

B.M.S COLLEGE OF ENGINEERING BENGALURU

Autonomous Institute, Affiliated to VTU



LAB REPORT

23CS3PCOOJ

Submitted in partial fulfillment of the requirements for

Lab Bachelor of Engineering

in

Computer Science and Engineering

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Lab Program 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 discriminate 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 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)

        {

            double r=-b/(2*a);

            System.out.println("Both roots are equal:"+r);

        }

        else

        {
```

```
        System.out.println("Roots are not equal since discriminate is 0");  
    }  
  
    System.out.println("Name:Akshith M Naik.");  
  
    System.out.println("USN:1BM22CS033.");  
  
}  
  
}
```

Output:

```
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.
```

Lab Program 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};

    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();
        System.out.println("Name:Akshith M Naik.");
        System.out.println("USN:1BM22CS033.");
    }
}

```

Output:

```
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 Program 3:

Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString() method that could display the complete details of the book. Develop a Java program to create n book objects.

```
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 the Details of the book " +(i+1)+ " in order name,  
author,price,Number of pages");
```

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

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

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

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

```
    }
```

```
    public String toString(){
```

```
        return "Details of Book \n" + "Name =" +name+"\n" + "Author  
Name=" +author+"\n" + "Price=" +price+"\n" + "Number of pages=" +no;
```

```
    }
```

```
}
```

```
public class Abhishek{
```

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

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

```
        System.out.println("Enter the number 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(int i=0;i<a;i++)
        {
            System.out.println(b[i].toString());
        }
        System.out.println("Name:Akshith M Naik.");
        System.out.println("USN:1BM22CS033.");
    }
}
```

Output:

```
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.
```

Lab Program 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 a,b;

    abstract void printArea();

}

class Rectangle extends Shape{

    Rectangle(int l,int br){

        a=l;

        b=br;

    }

    void printArea(){

        double area=a*b;

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

    }

}

class Triangle extends Shape{

    Triangle(int ba,int h){

        a=ba;

        b=h;

    }

    void printArea(){

        double area=a*b;

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

    }

}
```

```

    }

}

class Circle extends Shape{

    Circle(int r){

        a=r;

    }

    void printArea(){

        double area=a*a*3.14;

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

    }

}

public class Lab4{

    public static void main(String[] java){

        Scanner in=new Scanner(System.in);

        System.out.println("Enter length and breadth:");

        Rectangle rec=new Rectangle(in.nextInt(),in.nextInt());

        rec.printArea();

        System.out.println("Enter base and height:");

        Triangle tr=new Triangle(in.nextInt(),in.nextInt());

        tr.printArea();

        System.out.println("Enter Radius:");

        Circle cr=new Circle(in.nextInt());

        cr.printArea();

        System.out.println("Name:Akshith M Naik.");

        System.out.println("USN:1BM22CS033.");

    }

}

```

Output:

```
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.
```

Lab program 5

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

- a) Accept deposit from customer and update the balance.
- b) Display the balance.
- c) Compute and deposit interest
- d) Permit withdrawal and update the balance

Check for the minimum balance, impose penalty if necessary and update the balance.

```
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);

        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 withdrawl()

    {

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

        double q1 = s1.nextDouble();

        if(q1>bal)

        {

            System.out.println("Insuficient Bal!!");

        }

    }

}
```

```

    }

    else

    {

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

        bal = bal-q1;

        System.out.println(" Your .00Current balance is : "+bal);

    }

}

public void compinterest()

{

    double A=1/100;

    double w=bal*A;

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

}

}

class curentacct extends account

{

    double e;

    Scanner s2 = new Scanner(System.in);

    public curentacct(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 current account:");
    int B=s2.nextInt();
    bal = bal+B+2000;
    System.out.println("Your Current balance is : "+bal);
}

public void withdrawl()
{
    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("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 is : "+bal);
        }
    }
}

public void getchq()

```



```

{
    System.out.println("Enter the amount for which cheque has to be issued");
    e = s2.nextDouble();
}

public void cashchq()
{
    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("Current balance is : "+bal);
        }
    }
}
}

```

```
public class Main3
```

```
{  
  
    public static void main(String[] args) {  
  
        Scanner s=new Scanner(System.in);  
  
        savingacct sav = new savingacct("Abhishek",199,"Savings");  
  
        sav.deposit();  
  
        sav.compinterest();  
  
        sav.withdrawl();  
  
        curentacct cur = new curentacct("Amar",200,"Current");  
  
        cur.deposit();  
  
        cur.withdrawl();  
  
        cur.getchq();  
  
        cur.cashchq();  
  
        System.out.println("Name:Akshith M Naik.");  
  
        System.out.println("USN:1BM22CS033.");  
  
    }  
  
}
```

Output:

```
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:
52252
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.
```

Lab Program:6

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.

```
package CIE;

import java.util.*;

public class Student
{
    public int sem;

    public String usn;

    public String name;

    public void accept()
    {
        Scanner scan = new Scanner(System.in);

        System.out.println("Enter U, N, S:\n");

        usn=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[5];

        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[i].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]);
        System.out.println("Name:Akshith M Naik.");
        System.out.println("USN:1BM22CS033.");
    }
}
}
}
}

```

Output:

```

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

```

Lab Program 7:

Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called “Father” and derived class called “Son” which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge() when the input age<0. In Son class, implement a constructor that takes both father and son’s age and throws an exception if son’s age is >=father’s age.

```
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 Lab7 {  
    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, 25);  
            System.out.println("Son's age: " + son1.getSonAge());  
        } catch (WrongAge e) {  
            System.out.println(e.getMessage());  
        }  
        System.out.println("Name:Akshith M Naik.");  
        System.out.println("USN:1BM22CS033.");    }  
}
```


Output:

```
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 ten seconds and another displaying “CSE” once every two seconds.

```
public class Lab8 {  
  
    static class DisplayBMS extends Thread {  
  
        @Override  
  
        public void run() {  
  
            while (true) {  
  
                System.out.println("BMS College of Engineering");  
  
                try {  
  
                    Thread.sleep(10000); // 10 seconds  
  
                } catch (InterruptedException e) {  
  
                    e.printStackTrace();  
  
                }  
  
            }  
  
        }  
  
    }  
  
    static class DisplayCSE extends Thread {  
  
        @Override  
  
        public void run() {  
  
            while (true) {  
  
                System.out.println("CSE");  
  
                try {  
  
                    Thread.sleep(2000); // 2 seconds  
  
                } catch (InterruptedException e) {  
  
                    e.printStackTrace();  
  
                }  
  
            }  
  
        }  
  
    }  
  
}
```

```
    }  
    }  
}  
  
public static void main(String[] args) {  
    DisplayBMS displayBMS = new DisplayBMS();  
    DisplayCSE displayCSE = new DisplayCSE();  
  
    displayBMS.start();  
    displayCSE.start();  
    System.out.println("Name:Akshith M Naik.");  
    System.out.println("USN:1BM22CS033.");  
}  
}
```

Output:

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

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

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

```
CSE
```

```
BMS College of Engineering
```

```
USN:1BM22CS033.
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

```
BMS College of Engineering
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

```
BMS College of Engineering
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

```
BMS College of Engineering
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

```
BMS College of Engineering
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

Lab Program 9:

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

```
import javax.swing.*;

import java.awt.*;

import java.awt.event.*;

class SwingDemo{

    SwingDemo(){

        JFrame jfrm = new JFrame("Divider App");

        jfrm.setSize(275, 150);

        jfrm.setLayout(new FlowLayout());

        jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

        JLabel jlab = new JLabel("Enter the divider and 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 event 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("\nA = " + a);

            blab.setText("\nB = " + b);

            anslab.setText("\nAns = "+ 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 NON zero!");

        }

    }

}

```

```

    }

    });

    jfrm.setVisible(true);
}

public static void main(String args[]){

    SwingUtilities.invokeLater(new Runnable(){

        public void run(){

            new SwingDemo();

        }

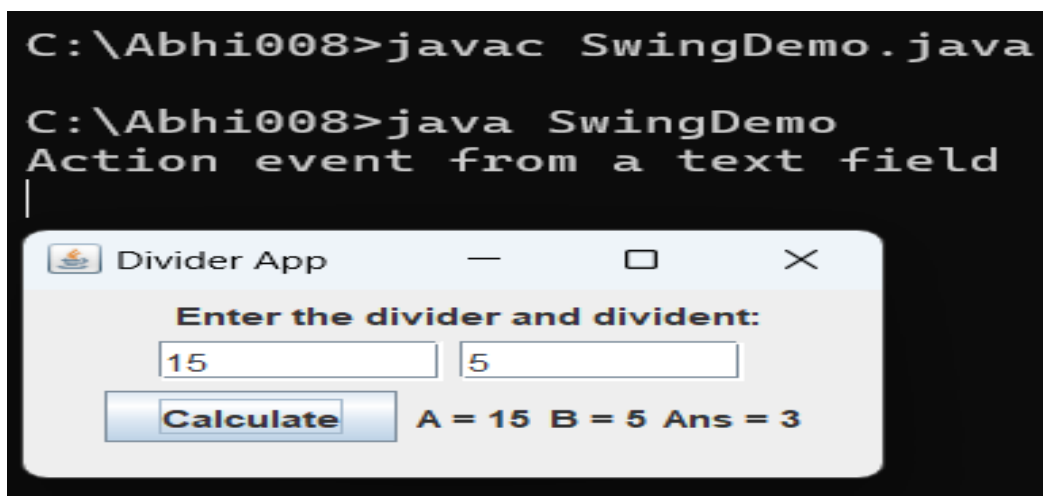
    });

}

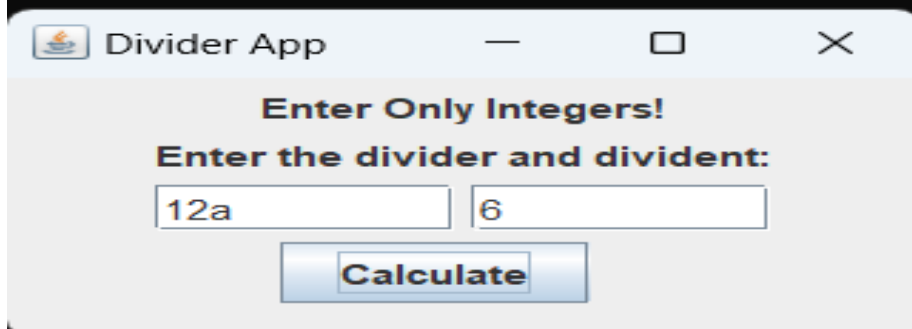
}

```

Output:

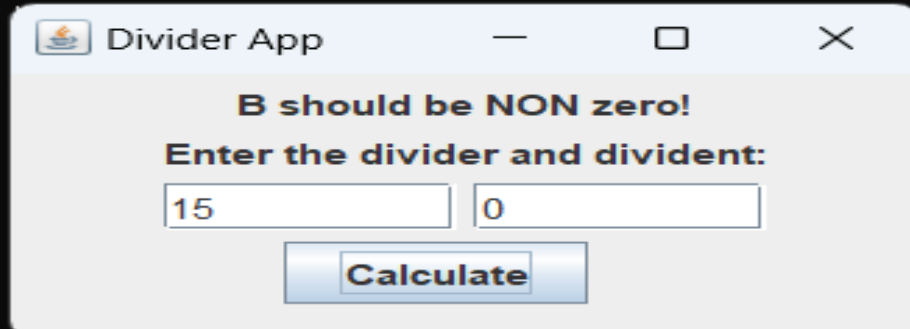


```
C:\Abhi008>java SwingDemo  
Action event from a text field
```



The screenshot shows a Java Swing window titled "Divider App". Inside the window, the text "Enter Only Integers!" is displayed in bold. Below it, the prompt "Enter the divider and dividend:" is shown. There are two text input fields: the first contains "12a" and the second contains "6". A "Calculate" button is positioned below the input fields.

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



The screenshot shows the same "Divider App" window. The text "B should be NON zero!" is displayed in bold, indicating an error. Below it, the prompt "Enter the divider and dividend:" is shown. The first text input field contains "15" and the second contains "0". A "Calculate" button is positioned below the input fields.