

① 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 discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solution.

```
import java.util.Scanner;
public class Q {
    public static void main (String [] args) {
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter a coefficient a: ");
        double a = scan.nextDouble();
        System.out.print ("Enter a coefficient b: ");
        double b = scan.nextDouble();
        System.out.print ("Enter a coefficient 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 solutions: " + r1 + " and " + r2);
        }
        else if (dis == 0)
        {
            System.out.println ("There are no real solutions.");
        }
        else
        {
            double r = -b / 2*a;
            System.out.println ("Roots are real and equal: " + r);
        }
    }
}
```

out put :

Enter a coefficient a : 5

Enter a coefficient b : 2

Enter a coefficient c : 4

Roots are imaginary.

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

```
C:\Abhi008>java Q
Enter a coefficient a: 1
Enter a coefficient b: 5
Enter a coefficient c: 2
Two real solutions: -2.9384471871911697 and -7.061552812808831
Name:Abhishek Shivanand Halagadagi.
USN:1BM22CS008.
```

```
C:\Abhi008>java Q
Enter a coefficient a: 1
Enter a coefficient b: 2
Enter a coefficient c: 1
Both roots are equal:-1.0
Name:Abhishek Shivanand Halagadagi.
USN:1BM22CS008.
```

```
C:\Abhi008>java Q
Enter a coefficient a: 4
Enter a coefficient b: 2
Enter a coefficient c: 2
Roots are not equal since discriminate is 0
Name:Abhishek Shivanand Halagadagi.
USN:1BM22CS008.
```

Lab program 2.

- 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.

```
→ 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} new int [8]  
    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 the no.of credits for " + (i+1)  
                " subject: ");  
            credits[i] = s.nextInt();  
            System.out.print ("Enter the marks for " + (i+1) +  
                " subject: ");  
            marks[i] = s.nextInt();  
        }  
        Public void displaydet()  
        {  
            System.out.println ("Your usn is : " + usn);  
            System.out.println ("Your name is : " + name);  
        }  
}
```

```

for (i=0; i<8; i++)
{
    System.out.println (" You entered marks for sub " + (i+1) +
                        " are ! " + marks[i]);
}
}

public void sgpa()
{
    float g = 0;
    for (int j=0; j<8; j++)
    {
        int v = credits[j] * ((marks[j]/10) + 1);
        g = g + v;
    }
    System.out.println (" Your sgpa is : " + (g/8));
}

```

```

Public class Main {
    public static void main (String [] args) {
        student p = new student();
        p.enterdet();
        p.displaydet();
        p.sgpa();
    }
}

```

Output:

Enter your usn = 08

Enter your name = Abhi.

Enter the no of credits : 4

Enter the no of marks for 1 subject : 50

Enter the no. of credits for 2 subjects : 4

Enter the no. of marks for 2 subjects : 65

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

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

```
Enter your usn : 5
```

```
Enter your name : Abhishek
```

```
Enter marks for subject 1 : 40
```

```
Enter marks for subject 2 : 33
```

```
Enter marks for subject 3 : 28
```

```
Enter marks for subject 4 : 32
```

```
Enter marks for subject 5 : 30
```

```
Enter marks for subject 6 : 40
```

```
Enter marks for subject 7 : 15
```

```
Enter marks for subject 8 : 40
```

```
Your usn is : 5
```

```
Your name is : Abhishek
```

```
Your marks for subject 1 is : 33
```

```
Your marks for subject 2 is : 28
```

```
Your marks for subject 3 is : 32
```

```
Your marks for subject 4 is : 30
```

```
Your marks for subject 5 is : 40
```

```
Your marks for subject 6 is : 15
```

```
Your marks for subject 7 is : 40
```

```
Your sgpa is : 4.05
```

```
Name:Abhishek Shivanand Halagadagi.
```

```
USN:1BM22CS008.
```

Details of a book

```
import java.util.Scanner
```

```
class Book{
```

```
    String name;
```

```
    String author;
```

```
    int price;
```

```
    int no;
```

```
    public void get (int i)
```

```
{
```

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

```
    System.out.println ("Enter details of book " +
```

```
        + (i+1) + " in order name, author, price, no." );
```

```
    name = s.next();
```

```
    author = s.next();
```

```
    price = s.nextInt();
```

```
    no = s.nextInt();
```

```
}
```

```
    public String toString()
```

```
{
```

```
    return "Detail of Book " + (i+1) + "\n" +
```

```
    "Name = " + name + "\n" +
```

```
    "Author = " + author + "\n" +
```

```
    "Price = " + price + "\n" +
```

```
    "No = " + no + "\n" +
```

```
    "Number of pages = " + no ;
```

```
}
```

```
}
```

```

class Main {
    public static void main (String [] args) {
        Scanner s = new Scanner (System.in);
        System.out.println ("Enter the no. of books");
        int a = s.nextInt();
        Book b[] = new Book[a];
        for (int i=0; i<a; i++) {
            b[i] = new Book();
            b[i].get(i);
        }
        System.out.println ();
        for (i=0; i<a; i++)
            System.out.println (* b[i].toString());
    }
}

```

output :-

Enter the no. of books :

1
Enter details of book : in order name, author,
price, number of pages

~~AAA~~
Sudha Murthy, AAA
100
450 ✓

Details of Book

Name : Sudha Murthy

Author : AAA

Price = 100

Number of pages : 450

```
C:\Abhi008>javac Abhishek.java
C:\Abhi008>java Abhishek
Enter the number of books:
2
Enter the Details of the book 1 in order name, author,price,Number of pages
Ramayana
Valmiki
500
1000
Enter the Details of the book 2 in order name, author,price,Number of pages
Mahabharat
Vyasa
500
1500

Details of Book
Name =Ramayana
Author Name=Valmiki
Price=500
Number of pages=1000
Details of Book
Name =Mahabharat
Author Name=Vyasa
Price=500
Number of pages=1500
Name:Abhishek Shivanand Halagadagi.
USN:1BM22CS008.
```

Program 4.

```
import java.util.Scanner  
abstract class Shape {  
    int a, b; // private member variables  
    abstract void printArea(); // abstract method  
}  
  
class Rectangle extends Shape {  
    Rectangle(int l, int b) {  
        a = l;  
        b = b;  
    }  
    void printArea() {  
        double area = a * b;  
        System.out.println("Area of a rectangle: " + area);  
    }  
}  
  
class Triangle extends Shape {  
    Triangle(int b, int h) {  
        a = b;  
        b = h;  
    }  
    void printArea() {  
        double area = 0.5 * a * b;  
        System.out.println("Area is: " + area);  
    }  
}  
  
class Circle extends Shape {  
    Circle(int r) {  
        a = r;  
    }  
    void printArea() {  
        double a = 3.14 * a * a;  
        System.out.println("Area of a circle: " + a);  
    }  
}
```

}

```
3  
Public class area{  
    public static void main (String [] args){  
        Scanner in = new Scanner (System.in);  
        S.O.P ("Enter l, b");  
        Rectangle rec = new Rectangle (in.nextInt(),  
            in.nextInt());  
        rec.printArea();  
        S.O.P ("Enter base and height");  
        Triangle tri = new Triangle (in.nextInt(),  
            nextInt());  
        tri.printArea();  
    }  
}
```

Output:

Enter the length and breadth of a Rectangle

11 13

Area of rectangle : 143.0

Enter of the base and height of the triangle

22,45

Area of the triangle: 495.0

Enter the radius of a circle two.πr²

99

Area of circle : 30775.14

~~Scalable
Object
of Screen~~

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

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

```
Enter length and breadth:
```

```
12
```

```
14
```

```
Area of the rectangle is:168.0
```

```
Enter base and height:
```

```
45
```

```
54
```

```
Area of the Triangle is:2430.0
```

```
Enter Radius:
```

```
45
```

```
Area of the Circle is:6358.5
```

```
Name:Abhishek Shivanand Halagadagi.
```

```
USN:1BM22CS008.
```

Lab program. Bank program.

```
=> import java.util.Scanner;
```

```
class account
```

```
{
```

```
String c-name;
```

```
int acc-num;
```

```
String acc-type;
```

```
double bal = 1000;
```

```
}
```

```
class savingacct extends account
```

```
{
```

```
Scanner s1 = new Scanner (System.in);
```

```
public savingacct (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);
```

```
}
```

```
public void deposit ()
```

```
{
```

```
System.out.println ("Enter the amount to be deposited  
in your saving account: ");
```

```
int A = s1.nextInt();
```

```
bal = bal + A;
```

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

```
}
```

```
public void withdraw()
```

```
{
```

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

```
int q1 = s1.nextInt();
```

```
if (q1 > bal)
```

```
{  
    System.out.println("Insufficient funds");  
}  
else  
{  
    System.out.println("You have withdrawn: " + ?);  
    bal = bal - q;  
    System.out.println("Your current balance is: " + bal)  
}
```

```
public void comInterest()  
{  
    double A = .0100; // interest rate per year  
    double w = bal * A; // (0.01 * bal) * 1;  
    System.out.println("Current interest is: ");  
}
```

class currentacct extends account

```
{  
    Scanner s1 = 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-num);  
        System.out.println("Customer account type is: " +  
            acc-type);  
    }  
}
```

public void deposit()

```
{  
    System.out.println("Enter the amount to be deposited in  
        your current account: ");  
}
```

```

int B = sc.nextInt();
bal = bal + B + 2000; System.out.println("Current balance is: " + bal);
}

public void withdrawl() {
    System.out.print("Enter the amount to be withdrawn");
    double q2 = sc.nextDouble();
    if (q2 > bal)
        System.out.println("Not enough money!");
    else {
        System.out.println("You have withdrawn " + q2);
        bal = bal - q2;
        System.out.println("Current balance is: " + bal);
        if (bal < 3000) {
            System.out.println("Your balance is below required
                balance!! A penalty has been imposed!");
            System.out.println("Current balance is: " + bal);
        }
    }
}

public void getcheq() {
    System.out.print("Enter the amount for which
        cheque has to be issued");
    double e = sc.nextDouble();
}

public void cashing() {
    if (e > bal)
        System.out.println("Cheque bounced!");
}

```

```

}
else
{
    System.out.println("via cashing a cheque");
    System.out.println("You have withdrawn " + e);
}

bal = bal - 100; // balance is 800
System.out.println("Current balance is " + bal);
if (bal < 3000)
{
    bal = bal - 100; // balance is 700
    System.out.println("Your balance is below
                        minimum required balance!! a penalty
                        will be applied");
    System.out.println("Current balance is " + bal);
}
}

}

public class Main
{
    public static void main (String [] args)
    {
        Scanner s = new Scanner (System.in);
        Scanner saw = new Saving ("Abhishek", 199,
                                "saving");
        saw.deposit();
        saw.withdrawn();
        saw.compinterest();
        current acnt curv = new Current ("Amar", 200,
                                         "current");
        curv.deposit();
        curv.withdrawn();
        curv.getchq();
        curv.cashchq();
    }
}

```

output:

Customer name is : Abhishek

Customer account number is : 199

Customer account type is : Savings

Enter the amount to be Deposit in your saving

account :

456

Your current balance is : 1456.0

Current interest is : 7.28

Enter the amount to be withdrawn from your saving acc

56

You have withdrawn 56.0

Your current balance is : 1400.0

Customer name is : Amar

Customer Account number is : 200

Customer Account type is : current

Enter the amount to be deposit in your current account

455

Your current balance is : 3455.0

Enter the amount to be withdrawn from your current

account

555

You have withdrawn : 555.0

Current balance is : 2900.0

Your balance is below require balance !! a penalty has been imposed.

Current balance is : 2800.0

Enter the amount for which cheque has to be issued

100

Current balance is : 2700.0

Your balance is below require balance !! a penalty is applied

Current balance is : 260.0

19/01/24

```
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:
450
Your Current balance is : 1450.0
Current interest is : 50
Enter the amount to be withdrawn From your saving account :
150
You have withdrawn 150.0
Your Current balance is : 1300.0
Customer name is :Amar
Customer account number is:200
Customer account type is:Current
Enter the amount to be Deposit in your current account:
500
Your Current balance is : 3500.0
Enter the amount to be withdrawn from your current account :
150
You have withdrawn 150.0
Current balance is : 3350.0
Enter the amount for which cheque has to be issued
350
Via cashing a cheque you have withdrawn 350.0
Current balance is : 3000.0
Name:Abhishek Shivanand Halagadagi.
USN:1BM22CS008.
```

```

Package CIE;
import java.util.*;
public class Student {
    public int sem;
    public String usn;
    public String name;
}

public void accept() {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter USN, name, marks");
    usn = sc.nextLine();
    name = sc.nextLine();
    sem = sc.nextInt();
}

```

```

};

public class Internals {
    public int in_marks[] = new int[5];
}

```

Package SEE;

```

import CIE.Student;
public class External extends Student {
    public int ex_marks[] = new int[5];
}

```

```

import java.util.*;
import SEE.*;
import CIE.*;
public class FinalMarks {
    public static void main (String[] args) {
        int f_marks[] = new int [5];
        Scanner sc = new Scanner (System.in);
        System.out.println ("Enter no. of students");
        int n = sc.nextInt();
        SEE.External st[] = new SEE.External[n];
        CIE.Internals s[] = new CIE.Internal[n];
    }
}

```

```

for (int i=0; i<n; i++) {
    st[i] = new SEE.External();
    s[i] = new CIE.Internal();
    System.out.println("Enter details of " + (i+1));
    s[i].accept();
    for (int j=0; j<5; j++) {
        System.out.println("Enter internal and external marks of subject " + (i+1));
        s[i].in-marks[j] = sc.nextInt();
        s[i].ex-marks[j] = sc.nextInt();
        f-marks[j] = s[i].in-marks[j] + s[i].ex-marks[j];
    }
    System.out.println("Final marks of " + st[i].name);
    for (int k=0; k<5; k++) {
        System.out.println("course " + (k+1) + " is " + f-marks[k]);
    }
}
}

```

Output:

```

Enter n=1
Enter details of 1
Enter usn=15
Enter name=Ram
Enter sem=2
Enter internal External marks
course 1.
23 89
course 2.
23 90
course 3.
95 78
course 4.
39 90

```

```
C:\Users\arbaa\Desktop\CS051>javac FinalMarks.java
```

```
C:\Users\arbaa\Desktop\CS051>java FinalMarks
```

```
Enter n:
```

```
1
```

```
Enter details for student 1
```

```
Enter USN, Name, and Semester:
```

```
008
```

```
Abhishek
```

```
3
```

```
Enter im and sm of subject 1
```

```
15
```

```
90
```

```
Enter im and sm of subject 2
```

```
36
```

```
92
```

```
Enter im and sm of subject 3
```

```
40
```

```
99
```

```
Enter im and sm of subject 4
```

```
34
```

```
98
```

```
Enter im and sm of subject 5
```

```
35
```

```
90
```

```
Final marks of Abhishek
```

```
Subject 1 = 105
```

```
Subject 2 = 128
```

```
Subject 3 = 139
```

```
Subject 4 = 132
```

```
Subject 5 = 125
```

```
Name: Abhishek Shivanand Halagadagi
```

```
USN: 1BM22CS008.
```

Program 7

Class wrongAge extends Exception

{

Public wrongAge()

{

System.out.println ("Invalid age");

}

}

Class Father

{

int Fage;

Public void Father (int age) throws wrongAge

{

if (age <= 0)

{

throws new wrongAge();

}

else {

System.out.println ("Valid age");

}

Fage = age;

}

Public int getAgeF () {

return Fage;

}

}

Class son extends Father

{

int sage;

Public son (int ageF, int ages) throws wrongAge

{

super(ageF);

if (ageF <= ages)

```
{  
    throw new wrongAge();  
}  
else {  
    System.out.println("Valid age");  
}  
public int getages() {  
    return sage;  
}  
}  
}  
  
class Ab {  
    public static void main(String[] args) {  
        try {  
            Father F1 = new Father(50);  
            Son S1 = new Son(50, 25);  
            SOP("Father age is " + F1.getageF());  
            SOP("Son age is " + S1.getages());  
        }  
        catch(wrongAge e) {  
            SOP(e);  
        }  
    }  
}
```

Father

Output :

Valid Age.

Valid Age.

Valid age.

Father Age is 50

Son Age is 25

(("Valid Input") is true, age = 50), (true))

(("Valid Input") is true, age = 25), (true))

(("Valid Input") is true, age = 50), (true))

(("Valid Input") is true, age = 25), (true))

(("Valid Input") is true, age = 50), (true))

(("Valid Input") is true, age = 25), (true))

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

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

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

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

```
Name:Abhishek Shivanand Halagadagi.
```

```
USN:1BM22CS008.
```

coarse 5

35 90.

final marks

course 1 = 58

course 2 = 57

course 3 = 61

course 4 = 62

course 5 = 62

Program 8

Class display_BMS extends thread

{

@ override

public void run()

{

int i=0;

while(i<5)

{

System.out.println ("BMS college of Engineering");

i++;

try {

Thread.sleep (1000);

}

catch (InterruptedException e)

{

e.printStackTrace();

}

}

class display_CSE extends Thread {

@ override

public void run()

{

int i=0;

while(i < 10)

{ System.out.println ("CSE"); }

```
try
{
    thread.sleep(1000);
}
catch (InterruptedException e)
{
    e.printStackTrace();
}
```

Public class main

```
{
    public static void main( String[] args )
    {
        DisplayBMS dis1 = new DisplayBMS();
        DisplayCSE dis2 = new DisplayCSE();
        dis1.start();
        dis2.start();
    }
}
```

output:

BMS college of Engineering

CSE

CSE



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

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

```
Name:Abhishek Shivanand Halagadagi.
```

```
USN:1BM22CS008.
```

```
CSE
```

```
BMS College of Engineering
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

```
BMS College of Engineering
```

```
CSE
```

```
BMS College of Engineering
```

```
CSE
```

```
BMS College of Engineering
```

```
CSE
```

```
BMS College of Engineering
```

Lab program 9

```
import javax.swing.*;  
import java.awt.*;  
import java.awt.event.*;  
  
class SwingDemo{  
    SwingDemo(){  
        JFrame jfrm = new JFrame("DividerApp");  
        jfrm.setSize(275, 150);  
        jfrm.setLayout(new FlowLayout());  
        jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);  
  
        JLabel jlab = new JLabel("Enter the Diveder and  
divident: ");  
  
        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 anslabel = 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(anslabel);  
  
        jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);  
        jfrm.setVisible(true);  
    }  
  
    public void actionPerformed(ActionEvent evt){  
        System.out.println("Action Event from a text field");  
    }  
}
```

```

};

ajtf.addActionListener(I);
bjtf.addActionListener(I);
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("In Ans = " + ans);
        }
        catch (NumberFormatException e) {
            alab.setText(" ");
            blab.setText(" ");
            anslab.setText(" ");
            err.setText("Enter only integers!");
        }
        catch (ArithmaticException e) {
            alab.setText(" ");
            blab.setText(" ");
            anslab.setText(" ");
            err.setText("B should be non zero!");
        }
    }
    jfrm.setVisible(true);
}
}

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

```

output:

Divider APP	- □ X
Enter the divider and dividend:	
<input type="text" value="A"/>	<input type="text" value="B"/>
<input type="button" value="calculate"/>	

A
10
10
100

B
5
0
5

A
10
10

B
5
0

Ans

2.

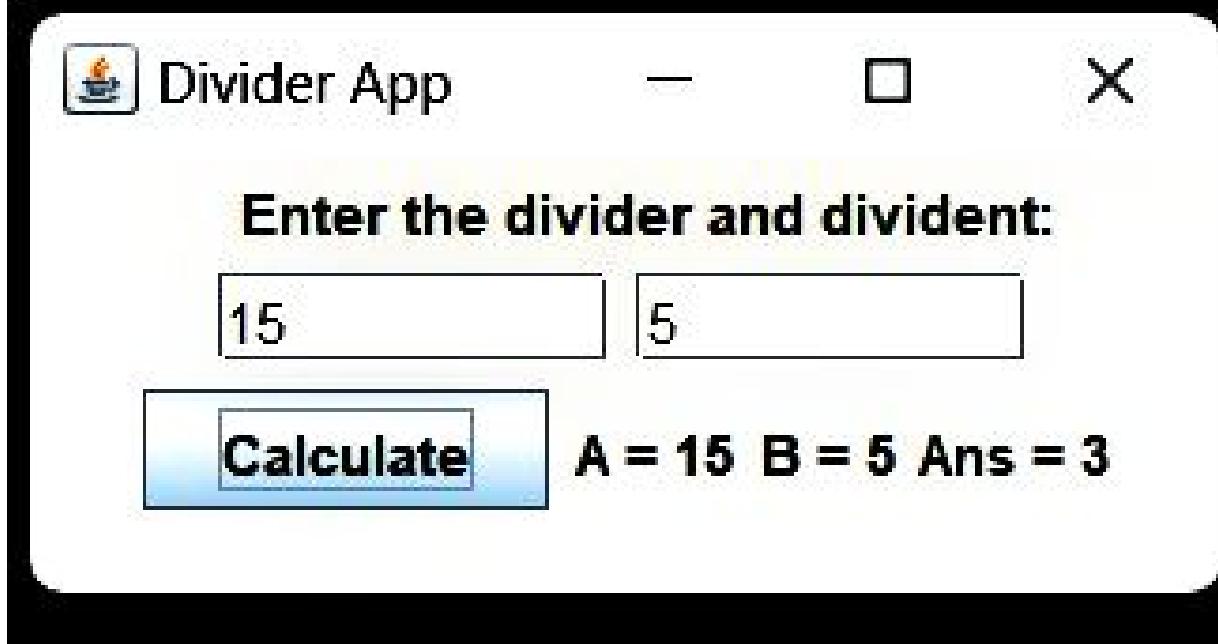
B Should not be zero!
Enter only integers.

~~Logic~~

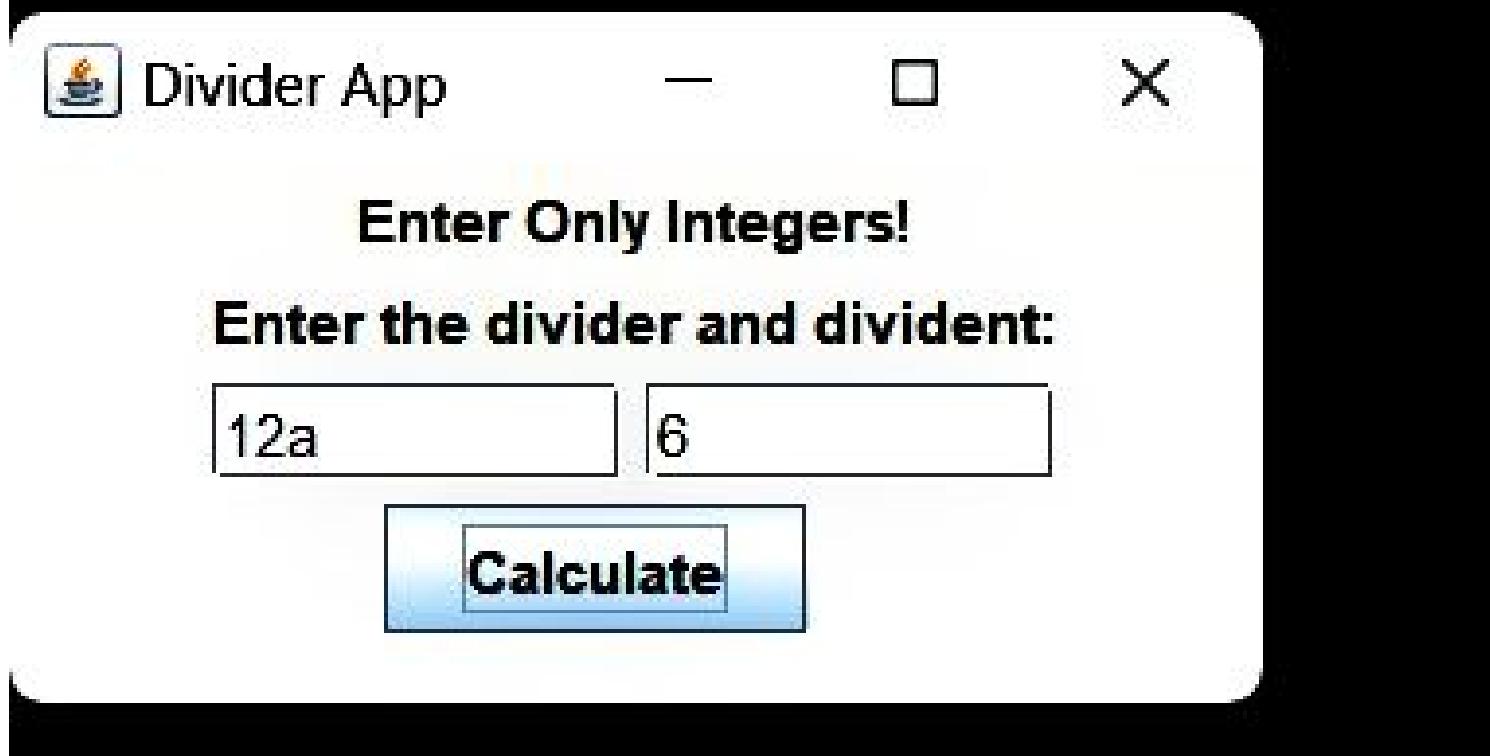
```
C:\Abhi008>javac SwingDemo.java
```

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

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



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



```
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:

15	0
----	---

Calculate