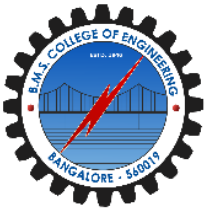
B.M.S. COLLEGE OF ENGINEERING
Basavanagudi, Bengaluru- 560019
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING



LAB REPORT

On

Object Oriented Java Programming

(23CS3PCOOJ)

Submitted By :

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1BM22CS050

In partial fulfilment of

BACHELOR OF ENGINEERING

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Faculty-In-Charge

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LAB PROGRAM 1:

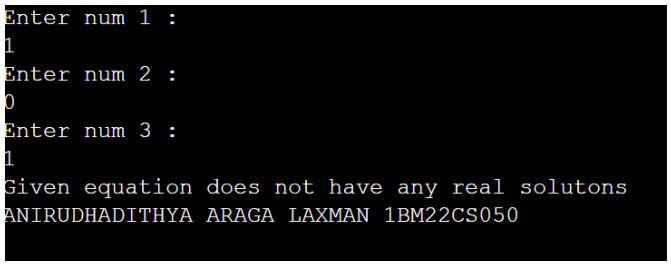
Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions.

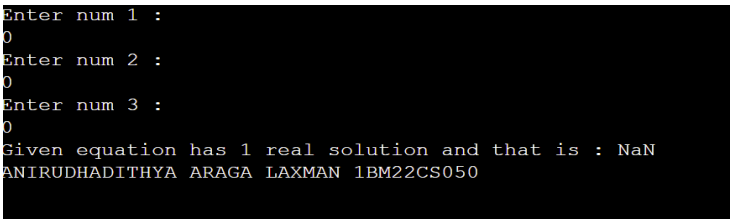
INPUT:

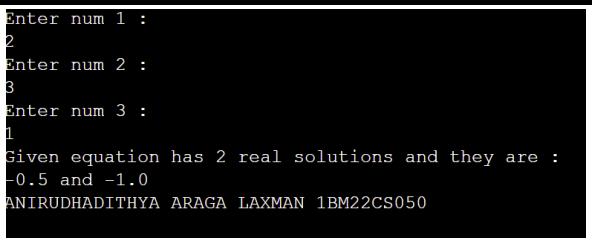
```
import java.util.Scanner;
public class quad
{
public static void main(String[] args)
{
Scanner s = new Scanner(System.in);
System.out.println("Enter num 1 : ");
double a = s.nextDouble();
System.out.println("Enter num 2 : ");
double b = s.nextDouble();
System.out.println("Enter num 3 : ");
double c = s.nextDouble();
double y = ((b*b)-(4*a*c));
double z = Math.sqrt(y);
if(y>0)
{
System.out.println("Given equation has 2 real solutions and they are : ");
double d = ((-b+z)/(2*a));
double e = ((-b-z)/(2*a));
System.out.println(d+" and "+e);
}
```

```
else if(y==0)
{
double f = -b/(2*a);
System.out.println("Given equation has 1 real solution and that is : "+f);
}
else if(y<0)
{
System.out.println("Given equation does not have any real solutons");
}
else
{
System.out.println("Invalid Input");
}
System.out.println("ANIRUDHADITHYA ARAGA LAXMAN 1BM22CS050");
}
}
```

OUTPUT :







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.

INPUT :

```
import java.util.Scanner;

class Subject {
    private int credits;
    private int marks;

    public Subject(int credits) {
        this.credits = credits;
        this.marks = 0;
    }
    public void setMarks(int marks) {
        this.marks = marks;
    }
    public int getCredits() {
        return credits;
    }
    public int getMarks() {
        return marks;
    }
}
```

```
class Student {
    private String usn;
    private String name;
    private Subject[] subjects;

    public Student(String usn, String name, int[] credits) {
        this.usn = usn;
        this.name = name;
        this.subjects = new Subject[credits.length];
        for (int i = 0; i < credits.length; i++) {
            subjects[i] = new Subject(credits[i]); // Initialize subjects with credits
        }
    }
    public void getStudentDetails(Scanner scanner) {
        System.out.println("Enter USN:");
        usn = scanner.nextLine();
        System.out.println("Enter Name:");
        name = scanner.nextLine();
    }
    public void getMarks(Scanner scanner) {
        for (int i = 0; i < subjects.length; i++) {
            System.out.println("Enter marks for subject " + (i + 1) + ":");
            int marks = scanner.nextInt();
            subjects[i].setMarks(marks);
        }
    }
    public double computeSGPA() {
        int totalCredits = 0;
        double totalGradePoints = 0;
```

```
    for (Subject subject : subjects) {
        totalCredits += subject.getCredits();
        totalGradePoints += calculateGradePoints(subject.getMarks()) * subject.getCredits();
    }
    if (totalCredits == 0) {
        return 0;
    }
    return totalGradePoints / totalCredits;
}
private double calculateGradePoints(int marks) {
    if (marks >= 90) {
        return 10;
    } else if (marks >= 80) {
        return 9;
    } else if (marks >= 70) {
        return 8;
    } else if (marks >= 60) {
        return 7;
    } else if (marks >= 50) {
        return 6;
    } else if (marks >= 40) {
        return 5;
    } else {
        return 0;
    }
}
public void displayDetails() {
    System.out.println("USN: " + usn);
    System.out.println("Name: " + name);
```

```
        System.out.println("SGPA: " + computeSGPA());
    }
}
public class Main {
    public static void main(String[] args) {
        int numSubjects = 8;
        int[] credits = {4, 4, 3 , 3, 3 , 1 , 1 ,1};
        Student student = new Student("", "", credits);
        Scanner scanner = new Scanner(System.in);
        student.getStudentDetails(scanner);
        student.getMarks(scanner);
        student.displayDetails();
        scanner.close();
    }
}
```

OUTPUT:

```
Enter USN:
1BM22CS050
Enter Name:
ARAGA LAXMAN ANIRUDHADITHYA
Enter marks for subject 1:
98
Enter marks for subject 2:
97
Enter marks for subject 3:
99
Enter marks for subject 4:
89
Enter marks for subject 5:
92
Enter marks for subject 6:
95
Enter marks for subject 7:
91
Enter marks for subject 8:
90
USN: 1BM22CS050
Name: ARAGA LAXMAN ANIRUDHADITHYA
SGPA: 9.85
```

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.

INPUT :

```
class Book{
   private String name;
   private String author;
   private int price;
   private int num_of_pages;

public Book(String name, String author, int price, int num_of_pages) {
   this.name = name;
   this.author = author;
   this.price = price;
   this.num_of_pages = num_of_pages;
}
public void setAuthor(String author) {
   this.author = author;
}
public void setPrice(int price) {
   this.price = price;
}
public void setNum_of_pages(int num_of_pages) {
   this.num_of_pages = num_of_pages;
}
```

```
public void setName(String name) {
        this.name = name;
}
public String getName() {
    return name;
    }
    public String getAuthor() {
        return author;
    }
    public int getPrice() {
        return price;
    }
    public int getNum_of_pages() {
        return num_of_pages;
    }
    public String toString() {
        return "Book name=" + name + ", author=" + author + ", price=" + price + ",
num_of_pages=" + num_of_pages
                + " ";
    }
}
public class javaa{
    public static void main(String[] args)
    {
      int n =2;
      Book [] b = new Book[n];
      b[0] = new Book("LOTR","JRR Tolkien",500,1500);
      b[1] = new Book("PJO","RICK",200,500);
      System.out.println(b[0]);
      System.out.println(b[1]);
```

```
System.out.println("ANIRUDHADITHYA ARAGA LAXMAN ->1BM22CS050");
   }
}
```

OUTPUT :

```
Book name=LOTR, author=JRR Tolkien, price=500, num_of_pages=1500
Book name=PJO, author=RICK, price=200, num_of_pages=500
    ANIRUDHADITHYA ARAGA LAXMAN 1BM22CS050


...Program finished with exit code 0
```

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

INPUT:

```
import java.util.Scanner;
abstract class shape
{
   double a,b;
   abstract void printArea();
}
class Rectangle extends shape
{
   void printArea()
   {
      System.out.println("The area is : "+(a*b));
   }
}
class Triangle extends shape
{
   void printArea()
   {
      System.out.println("The area is : "+((a*b)/2));
   }
}
```

```
class Circle extends shape
{
   void printArea()
   {
      System.out.println("The area is : "+(3.14*a*a));
   }
}
public class main
{
public static void main(String[] args) {
Rectangle r = new Rectangle();
Triangle t = new Triangle();
Circle c = new Circle();
Scanner s = new Scanner(System.in);
System.out.println("Enter sides for rectangle : ");
r.a = s.nextDouble();
r.b = s.nextDouble();
r.printArea();
System.out.println("Enter values for Triangle : ");
t.a = s.nextDouble();
t.b = s.nextDouble();
t.printArea();
System.out.println("Enter radius for Circle : ");
c.a = s.nextDouble();
c.printArea();
System.out.println("ANIRUDHADITHYA ARAGA LAXMAN ->1BM22CS050");
   }
}
```

OUTPUT :

```
Enter sides for rectangle :
23
14
The area is : 322.0
Enter values for Triangle :
12
17
The area is : 102.0
Enter radius for Circle :
44
The area is : 6079.04
ANIRUDHADITHYA ARAGA LAXMAN ->1BM22CS050
```

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.

INPUT:

```
import java.util.Scanner;
class account
{
   String custname;
   int accnum;
   String acctype;
   double bal=5000;
}
class savacct extends account
```

```
{
    public savacct(String e, int f, String g)
    {
        custname = e;
        accnum = f;
        acctype = g;
        System.out.println("Customer details : ");
        System.out.println("Customer name : "+custname);
        System.out.println("Customer acccount number : "+accnum);
        System.out.println("Customer account type : "+acctype);
    }
    Scanner s1 = new Scanner(System.in);
    public void deposit(int z)
    {
        bal = bal+z;
        System.out.println("Your Current balance is : "+bal);
    }
    public void withdrawl()
    {
        System.out.println("Enter the amount to be withdrawn : ");
        double q1 = s1.nextDouble();
        if(q1>bal)
        {
            System.out.println("Not enough amount!!");

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

```
            bal = bal-q1;
            System.out.println("Current balance is : "+bal);
        }
    }
    public void compinterest()
    {
        double w = bal*(1+(0.05/12)) - bal;
        System.out.println("Current interest in : "+w);
    }
    public int chq()
    {
        return 0;
    }
}
class curacct extends account
{
    public curacct(String e1, int f1, String g1)
    {
        custname = e1;
        accnum = f1;
        acctype = g1;
        System.out.println("Customer details : ");
        System.out.println("Customer name : "+custname);
        System.out.println("Customer acccount number : "+accnum);
        System.out.println("Customer account type : "+acctype);
    }
    double e;
    Scanner s2 = new Scanner(System.in);
    public void deposit(int y)
```

```
    {
        bal = bal+y;
        System.out.println("Your Current balance is : "+bal);
    }
    public void withdrawl()
    {
        System.out.println("Enter the amount to be withdrawn : ");
        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 int chq()
    {
        return 1;
    }
```

```
}
public class bank
{
        public static void main(String[] args) {
    Scanner s3 = new Scanner(System.in);
    System.out.println("Enter customer name : ");
    String a1 = s3.next();
    System.out.println("Enter customer acc num : ");
    int a2 = s3.nextInt();
    System.out.println("Enter customer type : ");
    String a3 = s3.next();
                savacct sav = new savacct(a1,a2,a3);
                sav.deposit(1000);
                sav.compinterest();
                sav.withdrawl();
    int l1 = sav.chq();
    if(l1 == 0)
    {
       System.out.println("There is no cheque facility");
    }
    else
    {
       System.out.println("Cheque facility available");
    }
    System.out.println("Enter customer name : ");
    String b1 = s3.next();
    System.out.println("Enter customer acc num : ");
    int b2 = s3.nextInt();
```

```
        System.out.println("Enter customer  account type : ");
        String b3 = s3.next();
                        curacct cur = new curacct(b1,b2,b3);
                        cur.deposit(3000);
                        cur.withdrawl();
                        int l2 = cur.chq();
        if(l2 == 0)
        {
           System.out.println("There is no cheque facility");
        }
        else
        {
           System.out.println("Cheque facility available");
        }
System.out.println("ANIRUDHADITHYA ARAGA LAXMAN ->1BM22CS050");
            }
}
```

OUTPUT :

```
Enter customer name :
Anirudh
Enter customer acc num :
10901
Enter customer type :
sav
Customer details :
Customer name : Anirudh
Customer acccount number : 10901
Customer account type : sav
Your Current balance is : 6000.0
Current interest in : 25.0
Enter the amount to be withdrawn :
750
You have withdrawn 750.0
Current balance is : 5250.0
There is no cheque facility
Enter customer name :
Anish
Enter customer acc num :
10902
Enter customer  account type :
cur
Customer details :
Customer name : Anish
Customer acccount number : 10902
Customer name : Anish
Customer acccount number : 10902
Customer account type : cur
Your Current balance is : 8000.0
Enter the amount to be withdrawn :
2000
You have withdrawn 2000.0
Current balance is : 6000.0
Cheque facility available
ANIRUDHADITHYA ARAGA LAXMAN ->1BM22CS050
```

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.

INPUT:

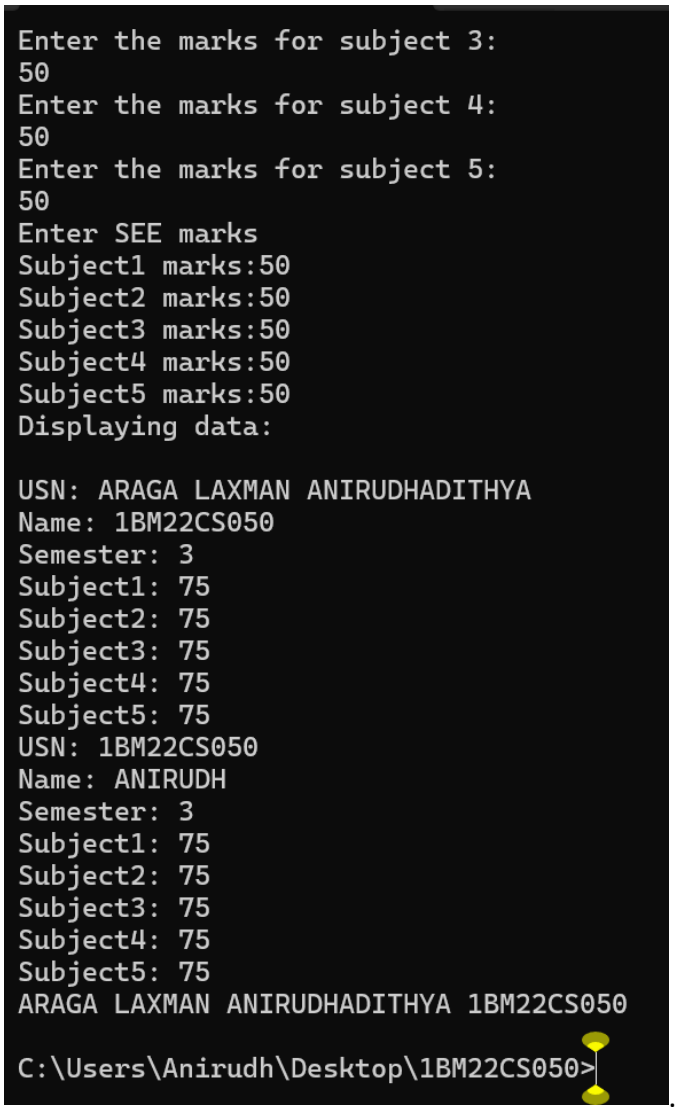
```
import SEE.Externals;
class Main {
   public static void main(String args[]) {
      int numOfStudents = 2;
      Externals finalMarks[] = new Externals[numOfStudents];
      for (int i = 0; i < numOfStudents; i++) {
         finalMarks[i] = new Externals();
         finalMarks[i].inputStudentDetails();
         System.out.println("Enter CIE marks");
         finalMarks[i].inputCIEmarks();
         System.out.println("Enter SEE marks");
         finalMarks[i].inputSEEmarks();
      }
      System.out.println("Displaying data:\n");
      for (int i = 0; i < numOfStudents; i++) {
         finalMarks[i].calculateFinalMarks();
         finalMarks[i].displayFinalMarks();
      }
   }
}
```

```
package CIE;
import java.util.Scanner;
public class Internals extends Student{
protected int marks[]=new int[5];
public void inputCIEmarks(){
Scanner s=new Scanner(System.in);
System.out.println("Enter the marks for 5 subjects");
for(int i=0;i<5;i++){
System.out.println("Enter the marks for subject "+(i+1)+": ");
marks[i]=s.nextInt();
   }
 }
}
package CIE;
import java.util.Scanner;
public class Student{
protected String usn=new String();
protected String name=new String();
protected int sem;
public void inputStudentDetails(){

System.out.println("Enter Details of students:");
Scanner s=new Scanner(System.in);
System.out.println("Enter USN:");
usn=s.nextLine();
System.out.println("Enter Name:");
name=s.nextLine();
System.out.println("Enter Semester:");
sem=s.nextInt();
```

```
}
public void displayStudentDetails(){
System.out.println("USN: "+usn);
System.out.println("Name: "+name);
System.out.println("Semester: "+sem);
  }
}
package SEE;
import CIE.Internals;
import java.util.Scanner;
public class Externals extends Internals{
protected int marks[];
protected int finalMarks[];
public Externals(){
marks=new int[5];
finalMarks=new int[5];
}
public void inputSEEmarks(){
Scanner s=new Scanner(System.in);
for(int i=0;i<5;i++){
System.out.print("Subject"+(i+1)+" marks:");

marks[i]=s.nextInt();
}
}
public void calculateFinalMarks(){
for(int i=0;i<5;i++)
finalMarks[i]=marks[i]/2+super.marks[i];
}
public void displayFinalMarks(){
```

```
displayStudentDetails();
for(int i=0;i<5;i++)
System.out.println("Subject"+(i+1)+": "+finalMarks[i]);
  }
}
```

OUTPUT:



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 cases both father and son's age and throws an exception if son's age is >=father's age.

INPUT:

```
import java.util.Scanner;
class WrongAgeException extends Exception {
   public WrongAgeException(String message) {
      super(message);
   }
}
class father {
   int d_age;

   public father(int a) throws WrongAgeException{
      if (a < 0) {
         throw new WrongAgeException("Age is less than zero!!");
      }
      d_age = a;
   }
}
class son extends father
{
```

```
    int s_age;
    public son(int d_age,int s) throws WrongAgeException
    {
        super(d_age);
        if(d_age<s)
        {
            throw new WrongAgeException("father age can't be less than son!!");
        }
        s_age = s;
    }
}
public class father1
{
public static void main(String[] args) {
int x,y;
Scanner s = new Scanner(System.in);
System.out.println("Enter father age");
x = s.nextInt();
System.out.println("Enter son age");
y = s.nextInt();
try {
        father s1 = new father(x);
son s2 = new son(x,y);
        } catch (WrongAgeException e) {
            System.out.println("Exception: " + e.getMessage());
        }
System.out.println("ANIRUDHADITHYA ARAGA LAXMAN ->1BM22CS050");
     }
}
```

OUTPUT:

```
Enter father age
77
Enter son age
78
Exception: father age can't be less than son!!
ANIRUDHADITHYA ARAGA LAXMAN 1BM22CS050
```

```
Enter father age
-5
Enter son age
23
Exception: Age is less than zero!!
ANIRUDHADITHYA ARAGA LAXMAN 1BM22CS050
```

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.

INPUT:

```
class A implements Runnable
{
   public void run()
   {
      for(int i = 0;i<5;i++)
      {
         try {
         System.out.println("BMS COLLEGE OF ENGINEERING");

         Thread.sleep(10000);
      } catch(Exception e) {
         e.printStackTrace();
      }
      }
   }
}
class B implements Runnable
{
   public void run()
   {
      for(int i = 0;i<5;i++)
```

```
        {
            try {
            System.out.println("CSE");

            Thread.sleep(2000);
        } catch(Exception e) {
            e.printStackTrace();
        }
        }
    }
}

public class threads
{
public static void main(String[] args) {
   A p1 = new A();
   B p2 = new B();
   Thread t1 = new Thread(p1);
   Thread t2 = new Thread(p2);
   t1.start();
   t2.start();
   System.out.println("ANIRUDHADITHYA ARAGA LAXMAN ->1BM22CS050");
    }
}
```

OUTPUT:

```
ANIRUDHADITHYA ARAGA LAXMAN ->1BM22CS050
CSE
BMS COLLEGE OF ENGINEERING
CSE
CSE
CSE
CSE
BMS COLLEGE OF ENGINEERING
BMS COLLEGE OF ENGINEERING
BMS COLLEGE OF ENGINEERING
```

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 a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box

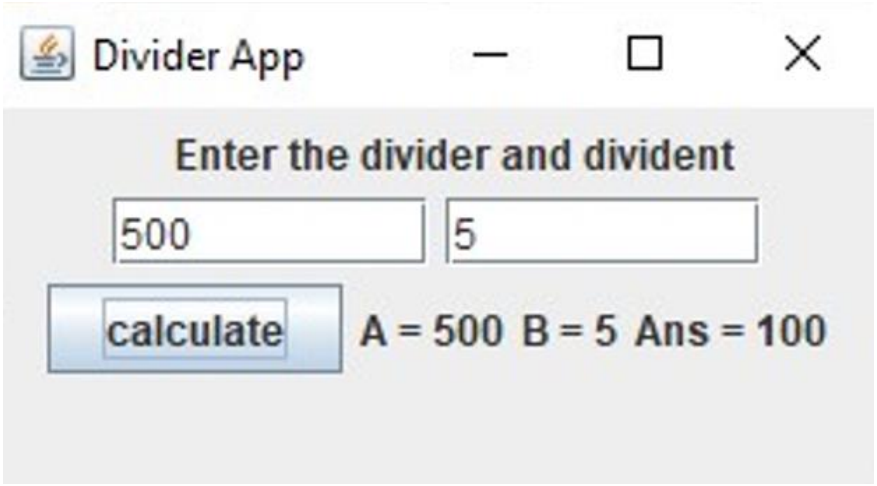
INPUT:

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

public class last
{
   public last()
   {
      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 divident");
      JTextField atjf = new JTextField(8);
      JTextField btjf = 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(atjf);
jfrm.add(btjf);
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");
   }
};
atjf.addActionListener(l);
btjf.addActionListener(l);
button.addActionListener(new ActionListener()
{
   public void actionPerformed(ActionEvent evt)
   {
      try
      {
         int a = Integer.parseInt(atjf.getText());
         int b = Integer.parseInt(btjf.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("B should be non zero");
            }
        }
    });
    jfrm.setVisible(true);
  }
  public static void main(String[] args)
  {
    SwingUtilities.invokeLater(new Runnable()
    {
      public void run()
      {
        new last();
      }
    }
  );
  }
}
```

OUTPUT:


Divider App
Enter the divider and divident
500
5
calculate
A = 500 B = 5 Ans = 100