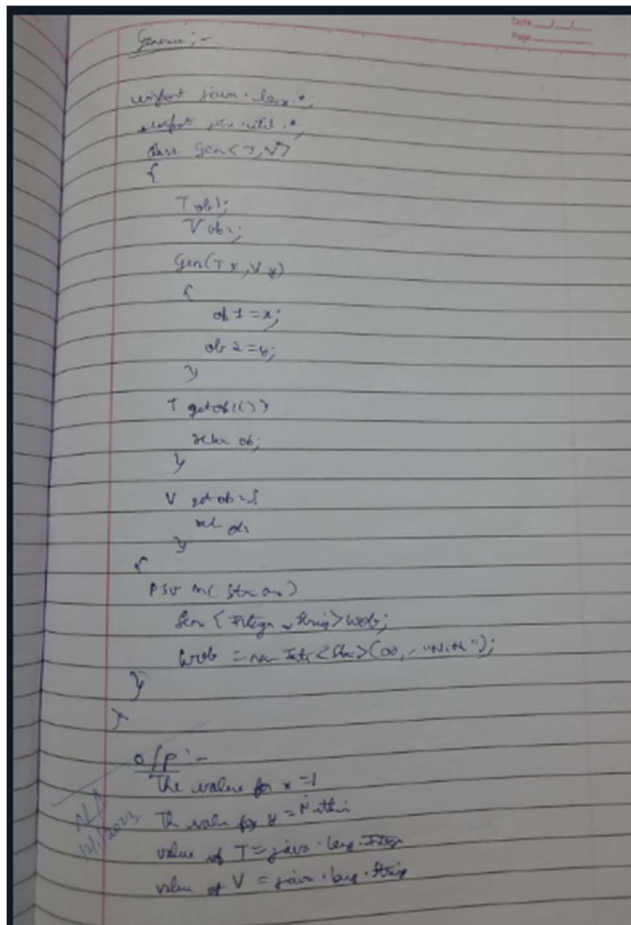
```
BMS college of engineering
```

```
BMS college of engineering
```

```
C:\Users\dhru2\OneDrive\Desktop\1BM21CS057>_
```


Generics problem with code:

Develop a Generic Class with Two Type Parameters.



Output:

```
nithinbs@Nithin ~ % /usr/bin/env /Library/Java/JavaVirtualMachines/jdk-17.0.1.jdk/Contents/Home/bin/java -agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:58909 --enable-preview -XX:+ShowCodeDetailsInExceptionMessages -cp /private/var/folders/gw/9l7m4j9s07n_7l47wptwmg00000gn/T/vscode-ff5c/jdt_ws/jdt.ls-java-project/bin generics  
The value for x = 1  
The value for y = Nithin  
value of T = java.lang.Integer  
value of V = java.lang.String  
nithinbs@Nithin ~ %
```

Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.

```
8) Packages :-  
CIE  
package CIE;  
import java.util.*;  
public class Student {  
    Scanner sc = new Scanner(System.in);  
    public String usn, name;  
    public int sem;  
    public void accept()  
    {  
        System.out.println("Enter USN, name, current sem");  
        usn = sc.nextLine();  
        name = sc.nextLine();  
        sem = sc.nextInt();  
    }  
    public void display()  
    {  
        System.out.println("Student details");  
        System.out.println("Name: " + name);  
        System.out.println("USN: " + usn);  
        System.out.println("Sem: " + sem);  
    }  
}
```

```

CIE;
package CIE;
import java.util.*;
public class Interval {
    Scanner sc = new Scanner(System.in);
    public int arr[] = new int[5];
    public void accept() {
        int i;
        for (i = 0; i < 5; i++)
            S.O.P("Enter arr[" + i + "]: ");
            arr[i] = sc.nextInt();
    }
}

SEE
package SEE;
import CIE.*;
import java.util.*;
public class IntervalTest {
    Scanner sc = new Scanner(System.in);
    public int arr[] = new int[5];
    public void accept() {
        for (int i = 0; i < 5; i++)
            S.O.P("Enter arr[" + i + "]: ");
            arr[i] = sc.nextInt();
    }
}

```

```

import CIE.*;
import SEE.*;
import java.util.*;
class total {
    public static void main (String args[]) {
        int i, j, n;
        Scanner sc = new Scanner(System.in);
        int total[] = new int[5];
        S.O.P("Enter n: ");
        n = sc.nextInt();
        CIE obj = new CIE(arr);
    }
}

```

Output:

```
n:\support\code\user\workspace\storage\CIE\10100
Enter number of students:
1

Enter student 1 details
Enter USN, Name and Current semester:
1BM20CS100
NITHIN BS
3
Enter CIE marks of subject 1
47
Enter CIE marks of subject 2
46
Enter CIE marks of subject 3
45
Enter CIE marks of subject 4
43
Enter CIE marks of subject 5
44
Enter SEE marks of subject 1
48
Enter SEE marks of subject 2
47
Enter SEE marks of subject 3
44
Enter SEE marks of subject 4
49
Enter SEE marks of subject 5
50

Details of student 1

Student Details
Name: NITHIN BS
USN: 1BM20CS100
Semester: 3
Total marks in subject 1: 95
Total marks in subject 2: 93
Total marks in subject 3: 89
Total marks in subject 4: 92
Total marks in subject 5: 94
```