

1. Develop a Java Program that prints all real solutions to the quadratic equation  $ax^2 + bx + c = 0$ .  
Read in  $a, b, c$  & use the quadratic formula. If the discriminant  $b^2 - 4ac$  is negative, display a message stating that there are no real solutions.

```
→ import java.util.Scanner;
public class Q {
    public static void main (String[] args) {
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter a co-efficient a: ");
        double a = scan.nextDouble();
        System.out.print ("Enter a co-efficient b: ");
        double b = scan.nextDouble();
        System.out.print ("Enter a co-efficient c: ");
        double c = scan.nextDouble();
        double dis = b*b - 4*a*c;
        if (dis > 0)
        {
            double r1 = (-b + Math.sqrt (b*b - 4*a*c)) / (2*a);
            double r2 = (-b - Math.sqrt (b*b - 4*a*c)) / (2*a);
            System.out.println ("Two real solution: " + r1 + " and " + r2);
        }
        else if (dis < 0)
        {
            System.out.println ("These are no real solution: ");
        }
        else {
            System double n = -b/2a;
            System.out.println ("These are real & equal root: " + n);
        }
    }
}
```

### Output:

Enter a co-efficient a:

1

Enter a co-efficient b:

2

Enter a co-efficient c:

1

The solution is real & equal: -1.0

```
C:\Abhi008>javac Q.java
```

```
C:\Abhi008>java Q
```

```
Enter a coefficient a: 1
```

```
Enter a coefficient b: 4
```

```
Enter a coefficient c: 1
```

```
Two real solutions: -2.267949192431123 and -5.732050807568877
```

```
Name:Akshith M Naik.
```

```
USN:1BM22CS033.
```

```
C:\Abhi008>java Q
```

```
Enter a coefficient a: 2
```

```
Enter a coefficient b: 4
```

```
Enter a coefficient c: 8
```

```
Roots are not equal since discriminate is 0
```

```
Name:Akshith M Naik.
```

```
USN:1BM22CS033.
```

```
C:\Abhi008>java Q
```

```
Enter a coefficient a: 2
```

```
Enter a coefficient b: 4
```

```
Enter a coefficient c: 2
```

```
Both roots are equal:-1.0
```

```
Name:Akshith M Naik.
```

```
USN:1BM22CS033.
```

Develop a Java program to create a class Student with members usn, name, an array credits & an array marks. Include methods to accept & display details & a method to calculate SGPA of a student  
→ import java.util.Scanner;  
class student

```
{
    Scanner s = new Scanner(System.in);
    String usn;
    String name;
    int[] credits = {4, 4, 3, 3, 3, 1, 1, 1};
    int[] marks = new int[8];
    public void enterdet()
    {
        System.out.print("Enter your usn:");
        usn = s.next();
        System.out.print("Enter your name:");
        name = s.next();
        for (int i = 0; i < 8; i++)
        {
            System.out.print("Enter marks for subject " + (i + 1) + ":");
            marks[i] = s.nextInt();
        }
    }
    public void displaydet()
    {
        System.out.println("Your usn is: " + usn);
        System.out.println("Your name is: " + name);
        for (int i = 1; i < 8; i++)
        {
            System.out.println("Your marks for subject " + i + " is: " + marks[i]);
        }
    }
    public void sgpa()
    {
        float g = 0;
        for (int j = 0; j < 8; j++)
        {
            int v;
            v = credits[j] * (marks[j] / 10 + 1);
            g = g + v;
        }
        System.out.println("Your sgpa is: " + (g / 20));
    }
}
```



```
public class Main
```

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

```
        Student p = new student();
```

```
        p.enterdet();
```

```
        p.displaydet();
```

```
        p.sgpa();
```

```
    }
```

```
}
```

Output:

Enter your details

Enter your USN:

IBH22CS033

Enter your name:

Akshith

Enter your marks:

99 95 89 79 84 96 100 91 90

```
C:\Abhi008>javac Main.java
```

```
C:\Abhi008>java Main
```

```
Enter your usn : 33
```

```
Enter your name : Akshith
```

```
Enter marks for subject 1 : 70
```

```
Enter marks for subject 2 : 80
```

```
Enter marks for subject 3 : 90
```

```
Enter marks for subject 4 : 50
```

```
Enter marks for subject 5 : 60
```

```
Enter marks for subject 6 : 100
```

```
Enter marks for subject 7 : 98
```

```
Enter marks for subject 8 : 99
```

```
Your usn is : 33
```

```
Your name is : Akshith
```

```
Your marks for subject 1 is : 80
```

```
Your marks for subject 2 is : 90
```

```
Your marks for subject 3 is : 50
```

```
Your marks for subject 4 is : 60
```

```
Your marks for subject 5 is : 100
```

```
Your marks for subject 6 is : 98
```

```
Your marks for subject 7 is : 99
```

```
Your sgpa is : 8.4
```

```
Name:Akshith M Naik.
```

```
USN:1BM22CS033.
```

#### LAB-4

Create a class Book which contains four members: name, author, price, num-pages. Include methods to set & get the details of the object. Include a constructor to set the values for the members. Include a toString() method ~~that~~ that could display the complete details of the book. Develop a Java Program to create ~~2~~ n book objects

→ import java.util.Scanner;

class book

{

String name;

String author;

float price;

int num-pages;

void set-details()

{

Scanner sc = new Scanner(System.in);

System.out.println("Enter bookname, author, price, page number");

name = sc.next();

author = sc.next();

price = sc.nextFloat();

num-pages = sc.nextInt();

}

void get-details()

{

String details = toString();

System.out.println(details);

}

public String toString()

{

return "the book" + name + "was written by" + author +  
"it consists of " + num-pages + " pages and costs around"  
+ price;

}

public static void main(String[] args)

{

Scanner scan = new Scanner(System.in);

System.out.println("Enter no. of books you want to  
generate");

int n = scan.nextInt();

book b[] = new book[n];

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

{

```

        b[i] = new book();
        b[i].set_details();
    }
    System.out.println("book details");
    System.out.println();
    for (i = 0; i < n; i++)
    {
        b[i].get_details();
    }
}
}

```

### Output:

Enter no. of books you want to generate

1

Enter bookname, author, price, ~~price~~ page number

Handsome-Hunk

Akshith

1595

899

Book details:

The book Handsome-Hunk was written by Akshith it consists of 1595 pages & cost around 899.0



```
C:\Abhi008>javac Abhishek.java
```

```
C:\Abhi008>java Abhishek
```

```
Enter the number of books:
```

```
1
```

```
Enter the Details of the book 1 in order name, author,price,Number of pages
```

```
Atom
```

```
Akshith
```

```
700
```

```
100
```

```
Details of Book
```

```
Name =Atom
```

```
Author Name=Akshith
```

```
Price=700
```

```
Number of pages=100
```

```
Name:Akshith M Naik.
```

```
USN:1BM22CS033.
```



Develop a Java Program to create an abstract class named Shape that contains two integers & an empty method named printArea(). Provide three classes named Rectangle, Triangle & 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 a, b;

abstract void printArea();

}

class Rectangle extends Shape {

Rectangle(int l, int br) {

a = l;

b = br;

}

void printArea() {

int area = a \* b;

System.out.println("Area of the triangle:" + area);

}

}

class Triangle extends Shape {

Triangle(int ba, int h) {

a = ba;

b = h;

}

void printArea() {

double area = 0.5 \* a \* b;

System.out.println("Area of the triangle:" + area);

}

}

class Circle extends Shape {

Circle(int r) {

a = r;

}

void printArea() {

double area = 3.14 \* a \* a;

System.out.println("Area of Circle:" + area);

}

}

class E {

public static void main(String[] args) {

Scanner in = new Scanner(System.in);

System.out.println("Enter length & breadth of a rectangle")

```

Rectangle rec = new Rectangle(in.nextInt(), in.nextInt());
rec.printArea();
System.out.println("Enter base and height of a triangle.");
Triangle tri = new Triangle(in.nextInt(), in.nextInt());
tri.printArea();
System.out.println("Enter the radius of a circle.");
Circle cir = new Circle(in.nextInt());
cir.printArea();
}
}

```

### Output:

Enter length & breadth of a Rectangle

4  
6

Area of rectangle: 24

~~Area of~~ Enter base & height of a triangle

5  
10

Area of triangle: 25

Enter the radius of a circle

5

Area of circle: 78.5.

```
C:\Abhi008>javac Lab4.java
```

```
C:\Abhi008>java Lab4
```

```
Enter length and breadth:
```

```
11
```

```
55
```

```
Area of the rectangle is:605.0
```

```
Enter base and height:
```

```
40
```

```
30
```

```
Area of the Triangle is:1200.0
```

```
Enter Radius:
```

```
12
```

```
Area of the Circle is:452.16
```

```
Name:Akshith M Naik.
```

```
USN:1BM22CS033.
```



Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account & the other current account. The savings account provides compound interest withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders also maintain a minimum balance & if the balance falls below this level service charge is imposed. Create a class Account that stores the customer name, account number & type of account. From this derive the classes Cur-act & Sav-act to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:

- Accept deposit from customer & update the balance.
- Display the balance.
- Compute & deposit interest.
- Permit withdrawal & update the balance. Check for the minimum balance, impose penalty if necessary & update the balance.

→ Import java.util.Scanner;

```
public class Person {
    String name;
    int age;

    public void setName (String name) {
        this.name = name;
    }

    public void setAge (int age) {
        if (age >= 0) {
            this.age = age;
        } else {
            System.out.println ("Age can't be negative.");
        }
    }
}
```

```
public String getDetails () {
    return "Name" + name + "In Age: " + age;
}

public static void main (String[] args) {
    Scanner s = new Scanner (System.in);
    Person person = new Person();
    System.out.println ("Enter the name to be set:");
    String name = s.nextLine();
    person.setName (name);
    System.out.println ("Enter the age to be set:");
    int age = s.nextInt();
    person.setAge (age);
    System.out.println (person.getDetails());
}
```



```
import java.util.Scanner;  
class account
```

```
{  
    String c-name;  
    int acc-num;  
    String acc-type;  
    double bal=1000;  
}
```

```
}  
class savingacc extends account
```

```
{  
    Scanner s1 = new Scanner(System.in);  
    public savingacc(String a, int b, String c){  
        c-name = a;  
        acc-num = b;  
        acc-type = c;  
        System.out.println("Customer name is: " + c-name);  
        System.out.println("Customer account number is: " + acc-num);  
        System.out.println("Customer account type is: " + acc-type);  
    }
```

```
}  
    public void deposit()
```

```
{  
        System.out.println("Enter the amount to be Deposit in your  
        saving account:");  
        int A = s1.nextInt();  
        bal = bal + A;  
        System.out.println("Your Current balance is: " + bal);  
    }
```

```
}  
    public void withdrawal()
```

```
{  
        System.out.println("Enter the amount to be withdrawn from  
        your saving account:");  
        double q1 = s1.nextDouble();  
        if(q1 > bal)
```

```
{  
            System.out.println("Insufficient Balance!");  
        }
```

```
    else
```

```
{  
        System.out.println("You have withdrawn " + q1);
```

```
        bal = bal - q1;
```

```
        System.out.println("Your Current balance is: " + bal);  
    }
```

```
}  
    public void compinterest()
```

```
{  
        double A = 0.5/100;
```

```
        double w = bal * A;
```

```
        System.out.println("Current interest is: " + w);  
    }
```

class currentacct extends account

{  
double e;

Scanner s2 = new Scanner(System.in);

public currentacct(String a, int b, String c)

{

c\_name = a;

acc\_num = b;

acc\_type = c;

System.out.println("Customer name is:" + c\_name);

System.out.println("Customer account number is" + acc\_name);

System.out.println("Customer account type is" + acc\_type);

}

public void display()

{

System.out.println("Enter amount to be Deposit in your  
current account:");

int B = s2.nextInt();

bal = bal + B + 2000;

System.out.println("Your current balance is:" + bal);

}

public void withdrawal()

{

System.out.println("Enter the amount to be withdrawn from  
your current account:");

double q2 = s2.nextDouble();

if (q2 > bal)

{

System.out.println("Not enough amount");

}  
else

{

System.out.println("You have withdrawn" + q2);

bal = bal - q2;

System.out.println("Your current balance is:" + bal);

if (bal < 3000)

{

bal = bal - 100

System.out.println("Your balance is below require  
balance !! A penalty has been imposed");

System.out.println("Current balance:" + bal);

}

}

}

public void getchq()

{

System.out.println("Enter the amount for which cheque has to  
be issued");



e = s2.nextDouble();

```
} public void cashchg()
```

```
{ if (e > bal)
```

```
{ System.out.println("Cheque bounced!!");
```

```
} else
```

```
{ System.out.println("Via cashing a cheque you have  
withdrawn" + e);
```

```
bal = bal - e;
```

```
System.out.println("Current balance is: " + bal);
```

```
if (bal < 3000)
```

```
{
```

```
bal = bal - 100
```

```
System.out.println("Your balance is below require  
balance!! a penalty is applied");
```

```
System.out.println("Your current balance is: " + bal);
```

```
}
```

```
}
```

```
}
```

```
}
```

```
public class Main
```

```
{
```

```
public static void main (String[] args)
```

```
{
```

```
Scanner s = new Scanner(System.in);
```

```
saving acct sav = new saving acct("Akshith", "1999", "Saving");
```

```
sav.deposit();
```

```
sav.compinterest();
```

```
sav.withdrawal();
```

```
current acct cur = new
```

```
current acct("Abhishek", "2000", "current");
```

```
cur.deposit();
```

```
cur.withdrawal();
```

```
cur.getchg();
```

```
cur.cashchg();
```

```
}
```

```
}
```

## Output:

Enter the name to be set:

Akshith

Enter the ~~name~~ age to be set:

22

Customer name: Akshith

Account number: 549541892

Account type: Saving

Enter amount to be deposited:

549542

Your Current Balance is: 549542.

Enter the amount to be withdraw:

549541

You have withdrawn: 549541

Your current balance is: 1

Current Invest is: 0.005

Customer name: ~~Aksh~~ Abhishek

Account number: 19547821

Account type: Current

Enter amount to be deposited:

549254

Your current balance is 549254

Enter the amount to be withdraw:

9254

You have withdrawn: 9254

Your current balance is 540000

~~via cash~~ Enter the amount for which cheque has to be issued:

40000

Via chasing a cheque you have withdrawn 40000

Current balance: 500000



```
C:\Abhi008>javac Main3.java
```

```
C:\Abhi008>java Main3
```

```
Customer name is :Abhishek
```

```
Customer account number is:199
```

```
Customer account type is:Savings
```

```
Enter the amount to be Deposit in your saving account:
```

```
1000
```

```
Your Current balance is : 2000.0
```

```
Current interest is : 50
```

```
Enter the amount to be withdrawn From your saving account :
```

```
100
```

```
You have withdrawn 100.0
```

```
Your Current balance is : 1900.0
```

```
Customer name is :Amar
```

```
Customer account number is:200
```

```
Customer account type is:Current
```

```
Enter the amount to be Deposit in your current account:
```

```
522252
```

```
Your Current balance is : 525252.0
```

```
Enter the amount to be withdrawn from your current account :
```

```
52582
```

```
You have withdrawn 52582.0
```

```
Current balance is : 472670.0
```

```
Enter the amount for which cheque has to be issued
```

```
32002
```

```
Via cashing a cheque you have withdrawn 32002.0
```

```
Current balance is : 440668.0
```

```
Name:Akshith M Naik.
```

```
USN:1BM22CS033.
```

## Program-6

Create a package CIE which has two classes - Student and Internals.

```
package CIE;
import java.util.*;
public class Student
{
    public int sem;
    public String uon;
    public String name;
    public void accept()
    {
        Scanner scan = new Scanner(System.in);
        System.out.println("Enter U, N, S:");
        uon = scan.nextLine();
        name = scan.nextLine();
        sem = scan.nextInt();
    }
}
```

```
}
package CIE;
public class Internals
{
    public int im[] = new int[5];
}
```

```
package SEE;
import CIE.Student;
public class External extends Student
{
    public int sm[] = new int[5];
}
```

```
import java.util.*;
import SEE.*;
import CIE.*;
public class FinalMarks
{
    public static void main(String args[])
    {
        int fm[] = new int[6];
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter n:");
        int n = sc.nextInt();
        SEE.External st[] = new SEE.External[n];
        CIE.Internals s[] = new CIE.Internals[n];
    }
}
```

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

```
{  
    st[i] = new SEE.External();
```

```
    s[i] = new CIE.Internals();
```

```
    System.out.println("Enter details "+(i+1));
```

```
    st[i].accept();
```

```
    for(int j=0; j<5; j++)
```

```
{
```

```
        System.out.println("Enter im and sm of sub "+(j+1));
```

```
        s[i].im[j] = sc.nextInt();
```

```
        st[j].sm[j] = sc.nextInt();
```

```
        fm[j] = s[i].im[j] + st[i].sm[j];
```

```
}
```

```
    System.out.println("Final marks of "+st[i].name);
```

```
    for(int k=0; k<5; k++)
```

```
{
```

```
        System.out.println("Course "+(k+1)+" = "+fm[k]);
```

```
}
```

```
}
```

```
}
```

```
}
```

Name: Akshith

USN: 1BM22CS033

Enter n:

1

Enter details 1

Enter USN, Name, Sem:

33

Akshith

3

Enter internal and external of sub 1

23

34

Enter internal and external of sub 2

45

43

Enter internal and external of sub 3

23

34

Enter internal and external of sub 4

43

12

Enter internal and external of sub 5

23

45

Final marks of Akshith

Course 1 = 57

Course 2 = 88

Course 3 = 57

Course 4 = 55

Course 5 = 68



### Program-7

Write a program that demonstrate handling of exceptions in inheritance tree.

```
class WrongAge extends Exception {  
    public WrongAge() {  
        super("Invalid age provided");  
    }  
}
```

```
class Father {  
    private int age;  
    public Father(int age) throws WrongAge {  
        if (age < 0) {  
            throw new WrongAge();  
        }  
        this.age = age;  
    }  
    public int getAge() {  
        return age;  
    }  
}
```

```
class Son extends Father {  
    private int sonAge;  
    public Son(int fatherAge, int sonAge) throws WrongAge {  
        super(fatherAge);  
        if (sonAge >= fatherAge) {  
            throw new WrongAge();  
        }  
        this.sonAge = sonAge;  
    }  
    public int getSonAge() {  
        return sonAge;  
    }  
}
```

```
public class Main {  
    public static void main(String[] args) {  
        try {  
            Father father = new Father(50);  
            System.out.println("Father's age:" + father.getAge());  
            Son son1 = new Son(50, 30);  
            System.out.println("Son's age:" + son1.getSonAge());  
            Son son2 = new Son(50, 55);  
            System.out.println("Son's age" + son2.getSonAge());  
        }  
        catch (WrongAge e) {  
            e.printStackTrace();  
        }  
    }  
}
```

```
System.out.println("get Message()");
```

Output:

Father's Age: 50

Son's Age: 30

Invalid age provided

```
C:\Abhi008>javac Lab7.java
```

```
C:\Abhi008>java Lab7
```

```
Father's age: 50
```

```
Son's age: 25
```

```
Name:Akshith M Naik.
```

```
USN:1BM22CS033.
```

### Lab - Program - 8

Write a program which creates two threads, one thread displaying "BMS College of Engineering" once every 10 sec & another displaying "CSE" once every 2sec.

```
public class Main {  
    static class DisplayBMS extends Thread {  
        @Override  
        public void run() {  
            while (true) {  
                System.out.println("BMS College of Engineering");  
                try {  
                    Thread.sleep(10000);  
                }  
                catch (InterruptedException e) {  
                    e.printStackTrace();  
                }  
            }  
        }  
    }  
  
    static class DisplayCSE extends Thread {  
        @Override  
        public void run() {  
            while (true) {  
                System.out.println("CSE");  
                try {  
                    Thread.sleep(2000);  
                }  
                catch (InterruptedException e) {  
                    e.printStackTrace();  
                }  
            }  
        }  
    }  
  
    public static void main (String[] args) {  
        DisplayBMS displayBMS = new DisplayBMS();  
        DisplayCSE displayCSE = new DisplayCSE();  
        displayBMS.start();  
        displayCSE.start();  
    }  
}
```



Output :

BMS College of Engineering

CSE

CSE

CSE

CSE

CSE

BMS College of Engineering

CSE

CSE

,

,

,

,

,

,

,

,

,

,

,

,

,

,

,

,

,

,

,

,

,

```
C:\Abhi008>javac Lab8.java
```

```
C:\Abhi008>java Lab8
```

```
Name:Akshith M Naik.
```

```
CSE
```

```
BMS College of Engineering
```

```
USN:1BM22CS033.
```

```
CSE
```

```
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Write a program that creates a user interface to perform integer divisions.

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

class SwingDemo {
    SwingDemo() {
        JFrame jfrm = new JFrame("Division App");
        jfrm.setSize(275, 150);
        jfrm.setLayout(new FlowLayout());
        jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        JLabel jlab = new JLabel("Enter the divider & dividend");
        JTextField ajtf = new JTextField(8);
        JTextField bjtf = new JTextField(8);
        JButton button = new JButton("Calculate");
        JLabel err = new JLabel();
        JLabel alab = new JLabel();
        JLabel blab = new JLabel();
        JLabel ansLab = new JLabel();
        jfrm.add(err);
        jfrm.add(jlab);
        jfrm.add(ajtf);
        jfrm.add(bjtf);
        jfrm.add(button);
        jfrm.add(alab);
        jfrm.add(blab);
        jfrm.add(ansLab);

        ActionListener l = new ActionListener() {
            public void actionPerformed(ActionEvent evt) {
                System.out.println("Action went from a text field");
            }
        };
        ajtf.addActionListener(l);
        bjtf.addActionListener(l);
        button.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent evt) {
                try {
                    int a = Integer.parseInt(ajtf.getText());
                    int b = Integer.parseInt(bjtf.getText());
                    int ans = a / b;
                }
            }
        });
    }
}
```

```

alab.setText("In A=" + a);
blab.setText("In B=" + b);
anslab.setText("Ans=" + ans);

```

```

}
catch (NumberFormatException e) {
    alab.setText("");
    blab.setText("");
    anslab.setText("");
    err.setText("Enter only integers!");
}

```

```

catch (ArithmeticException e) {
    alab.setText("");
    blab.setText("");
    anslab.setText("");
    err.setText("B should be NonZero");
}
}
}
}

```

```

});

```

```

jfm.setVisible(true);

```

```

}
public static void main (String args[]) {
    SwingUtilities.invokeLater (new Runnable() {
        public void run() {
            new Swing Demo();
        }
    });
}
}

```

Output:

Divider App

Enter the divider & dividend

45 4

Calculate A = 45 B = 4

Ans = 11



```
C:\Abhi008>java SwingDemo
```

```
Action event from a text field
```

```
Action event from a text field
```



Divider App



**B should be NON zero!**

**Enter the divider and dividend:**

**Calculate**

```
C:\Abhi008>java SwingDemo  
Action event from a text field
```



Divider App



**Enter Only Integers!**

**Enter the divider and dividend:**

**Calculate**

```
C:\Abhi008>javac SwingDemo.java
```

```
C:\Abhi008>java SwingDemo
```

```
Action event from a text field
```



Divider App



**Enter the divider and dividend:**

**Calculate**

**A = 15 B = 5 Ans = 3**