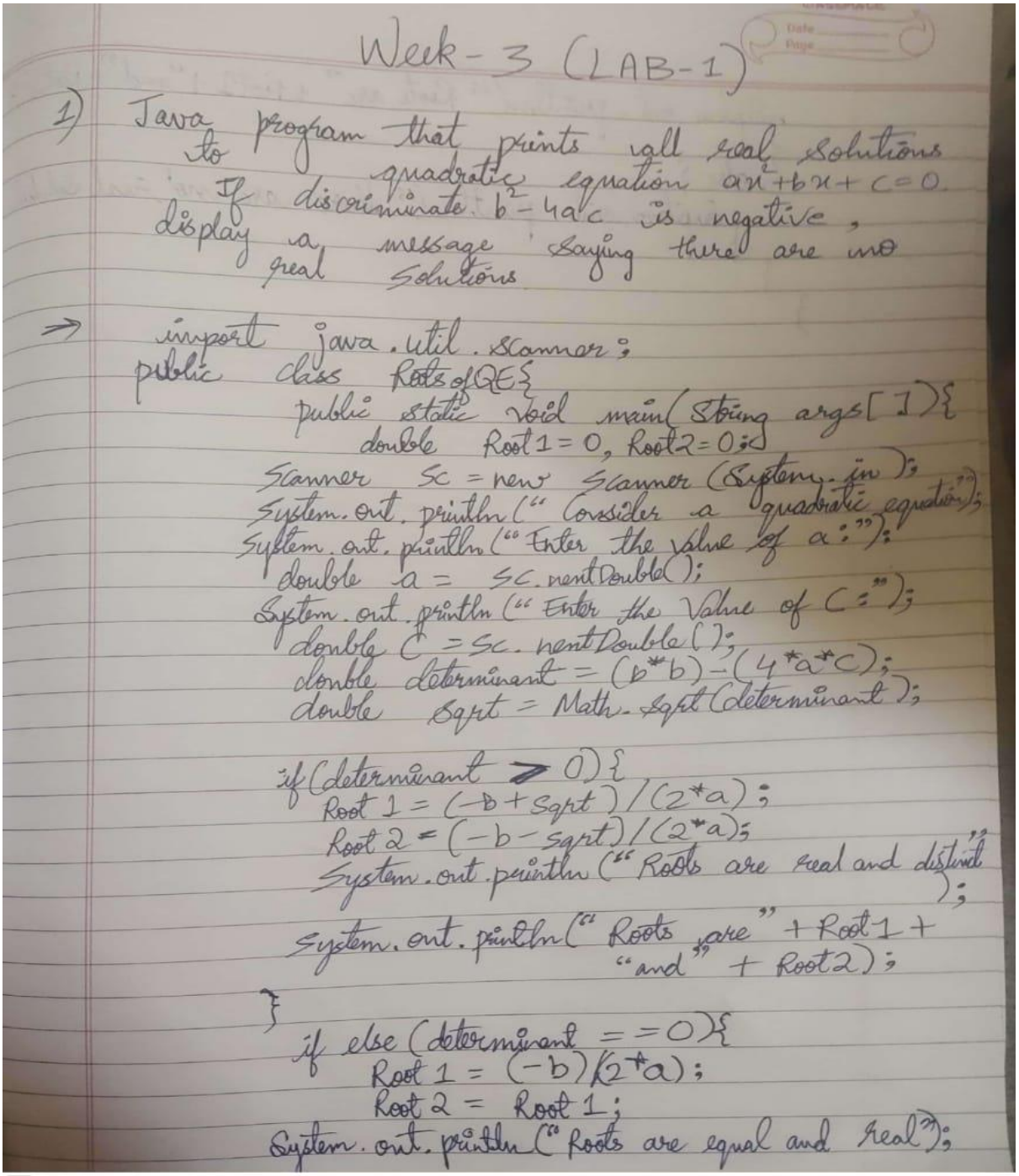
LAB PROGRAM 1

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.

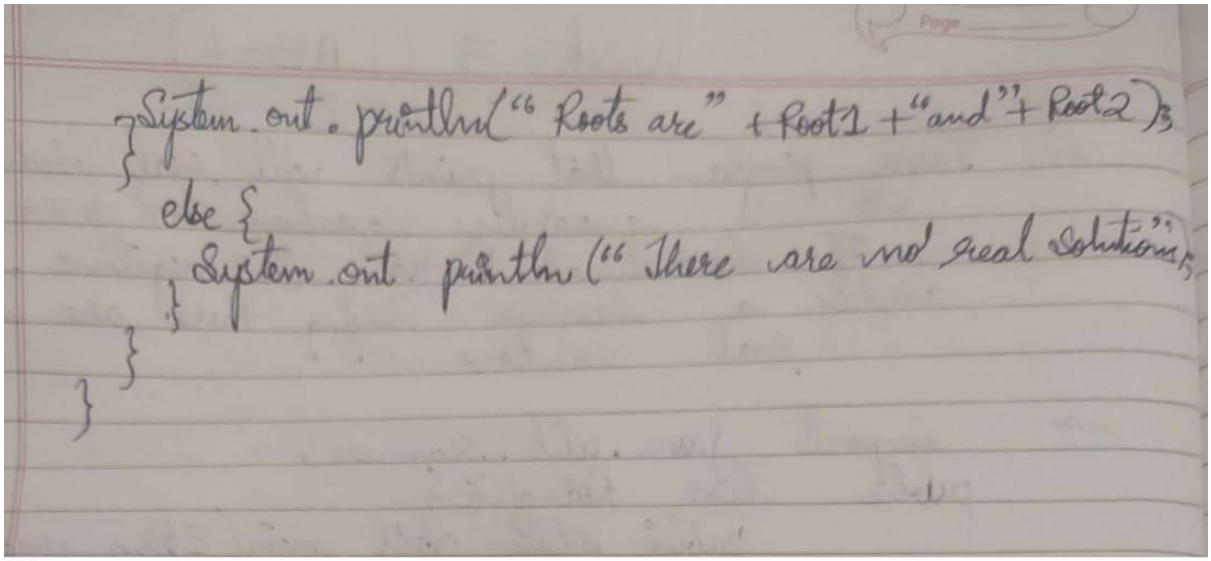
Program :



Week - 3 (LAB-1)

1) Java program that prints all real solutions to quadratic equation $ax^2+bx+c=0$. If discriminate b^2-4ac is negative, display a message saying there are no real solutions

```
import java.util.Scanner;
public class RootsOfQE{
    public static void main(String args[]){
        double Root1=0, Root2=0;
    Scanner sc = new Scanner(System.in);
    System.out.println("Consider a quadratic equation");
    System.out.println("Enter the value of a:");
    double a = sc.nextDouble();
    System.out.println("Enter the value of c:");
    double c = sc.nextDouble();
    double determinant = (b*b)-(4*a*c);
    double sqrt = Math.sqrt(determinant);

    if(determinant > 0){
        Root1 = (-b+sqrt)/(2*a);
        Root2 = (-b-sqrt)/(2*a);
        System.out.println("Roots are real and distinct");
        System.out.println("Roots are" + Root1 +
                           "and" + Root2);
    }
    if else(determinant == 0){
        Root1 = (-b)/(2*a);
        Root2 = Root1;
    System.out.println("Roots are equal and real");
```



```
        System.out.println("Roots are" + Root1 + "and" + Root2);
    }
    else {
        System.out.println("There are no real solutions");
    }
}
}
```



```
Enter the value of a :
1
Enter the value of b :
-2
Enter the value of c :
-8
Roots are real and distinct
Roots are 4.0 and -2.0
```

```
Enter the value of a :
1
Enter the value of b :
2
Enter the value of c :
1
Roots are real and equal
Roots are :: -1.0 and -1.0
```

```
Enter the value of a :
5
Enter the value of b :
6
Enter the value of c :
7
There are no real roots
```

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.

Program:

Week-4 (LAB-2)

1)
```
import java.util.Scanner;
Class student {
    private int Cred[], tc=0
    private double mark[], Cal[], Sum=0, SGPA;
    private String name, USN;

  Void accept()
{
  System.out.println("Enter Student details");
    Scanner S1 = new Scanner(System.in);
    System.out.println("Enter name:");
      name = S1.nextLine();
    System.out.println("Enter USN:");
      USN = S1.nextLine();
      mark = new double[5];
      Cred = new int[5];
      Cal = new double[5];
    for(int i=0; i<5; i++){
      System.out.println("Enter mark["+i+"]:");
        mark[i] = S1.nextDouble();
    }
    for(int i=0; i<5; i++){
      System.out.println("Enter Cred["+i+"]:");
        Cred[i] = S1.nextInt();
      }
  }
  Void display()
  {
    System.out.println("name:"+name);
    System.out.println("USN:"+USN);
    System.out.println("Marks of Student are:");
```

```
for(int i=0; i<5; i++){
  System.out.println(mark[i]);
}
}
Void calculate()
{
num = new double[5]
for(int i=0; i<5; i++){
  if(mark[i] > 100){
    System.out.println("Not-Valid");
  }
  else if(mark[i]>=90){
      num[i]=10;
  }
else if(mark[i]>=80 && mark[i]<90)
{
  num[i]=9; }
else if(mark[i]>=70 && mark[i]<80){
  num[i]=8;
}
else if(mark[i]>=60 && mark[i]<70)
{
  num [i]=7;
}
else if(mark[i]>=50&& mark[i]<60){
    num[i]=5;
}
else if(mark[i]>=40&& mark[i]<50)
{
  num[i]=4;
}
```

```
        else{
          num[i] = 0;
        }
        Cal[i] = num[i] * Cred[i];
        Sum = Sum + Cal[i];
        tc = tc + Cred[i];

      }
      Sgpa = Sum/tc;
      System.out.println("Sgpa :-" + Sgpa);
    }
}
public class Main
{
  public static void main (String args[])
{
  Student obj = new student();
      obj.accept()
      obj.display();
      obj.Calculate();
  }
}
```

```
enter student details
enter name:
jayanti
enter USN:
1BM19CS067
Enter mark[0]:
90
Enter mark[1]:
87
Enter mark[2]:
92
Enter mark[3]:
80
Enter mark[4]:
87
Enter cred[0]:
5
Enter cred[1]:
4
Enter cred[2]:
4
Enter cred[3]:
3
Enter cred[4]:
3
name:jayanti
usn:1BM19CS067
Marks of student are:
90.0
87.0
92.0
80.0
87.0
sgpa:9.473684210526315


...Program finished with exit code 0
Press ENTER to exit console.
```

LABPROGRAM-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.

Program :

LAB-3

1)
```
import java.util.Scanner;
Class Ebook {
    String name;
    String author;
    Double price;
    int num_pages;
    Book()
    {}
    Book(String name, String author, Double price,
                                    int num_pages)
    {
        this.name = name;
        this.author = author;
        this.price = price;
        this num_pages = num_pages;
    }
    Void accept()
    {
        Scanner S = new Scanner (System.in);
        System.out.println("Enter Book name");
        name = S.nextLine();
        System.out.println("Enter author");
        author = S.nextLine);
        System.out.println("Enter price");
        price = S.nextDouble();
        System.out.println("Enter the number of pages
                                    of the book");
        num_pages = S.nextInt();
    }
```

```
public String toString(){
return("Name:"+name+"\n"+"Author:"+author+"\n"
        +"Price:"+price+"\n"+"No. of pages:"+num_pgs);
    }
}
public class Main{
        public static void main(String ss[])
    {
      Scanner a = new Scanner(System.in);
      Book b1 = new Book("wizard","Mary",299,345);
    System.out.println("Sample book:\n"+b1);
    System.out.println("Enter the number of books");
      int n= a.nextInt();
    Book b[] = new Book[n];
    for(int i=0;i<n;i++)
    {
        b[i]= new Book();
    System.out.println("Enter details"+(i+1)+"book");
      b[i].accept();
    }
    for(int i=0; i<n; i++)
    {
        System.out.println("Details of book"+(i+1));
        System.out.println(b[i]);
    }
}
}
```

```
Sample book:
Name: wizard
Author: mary
Price: 299.0
Number of pages: 345
Enter the number of books
2
Enter the details of 1 book
Enter the name of the book
harry porter
Enter the author of the book
jk.rowling
Enter the price of the book
500
Enter the number of pages of the book
455
Enter the details of 2 book
Enter the name of the book
oceans
Enter the author of the book
seaan
Enter the price of the book
1011
Enter the number of pages of the book
900
```

```
Details of book 1
Name: harry porter
Author: jk.rowling
Price: 500.0
Number of pages: 455
Details of book 2
Name: oceans
Author: seaan
Price: 1011.0
Number of pages: 900


...Program finished with exit code 0
Press ENTER to exit console.
```

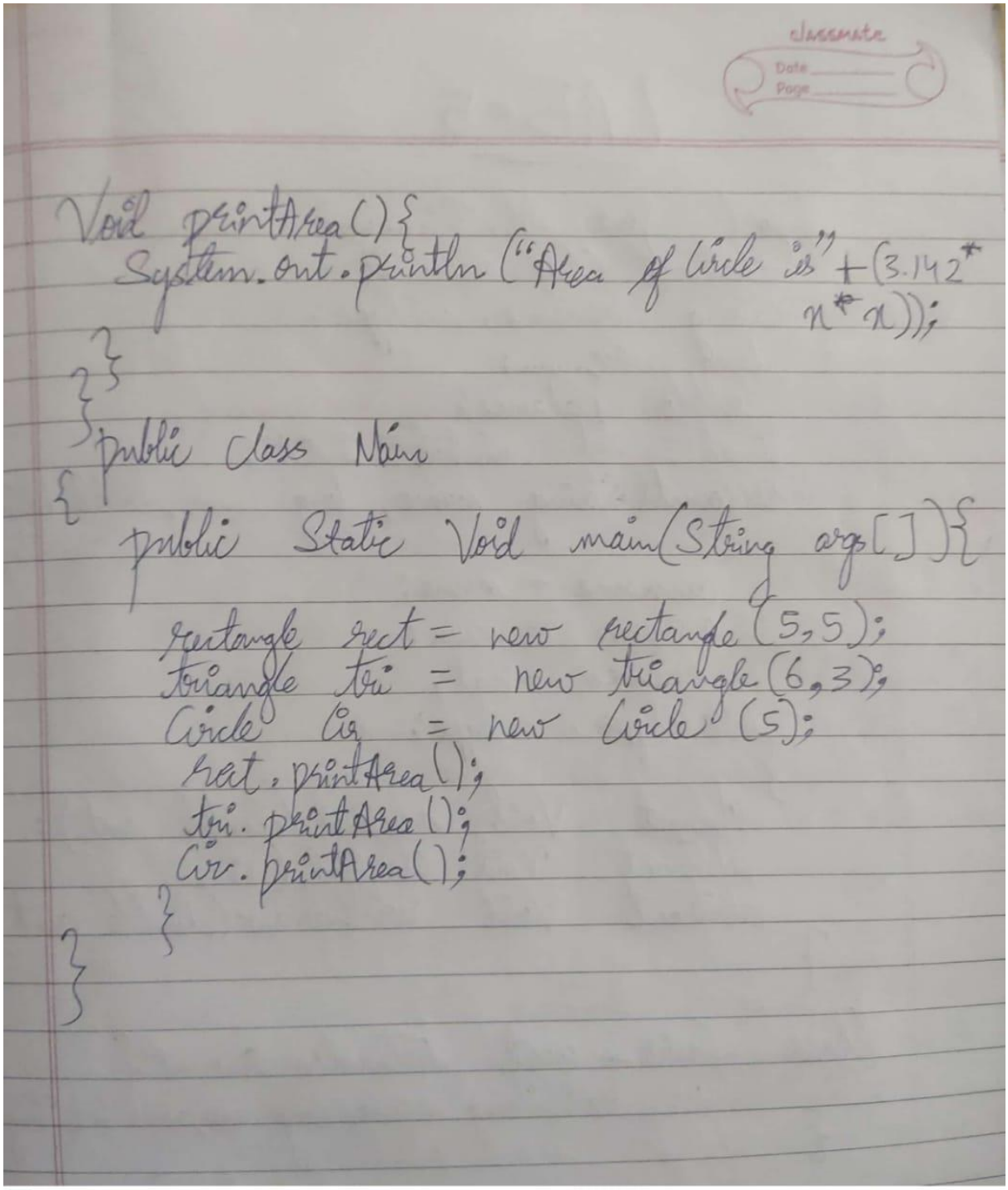
LABPROGRAM-4

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.

Program :

LAB-4

```
abstract class shape{
    int x, y;
    abstract void printArea();
}
class rectangle extends Shape
{
    rectangle(int a, int b){
        x = a;
        y = b;
    }
    void printArea(){
        System.out.println("Area of rectangle is" + (x*y));
    }
}
class triangle extends shape
{
    triangle (int a, int b){
        x = a;
        y = b;
    }
    void printArea(){
        System.out.println("Area of triangle is"
                + (0.5*x*y));
    }
}
class circle extends shape
{
    circle(int a){
        x = a;
    }
```



```
Void printArea(){
    System.out.println("Area of circle is" + (3.142*
                                    r*r));
}
}
public class Main
{
    public static void main(String args[]){

        rectangle rect = new rectangle(5,5);
        triangle tri = new triangle(6,3);
        Circle cir = new Circle(5);
        rect.printArea();
        tri.printArea();
        cir.printArea();
    }
}
```



```
Area of rectangle is 25
Area of triangle is 9.0
Area of circle is 78.55


...Program finished with exit code 0
Press ENTER to exit console.
```

LABPROGRAM-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 Curr-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: • Accept deposit from customer and update the balance. • Display the balance. • Compute and deposit interest • Permit withdrawal and update the balance • Check for the minimum balance, impose penalty if necessary and update the balance

Program :

LAB-5

```
import java.util.Scanner;
abstract class account{
String accname, acctype;
long accnum;
double balance;
final int minbal = 1000;
account(String name, long num, double bal, String type){
    accname = name;
    accnum = num;
    balance = bal;
    acctype = type;
}
abstract Void addBal(double amt);
abstract Void dispBal();
abstract Void withdraw(double amt);
}

Class Curr_acct extends account{
Curr_acct(String name, long num, double bal, String type)
{
    Super(name, num, bal, type);
System.out.println("name:" + accname + "\naccnum:
    +"\nbalance:" + balance + "\nacctype: Current");
}
Void addBal(double amount){
    balance = balance + amount;
}
Void dispBal(){
    System.out.println("Your balance is" + balance);
}
```

```
Void withdraw(double amount){
    if(balance < amount){
        System.out.println("You dont have enough
                                balance");
    System.out.println("Balance is" + balance);
        return;
}
    balance = balance - amount;
    System.out.println("balance =" + balance);
    if (balance < minbal){
        System.out.println("Penalty of Rs." + (balance * 0.01)
            + "as balance is less than minimum");
        balance = balance - balance * 0.01;
    System.out.println("current balance =" + balance);
    }
}
}
}
Class Sav_acct extends account{
  Sav_acct(String name, long num, double bal){
    super(name, num, bal, "Savings");
System.out.println("name:" + acname + "\tacno:" +
    acnum + "\tbal:" + bal + "\ttype:" + acctype);
}
  Void addBal(double amount){
    balance = balance + amount;
        interest();
  }
  Void interest(){
    int t=2;
    balance = balance * Math.pow(1+(a2), t);
  }
```

```
Void dispBal(){
    System.out.println("Your balance is:"+balance);
}
Void withdraw(double amount){
    balance = balance - amount;
    System.out.println("Balance="+balance);
}
}

public class Main
{
    public static void main(String args[]){
    Scanner Sc = new Scanner(System.in);
    Curr_acct C = new Curr_acct("Jay",123456,
                    3000.0,"Current");
    double amount;
    int flag=0;
    while(flag==0){
    System.out.println("1.Add Bal\n2.DisplayBal\n
        3.withdraw\n4.CheckBook\n5.quit");
    int ch=Sc.nextInt();
    Switch(ch){
    Case 1:
    System.out.println("Enter amount to be withdrawn:");
    amount = Sc.nextDouble();
    C.withdrawn(amount);
    Break;

    Case 2:
    C.dispBal();
    break;
```

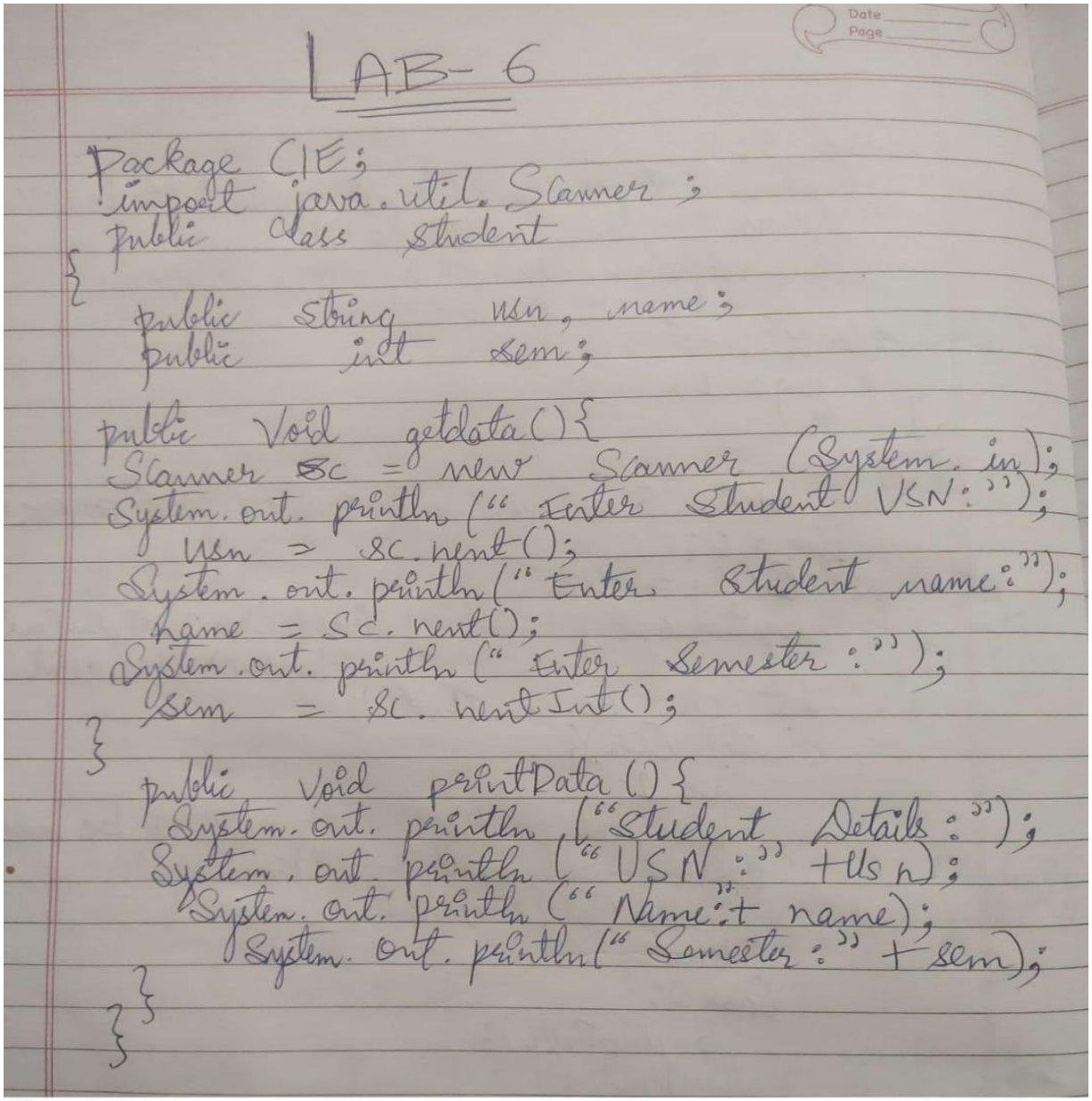
```
Case 3:
System.out.println("Enter amount to be withdrawn");
amount = Sc.nextDouble();
C.withdraw(amount);
break;
default:
flag = 1;
}}

Sav_acct S = new Sav_acct("jennie", 500.67, 7000);
flag = 0;
while(flag == 0){
System.out.println("1. Addbal\n 2. displayBal\n
3. withdraw\n 4. quit");
int ch = Sc.nextInt();
Switch(ch){
Case 1:
System.out.println("Enter amt to be added:");
amount = Sc.nextDouble();
S.addBal(amount);
break;
Case 2:
S.dispBal();
break;
Case 3:
System.out.println("Enter amt to be
withdrawn:");
amount = Sc.nextDouble();
S.withdraw(amount);
break;
default: flag = 1;
}}}}
```

```
name: jay
accnum: 123456
balance: 3000.0
acctype: Current
1:AddBal
2:displayBal
3:withdraw
4:checkbook
5:quit
1
enter amount to be added:
2000
1:AddBal
2:displayBal
3:withdraw
4:checkbook
5:quit
3
enter amount to be withdrawn:
1000
balance = 4000.0
1:AddBal
2:displayBal
3:withdraw
4:checkbook
5:quit
3
enter amount to be withdrawn:
3500
balance = 500.0
penalty of RS.5.0 as balance is less than the minumun needed
current balance = 495.0
1:AddBal
2:displayBal
3:withdraw
4:checkbook
5:quit
4
enter details
enter name of the reciever:
jay
enter the amount to be sent:
200
Enter password
12345
 reciever : jay
amount sent is 200.0
balance = 295.0
```

```
1:AddBal
2:displayBal
3:withdraw
4:checkbook
5:quit
5
name: jennie    accno: 500676   bal: 7000.0     type: Savings
1:AddBal
2:displayBal
3:withdraw
4:quit
1
enter amt to be added:
400
1:AddBal
2:displayBal
3:withdraw
4:quit
2
Your balance is: 10656.0
1:AddBal
2:displayBal
3:withdraw
4:quit
3
enter amt to be withdrawn:
1000
balance = 9656.0
1:AddBal
2:displayBal
3:withdraw
4:quit
4


...Program finished with exit code 0
Press ENTER to exit console.
```

LABPROGRAM-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.



```
LAB- 6

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

    public Void getdata(){
    Scanner sc = new Scanner (System.in);
    System.out.println(" Enter Student USN: ");
        usn = sc.next();
    System.out.println(" Enter Student name: ");
        name = sc.next();
    System.out.println(" Enter Semester : ");
        sem = sc.nextInt();
    }

    public Void printData (){
        System.out.println("Student Details : ");
        System.out.println(" USN : " +usn);
            System.out.println(" Name :" + name);
                System.out.println(" Semester : " + sem);

    }
}
```

```
package CIE;
import java.util.Scanner;
public class Internals extends Student
{
  public int cie[] = new int[5];

  public void getcie(){
  for(int i=0; i<5; i++){
  Scanner sc = new Scanner(System.in);
System.out.println("Enter Subject " + (i+1) + "cie marks:");
  cie[i] = sc.nextInt();
  }
}
}
```

```
package SEE;
import CIE.*;
  import java.util.Scanner;
public class Externals extends CIE.Student
{
  public int see[] = new int[5];
  public void getsee(){
    for(int i=0; i<5; i++){
      Scanner sc = new Scanner(System.in);
System.out.println("Enter Subject " + (i+1) + "see marks:");
      see[i] = sc.nextInt();
    }
  }
}
```

```
import CIE.*;
import SEE.*;
import java.util.Scanner;

Class TotalMarks{
public Static Void main (String sss[]){
Scanner sc = new Scanner (System.in);
  int n, i;
  double total[] = new double[5];
System.out.println(" Enter num of students :");
  n = sc.nextInt();

CIE.Internals in[] = new CIE.Internals[n];
SEE.Enternals ent[] = new SEE.Enternals[n];
  for(i=0; i<n; i++){
  in[i] = new CIE.Internals();
  ent[i] = new SEE.Enternals();
  in[i].getdata();
  in[i].printdata();
System.out.println(" Internal marks :");
  in[i].getcie();
System.out.println(" Enternals marks :");
  ent[i].getseel();
  }
  for(i=0; i<n; i++){
  for(int j=0; j<5; j++){
total[j] = (double) in[i].cie[j] + (ent[i].see[j]);

System.out.println(" Total marks in Subject" + (j+1) +
    " by student" +(i+1)+":" + total[j]);
}}
}
```

```
C:\Users\llokm\Desktop\java\packages>javac Student.java

C:\Users\llokm\Desktop\java\packages>javac Internals.java

C:\Users\llokm\Desktop\java\packages>javac Externals.java

C:\Users\llokm\Desktop\java\packages>javac main.java

C:\Users\llokm\Desktop\java\packages>java main
Enter the number of students:
2
Name:
jay
USN:
1BM19cs067
Semester:
3
CIE Marks for 5 subjects(out of 50):
50
40 30 20 40
SEE Marks for 5 subjects(out of 100):
99 98 80 95 92
Total marks of student jay in 5 subjects are:
99.5
89.0
70.0
67.5
86.0
Name:
jayanti
USN:
1BM19CS067
Semester:
5
CIE Marks for 5 subjects(out of 50):
50
40
30 45 47
SEE Marks for 5 subjects(out of 100):
97 98 87 96 75
Total marks of student jayanti in 5 subjects are:
98.5
89.0
73.5
93.0
84.5
```

LABPROGRAM-7

Write a program to demonstrate generics with multiple object parameters

LAB-7

```
Class MultipleGren <T, V, J>{

    T ob1;
    V ob2;
    J ob3;

MultipleGren (T O1, V O2, J O3){

    ob1 = O1;
    ob2 = O2;
    ob3 = O3;

Void typeDisplay(){

    System.out.println("Type of T is" +ob1.getclass().
                                        getName());
  System.out.println("Type of V is" +ob2.getClass().getName());
System.out.println("Type of J is" + ob3.getclass().getName());
}

T getob1(){
    return ob1;
}

V getob2(){
    return ob2;
}

J get ob3(){
    return ob3;
}
}
```

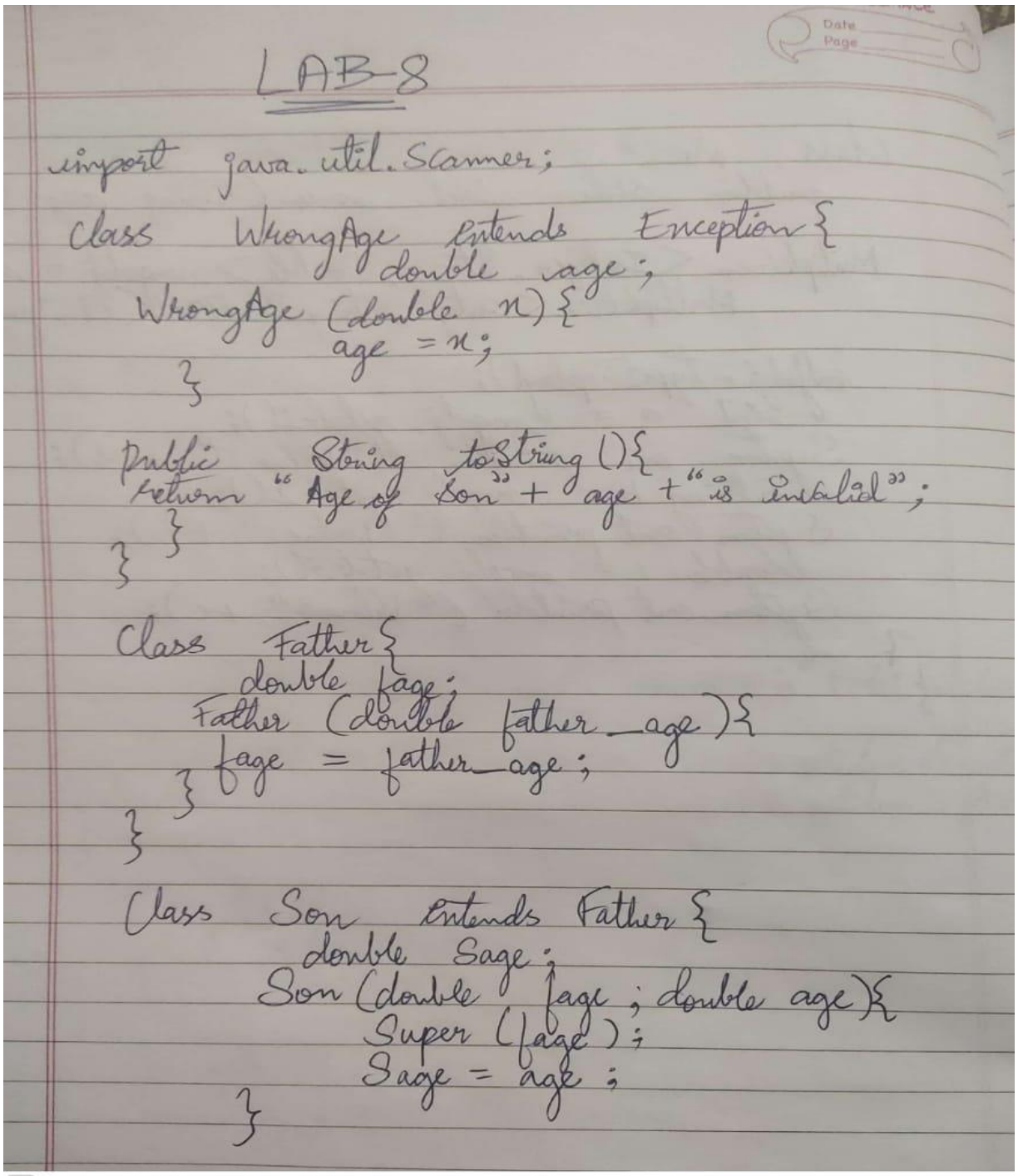
```
class Main{
    public static void main(String args[]){

MultipleGen<Integer, String, Double> mgobj = new
        MultipleGen<Integer, String, Double>(9, "jay", 9.9);

    mgobj.typeDisplay();
        int a = mgobj.getob1();
    System.out.println("Value:" + a);
        String b = mgobj.getob2();
    System.out.println("Value:" + b);
        Double c = mgobj.getob3();
    System.out.println("Value:" + c);
}
}
```



```
Type of T is java.lang.Integer
Type of V is java.lang.String
Type of J is java.lang.Double
Value: 9
Value: jayanti
Value: 99.99


...Program finished with exit code 0
Press ENTER to exit console.
```

LAB PROGRAM-8

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 Wrong Age( )



```
LAB-8

import java.util.Scanner;
class WrongAge extends Exception{
        double age;
    WrongAge (double x){
        age = x;
    }

public String toString(){
return "Age of Son" + age + "is invalid";
    }
}

class Father{
    double fage;
    Father (double father_age){
        fage = father_age;
    }
}

class Son extends Father{
    double Sage;
    Son (double fage, double age){
        super (fage);
        Sage = age;
    }
```

```
Void Calculate() throws WrongAge {
        if (Sage >= fage){
            throw new WrongAge(Sage);
    }
    else {
        System.out.println("The age of father :"+fage);
        System.out.println("The age of son is:" + Sage);
    }
}
}

Class Main{
    public Static Void main(String args[]){
        Scanner S1 = new Scanner(System.in);
        System.out.println("Enter father's age :");
        double f = S1.nextDouble();
        System.out.println("Enter Son's age :");
        double S = S1.nextDouble();
        Son Sa = new Son(f, S);
        try {
            Sa.Calculate();
        }
        Catch (WrongAge e){
            System.out.println("Input invalid "+e);
        }
    }
}
```

```
Enter father's age:
50
Enter son's age:
30
The age of Father is: 50.0
The age of Son is: 30.0


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

```
Enter father's age:
50
Enter son's age:
60
Input invalidAge of son 60.0 is invalid
```

LABPROGRAM-9

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.

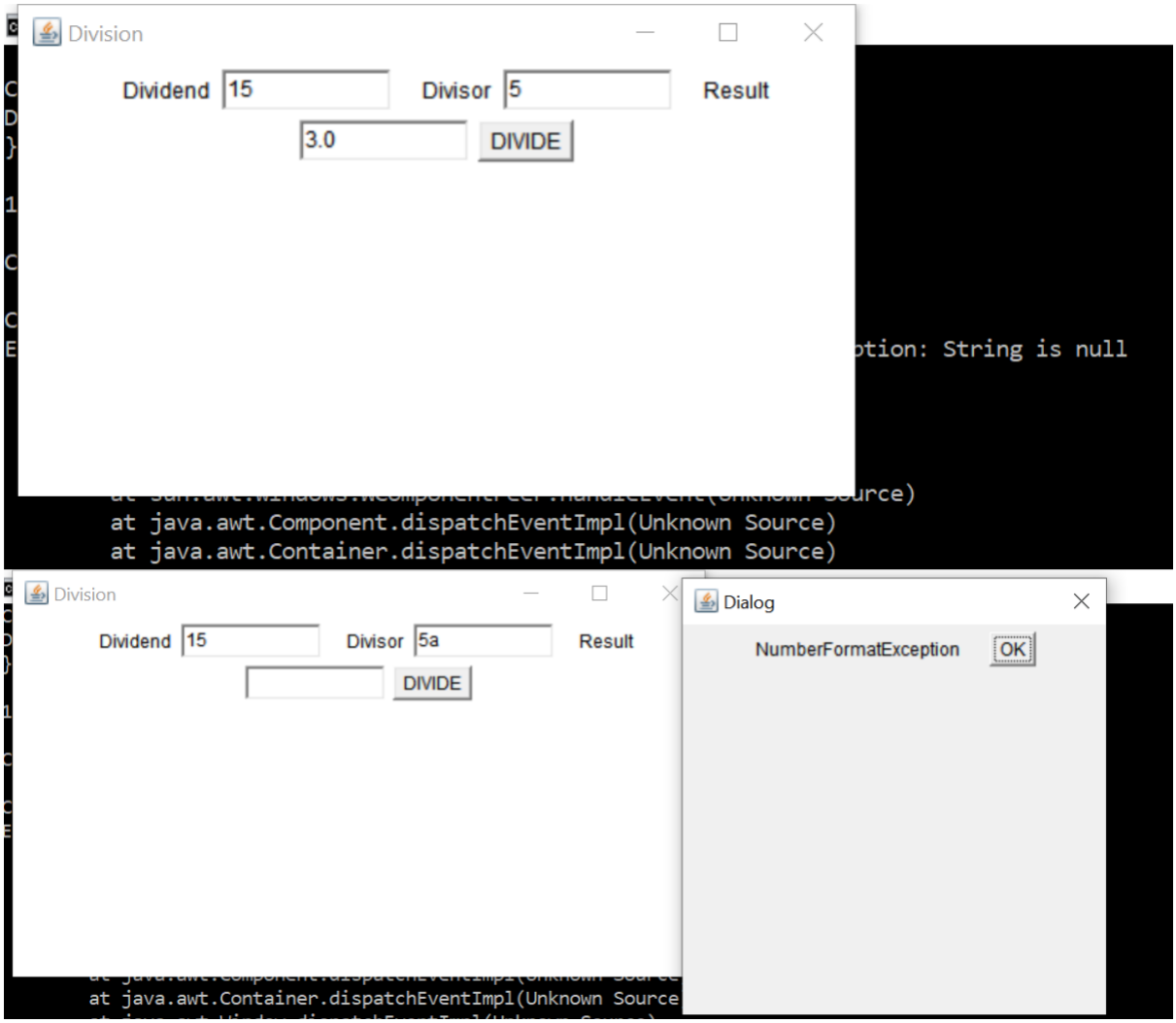
```
thread:Thread[BMS College of Engineering,5,main]
thread:Thread[CSE,5,main]
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE Exiting Thread
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering Exiting Thread


...Program finished with exit code 0
Press ENTER to exit console.
```

LAB-9

```
Class Thread1 implements Runnable {
    Thread t;
    String name;
    int time;
    Thread1(String threadname, int time){
        name = threadname;
        this.time = time;
        t = new Thread(this, name);
        System.out.println("thread:" + t);
        t.start();
    }
    public void run(){
        try{
            for(int i=5; i>0; i--){
                System.out.println(name);
                Thread.sleep(time);
            }
        }
        catch(InterruptedException e){
            System.out.println(name + "Interrupting thred");
        }
        System.out.println(name + " Exiting thread");
    }
}
Class Main{
public static void main(String args[]){
    Thread t1 = new Thread1("BMS College of
                Engineering", 10000);
    Thread t2 = new Thread1("CSE", 2000);
}
}
```

LABPROGRAM-10

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



LAB 10

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

public class Division extends Frame implements
                                    ActionListener{
public class DialogD extends Frame{
    String msg;
    DDialog myDialog;
    public DialogD(){
    mydialog = new DDialog(this, "new Dialog", msg);
}
}
}
Textfield num1, num2, res;
 Label l1, l2, l3;
Button div;

public Division(){
 SetLayout(new FlowLayout());
 l1 = new Label("Dividend", Label.RIGHT);
 l2 = new label("Divisor", Label.RIGHT);
 l3 = new Label("Result", Label.RIGHT);
 num1 = new Textfield(10);
num2 = new Textfield(10);
 res = new Textfield(10);
 div = new Button("Divide");
 add(l1); add(num1);
add(l2); add(num2);
 add(l3); add(res);
 add(div);
div.addActionListener(new MyWindowAdapter());
}
```

```
public Void actionPerformed (ActionEvent ae){
    int num1 = 0; num2 = 0;
    try {
        num1 = Integer.parseInt (this.num1.getText());
        num2 = Integer.parseInt (this.num2.getText());
        double num3 = (double) num1 / num2;
        Res.setText (String.valueOf (num3));
        msg = " Division Successful ";
    }
    Catch (NumberFormatException e){
        System.out.println(e);
        Res.SetText(" ");
        msg = "NumberFormatException ";
        DDialog dd = new DDialog (this, "Dialog", msg);
        dd.setVisible (true);
        return;
    }
    try {
        if (num2 == 0)
            throw new ArithmeticException ();
        msg = " Can't be divided by Zero ";
    }
    Catch(ArithmeticException e){
        System.out.println("Can't be divided by Zero"+e);
        Res.setText(" ");
        msg = "Can't be divided by Zero";
        DDialog dd = new DDialog (this, "Dialog", msg);
        dd.setVisible (true);
        return;
    }
}
```

```
public Void paint (Graphics g){
    g.drawString(msg, 80,100);
public Static Void main (String[] args){
    Division appwin = new Division();
    appwin.setSize(new Dimension(480,280));
    appwin.SetTitle("Division");
    appwin.Set Visible(true);
}
}

Class DDialog extends Dialog{
DDialog (Frame parent, String title, String msg){
    Super(parent, title, false);
    SetLayout(new FlowLayout());
    SetSize(300, 300);
    add(new Label(msg));
    Button b;
    add(b = new Button("OK"));
    b.addActionListener((ae)→dispose());
    add WindowListener(new WindowAdapter(){
    public Void WindowClosing(WindowEvent we)
    {
        dispose();
    }
    }
}
}
```


THE END

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