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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1BM22CS044

In partial fulfilment of
BACHELOR OF ENGINEERING
In
COMPUTER SCIENCE AND ENGINEERING
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Faculty-In-Charge
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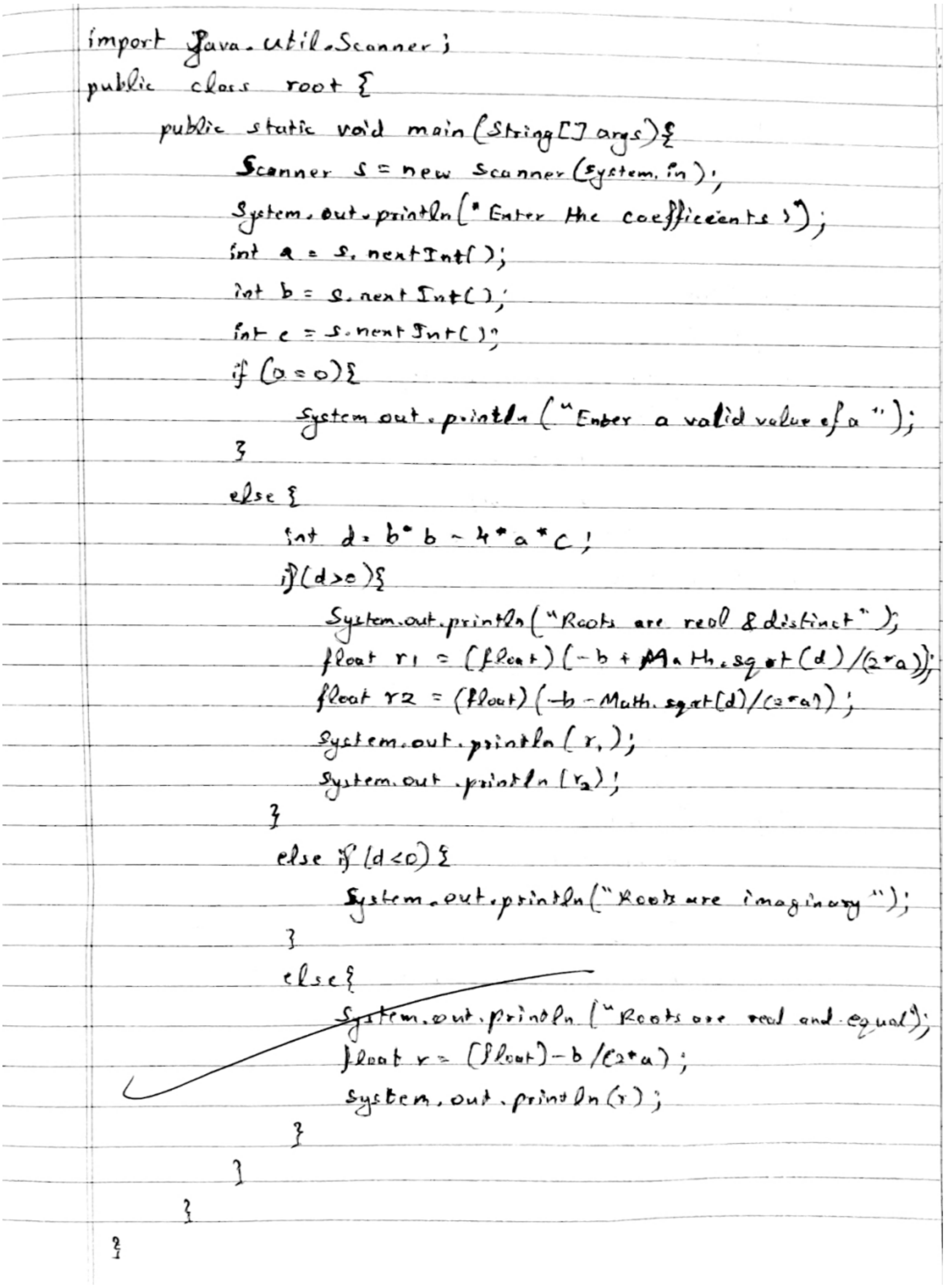
Assistant Professor
Department of Computer Science and Engineering

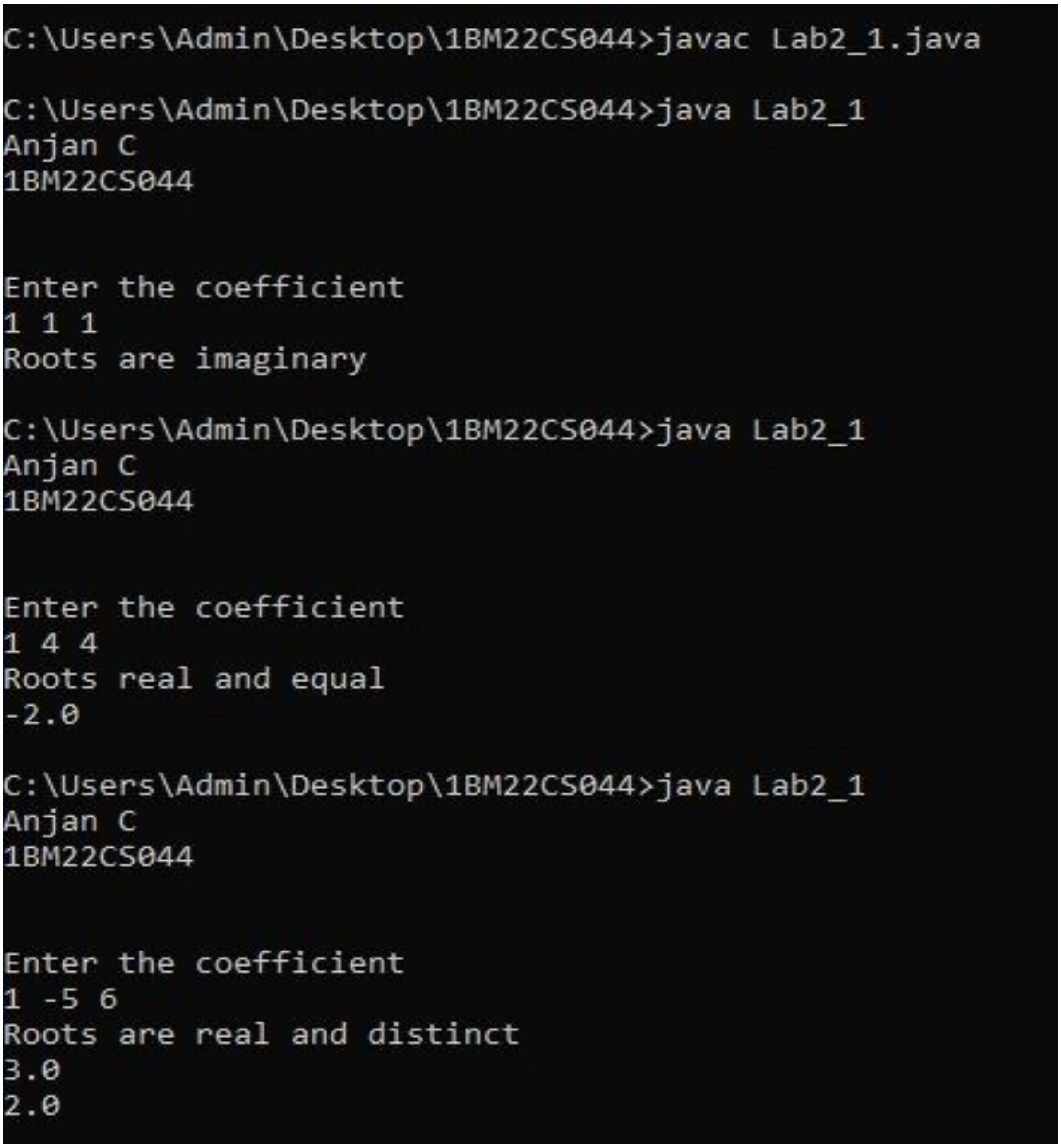
LAB-1: QUADRATIC EQUATION

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.



```
import Java.util.Scanner;
public class root {
        public static void main(String[] args){
                Scanner s = new Scanner(System.in);
                Sytem.out.println("Enter the coefficeents");
                int a = s.nextInt();
                int b = s.nextInt();
                int c = s.nextInt();
                if (a=0){
                        System out.println("Enter a valid value of a");
                }
                else {
                        int d= b*b - 4*a*c;
                        if(d>0){
                                System.out.println("Roots are real & distinct");
                                float r1 = (float)(-b + Math.sqrt(d)/(2*a));
                                float r2 = (float)(-b - Math.sqrt(d)/(2*a));
                                System.out.println(r1);
                                System.out.println(r2);
                        }
                        else if (d<0){
                                System.out.println("Roots are imaginary");
                        }
                        else{
                                System.out.println("Roots are real and equal");
                                float r= (float)-b/(2*a);
                                system.out.println(r);
                        }
                }
        }
}
```

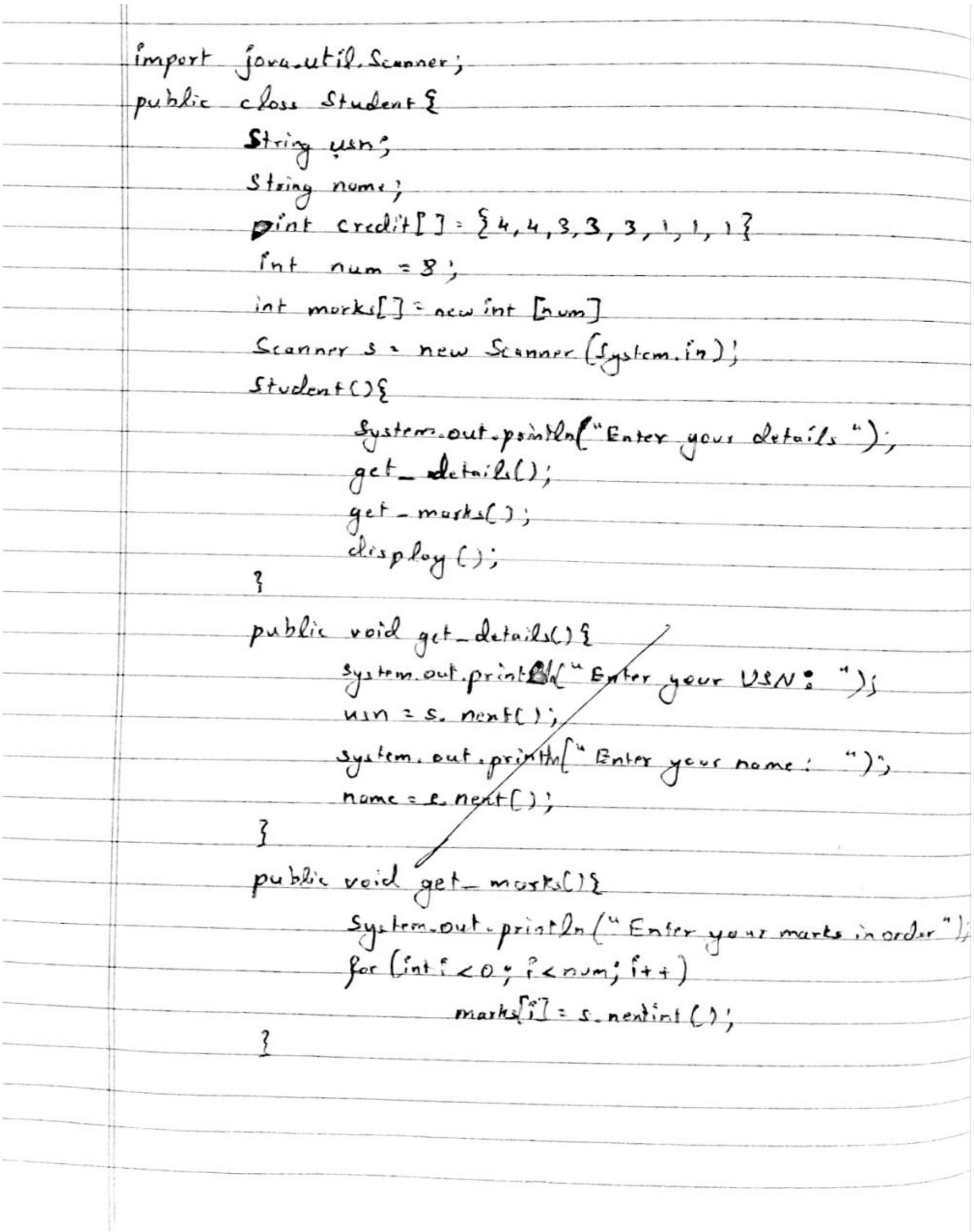
OUTPUT :



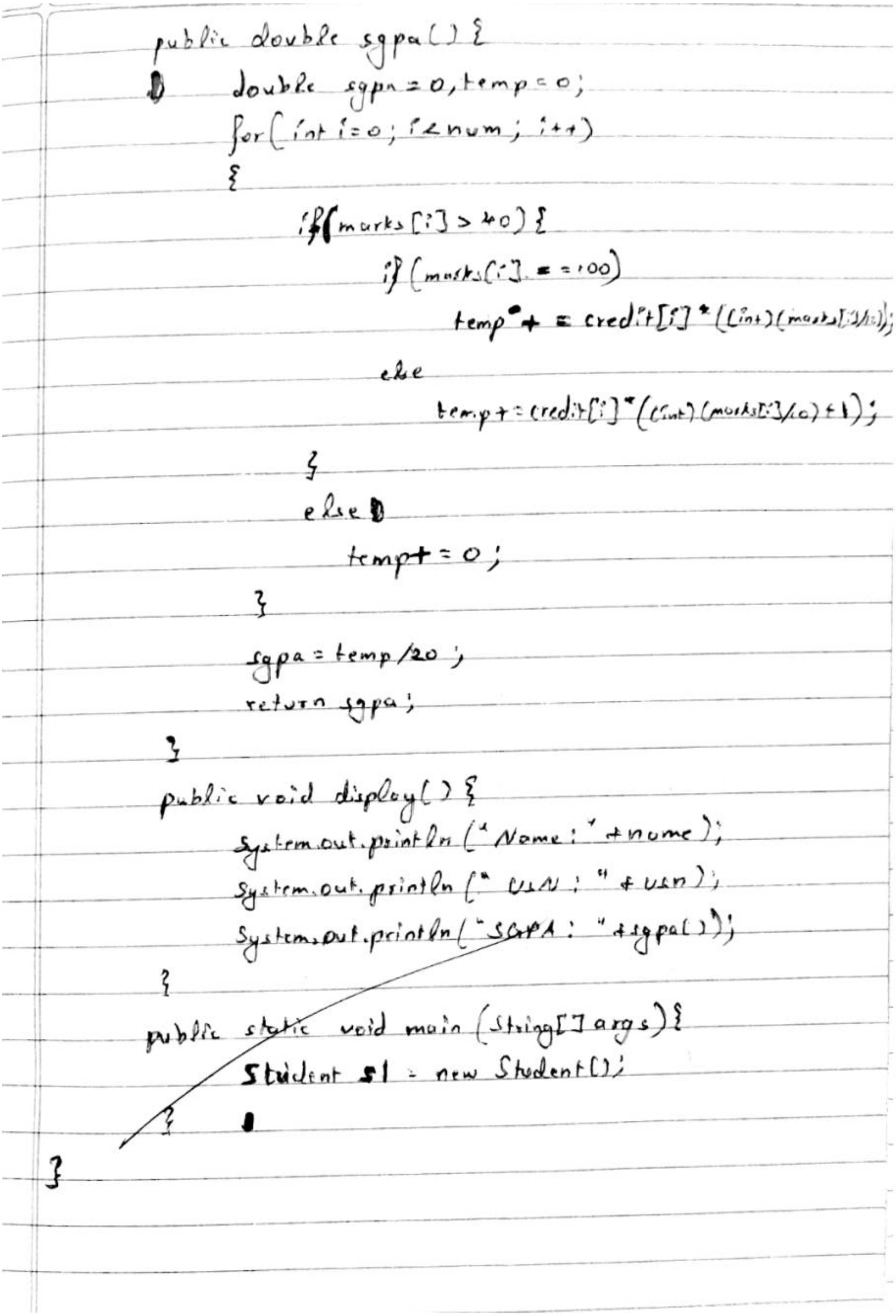
```
C:\Users\Admin\Desktop\1BM22CS044>javac Lab2_1.java

C:\Users\Admin\Desktop\1BM22CS044>java Lab2_1
Anjan C
1BM22CS044


Enter the coefficient
1 1 1
Roots are imaginary

C:\Users\Admin\Desktop\1BM22CS044>java Lab2_1
Anjan C
1BM22CS044


Enter the coefficient
1 4 4
Roots real and equal
-2.0

C:\Users\Admin\Desktop\1BM22CS044>java Lab2_1
Anjan C
1BM22CS044


Enter the coefficient
1 -5 6
Roots are real and distinct
3.0
2.0
```

LAB-2: STUDENT SGPA CALCULATOR

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.

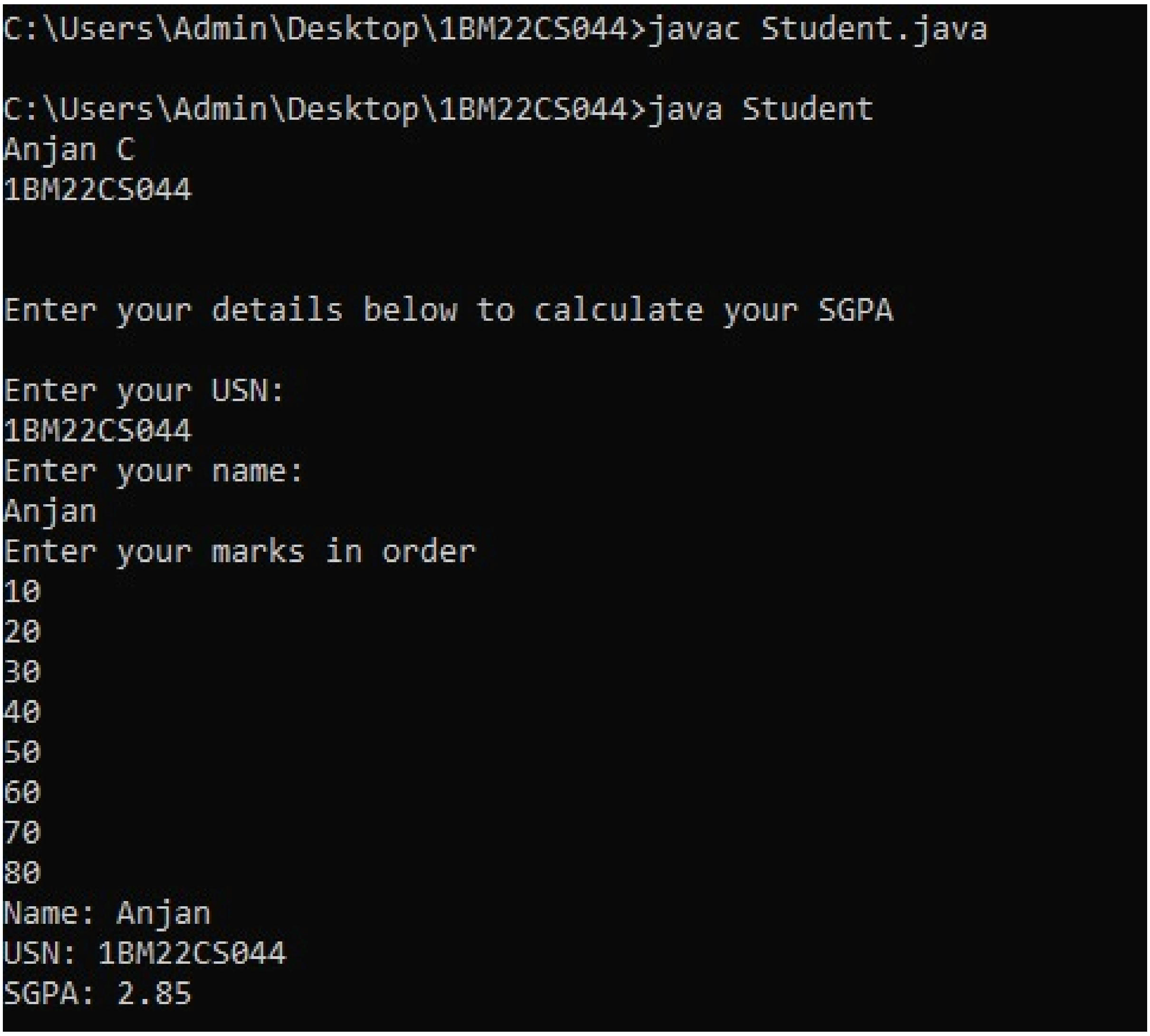


```
import java.util.Scanner;
public class Student{
        String usn;
        String name;
        int credit[] = {4,4,3,3,3,1,1,1}
        int num = 8;
        int marks[] = new int [num]
        Scanner s = new Scanner(System.in);
        Student(){
                System.out.println("Enter your details ");
                get_details();
                get_marks();
                display();
        }
        public void get_details(){
                system.out.println(" Enter your USN: ");
                usn = s.next();
                system.out.println(" Enter your name:  ");
                name = e.next();
        }
        public void get_marks(){
                System.out.println(" Enter your marks in order");
                for (int i<0; i<num; i++)
                        marks[i] = s.nextint();
        }
```



```
public double sgpa() {
        double sgpa=0,temp=0;
        for( int i=0; i<num; i++)
        {
            if(marks[i] > 40) {
                if (marks[i] ==100)
                    temp += credit[i] * ((int)(marks[i]/10));
                else
                    temp+=credit[i]*((int)(marks[i]/10)+1);

            }
            else
              temp+=0;
        }
        sgpa=temp/20;
        return sgpa;
}
public void display() {
        System.out.println ("Name: "+name);
        System.out.println (" USN: " + usn);
        System.out.println("SGPA: "+sgpa());
}
public static void main (String[] args){
        Student s1 = new Student();
    }
}
```

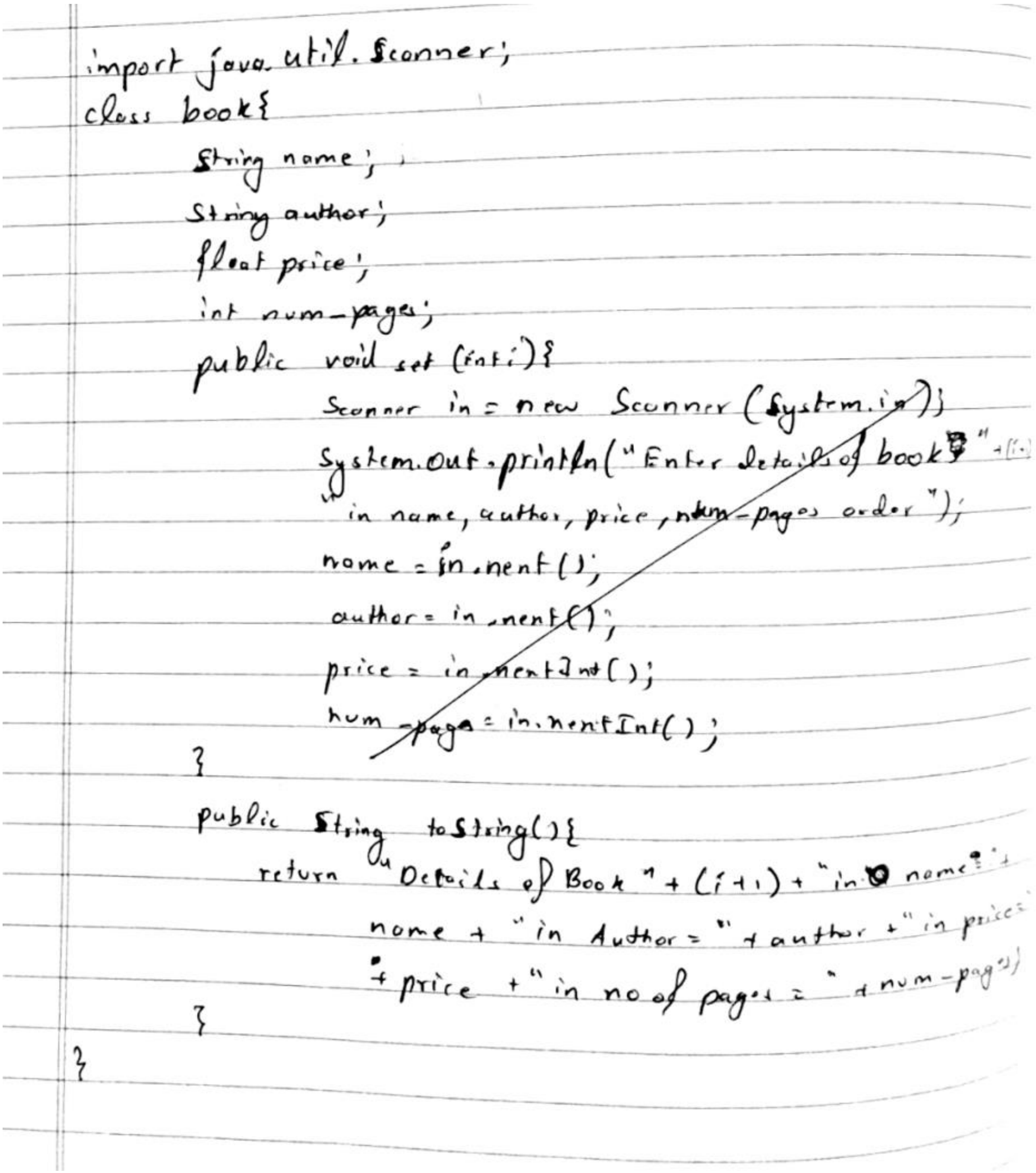
OUTPUT :



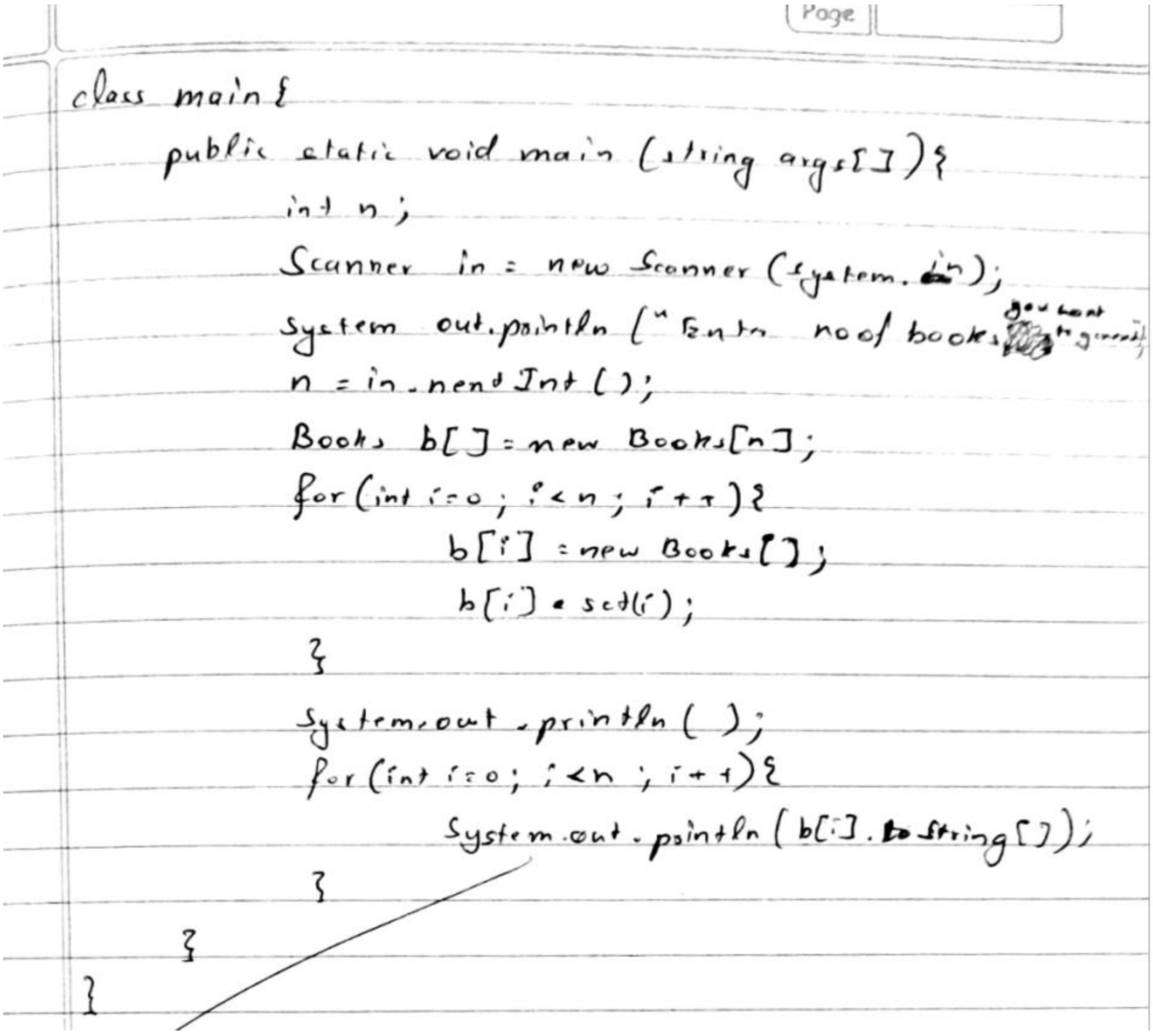
```
C:\Users\Admin\Desktop\1BM22CS044>javac Student.java

C:\Users\Admin\Desktop\1BM22CS044>java Student
Anjan C
1BM22CS044


Enter your details below to calculate your SGPA

Enter your USN:
1BM22CS044
Enter your name:
Anjan
Enter your marks in order
10
20
30
40
50
60
70
80
Name: Anjan
USN: 1BM22CS044
SGPA: 2.85
```

LAB-3: BOOK DETAILS

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.



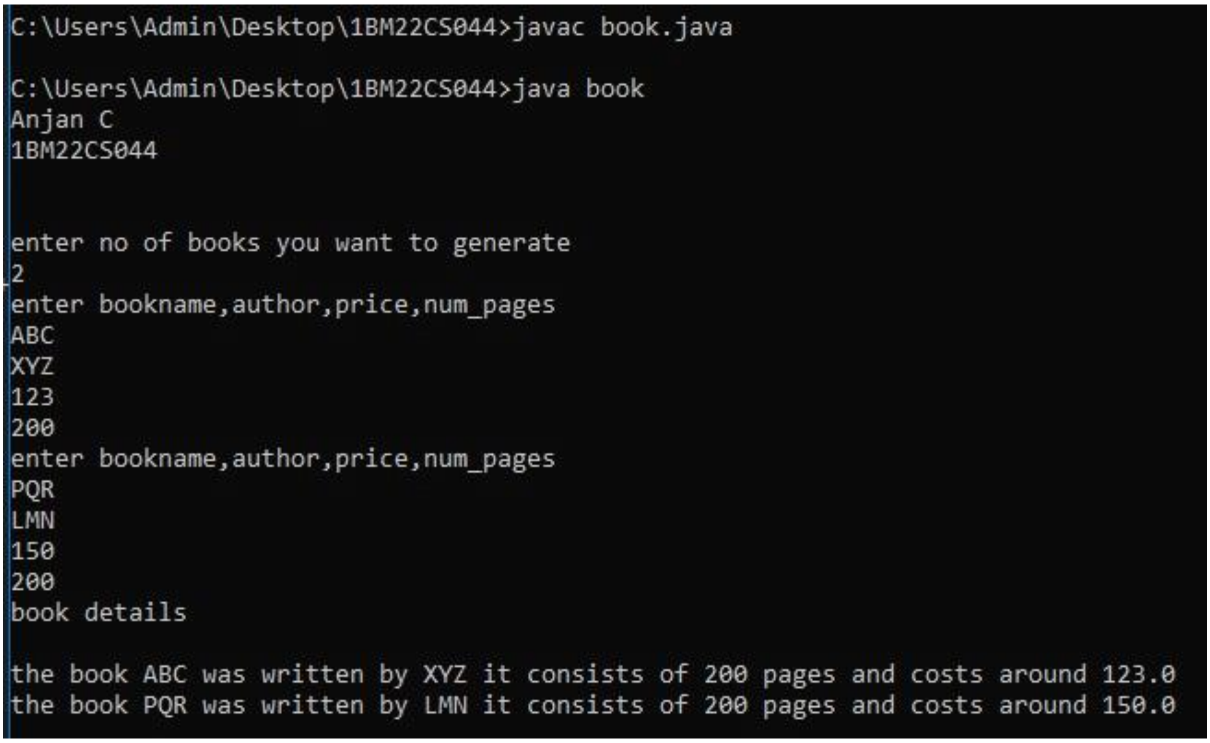
```
import java.util.Scanner;
class book{
        String name;
        String author;
        float price;
        int num-pages;
        public void set (int i){
                Scanner in = new Scanner (System.in);
                System.out.println("Enter details of book" +(i+1)+
                 "in name, author, price, num-pages order");
                name = in.next();
                 author= in.next();
                price = in.nextInt();
                num-page = in.nextInt();
        }
        public String toString(){
            return "Details of Book " + (i+1) + "in name="+
                    name + "in Author = " + author + "in price=
                    "+ price + "in no of pages = " + num-pages;
        }
}
```



Page

```
class main{
    public static void main (string args[]){
        int n;
        Scanner in = new Scanner (System.in);
        System out.println (" Enter no of books you want to generate");
        n = in.nextInt ();
        Books b[] = new Books[n];
        for(int i=0; i<n; i++){
                b[i] = new Books[];
                b[i] . set(i);
        }
        System.out.println ( );
        for(int i=0; i<n; i++){
                System.out.println (b[i]. toString[]);
        }
    }
}
```

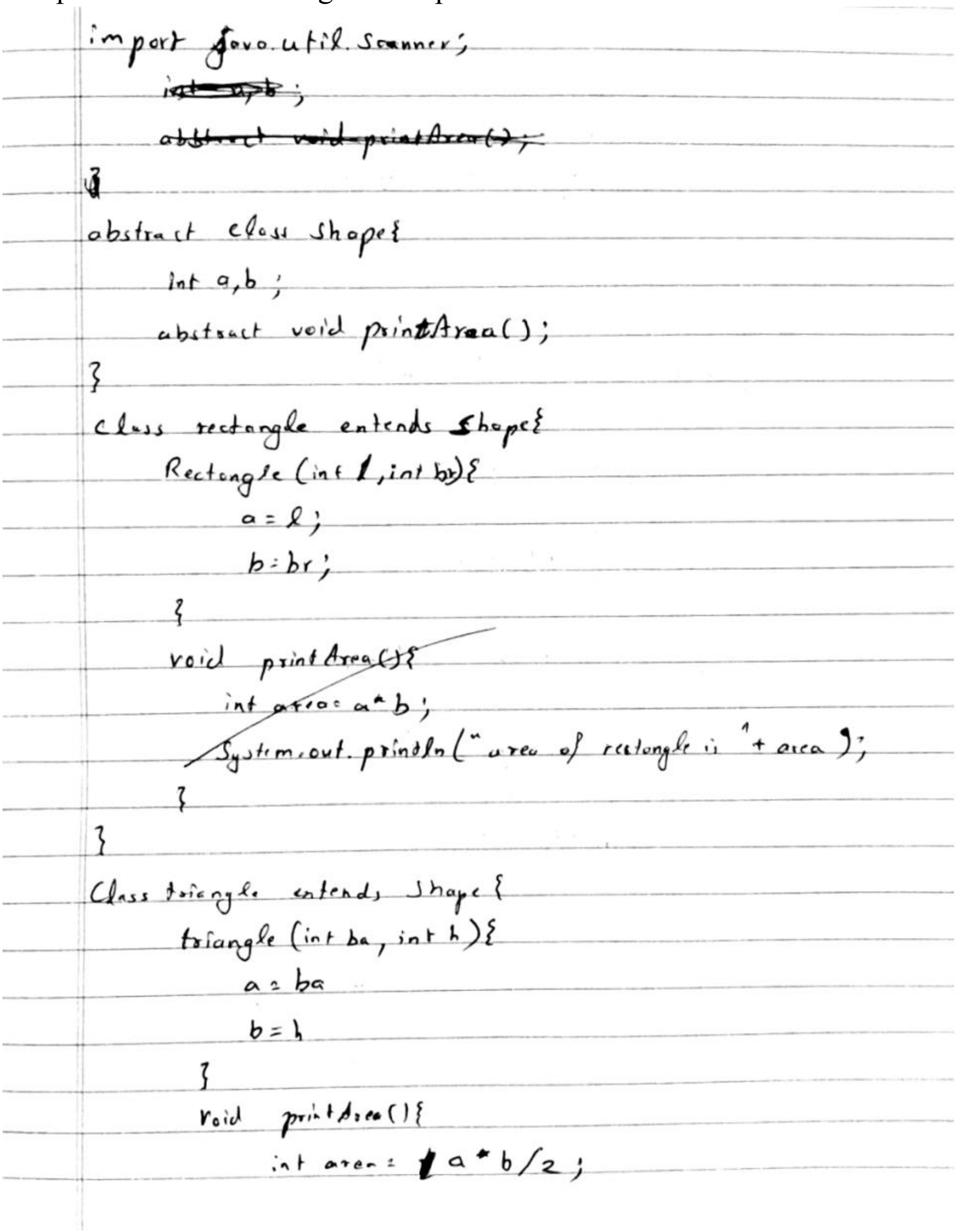
OUTPUT :



```
C:\Users\Admin\Desktop\1BM22CS044>javac book.java

C:\Users\Admin\Desktop\1BM22CS044>java book
Anjan C
1BM22CS044


enter no of books you want to generate
2
enter bookname,author,price,num_pages
ABC
XYZ
123
200
enter bookname,author,price,num_pages
PQR
LMN
150
200
book details

the book ABC was written by XYZ it consists of 200 pages and costs around 123.0
the book PQR was written by LMN it consists of 200 pages and costs around 150.0
```

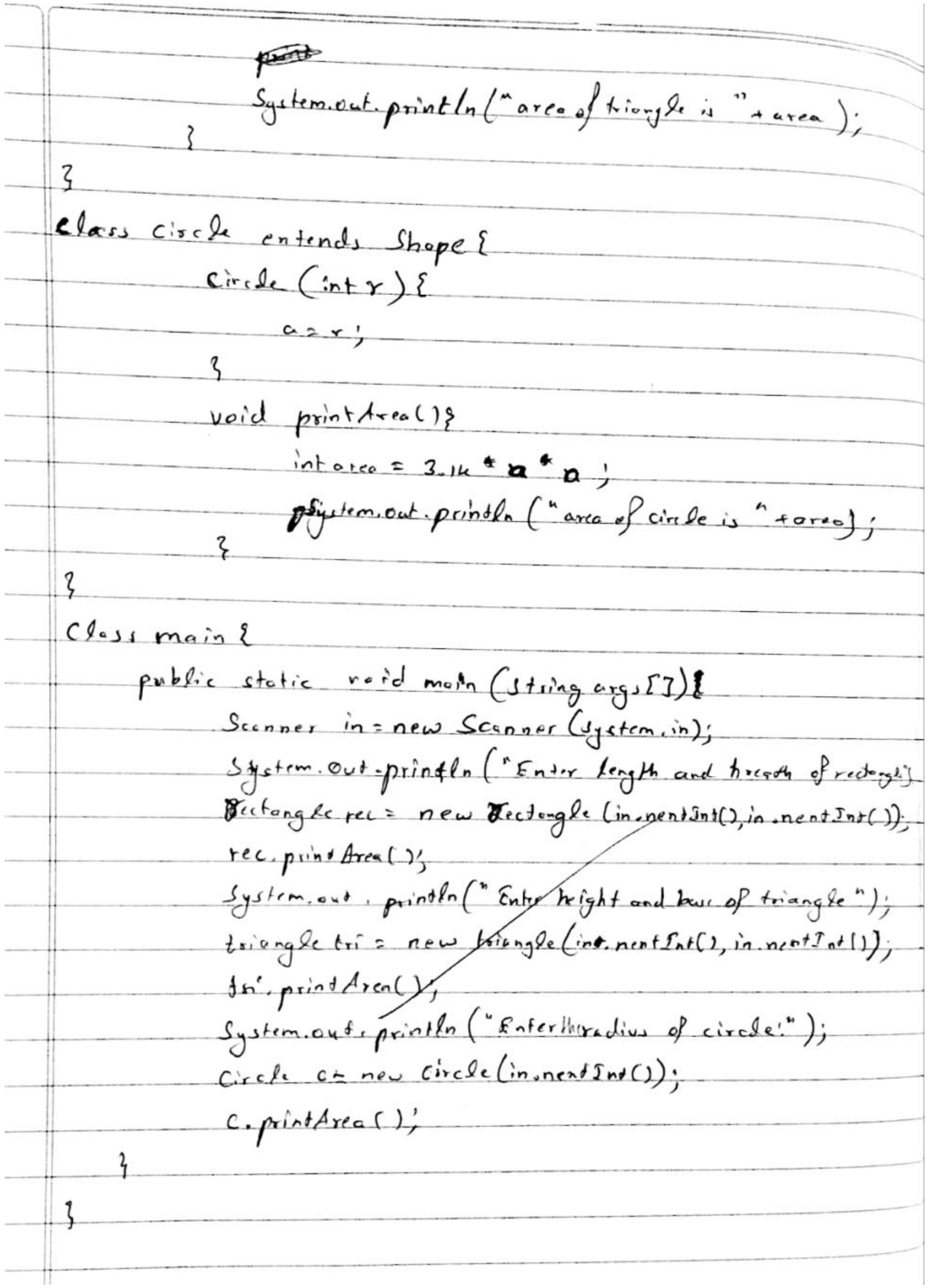
LAB-4: AREA CALCULATION

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 shap



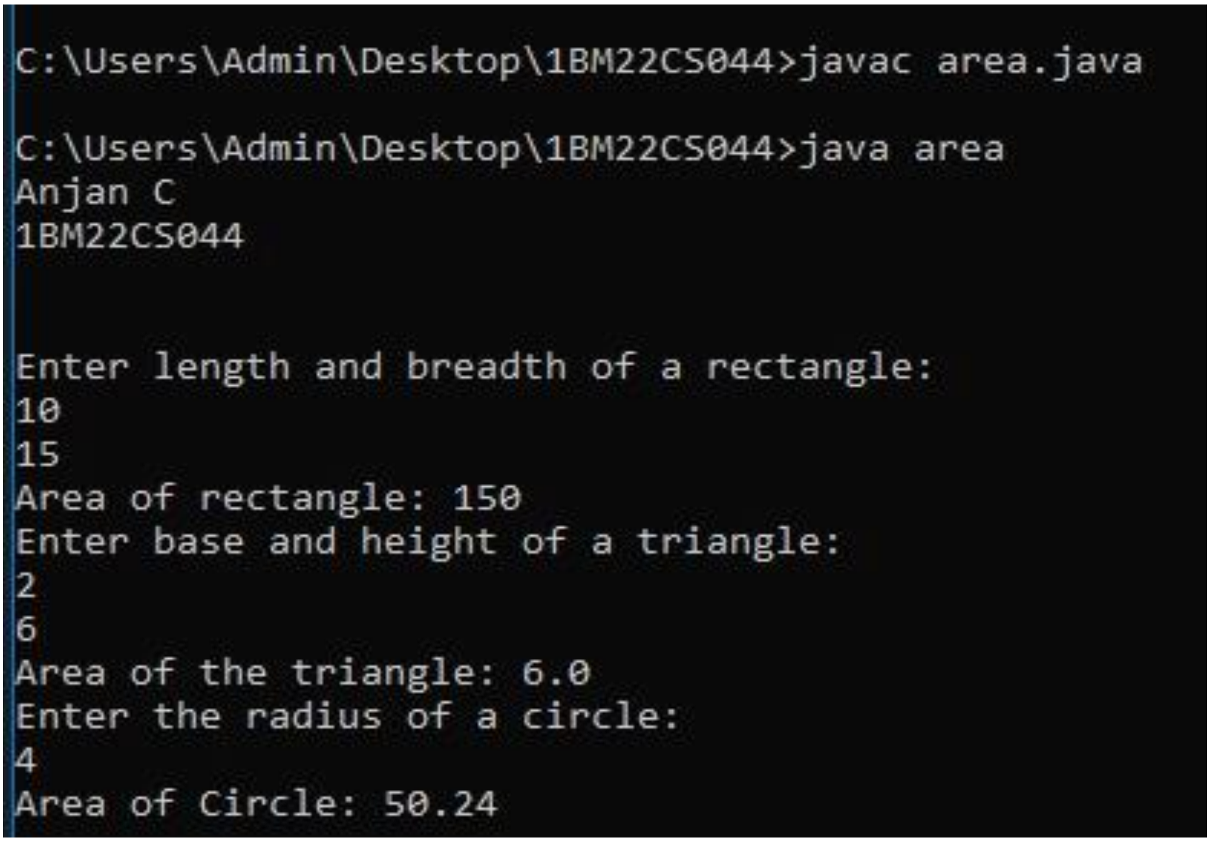
```
import jovo.util.Scanner;
        ~~int a,b~~;
        ~~abstract void printArea();~~
}
abstract class Shape{
        int a,b ;
        abstsact void printArea();
}
Class rectangle entends Shape{
        Rectangle (int l,int br){
                a=l;
                b=br;
        }
        void printArea(){
                int area= a*b;
                System.out.println(" area of rectangle is "+ area );
        }
}
Class triangle entends Shape{
        triangle (int ba, int h){
                a= ba
                b=h
        }
        void printArea(){
                int area= a*b/2;
```

e



```
            ~~print~~
            System.out.println("area of triangle is " + area);
        }
}
class circle entends Shape{
        Circle (int r){
            a=r;
        }
        void printArea(){
            int area = 3.14 * a * a;
            System.out.println ("area of circle is " +area);
        }
}
Class main {
    public static void main (String args[]){
        Scanner in = new Scanner (System.in);
        System.out.println ("Enter length and breath of rectangle");
        Rectangle rec = new Rectangle (in.nentInt(), in.nentInt());
        rec.printArea();
        System.out.println(" Enter height and base of triangle ");
        triangle tri = new triangle(in.nentInt(), in.nentInt());
        tri.printArea();
        System.out.println ("Enter the radius of circle:");
        Circle c= new Circle(in.nentInt());
        c.printArea();
    }
}
```

OUTPUT :



```
C:\Users\Admin\Desktop\1BM22CS044>javac area.java

C:\Users\Admin\Desktop\1BM22CS044>java area
Anjan C
1BM22CS044


Enter length and breadth of a rectangle:
10
15
Area of rectangle: 150
Enter base and height of a triangle:
2
6
Area of the triangle: 6.0
Enter the radius of a circle:
4
Area of Circle: 50.24
```

LAB-5: BANK ACCOUNT DETAILS

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:

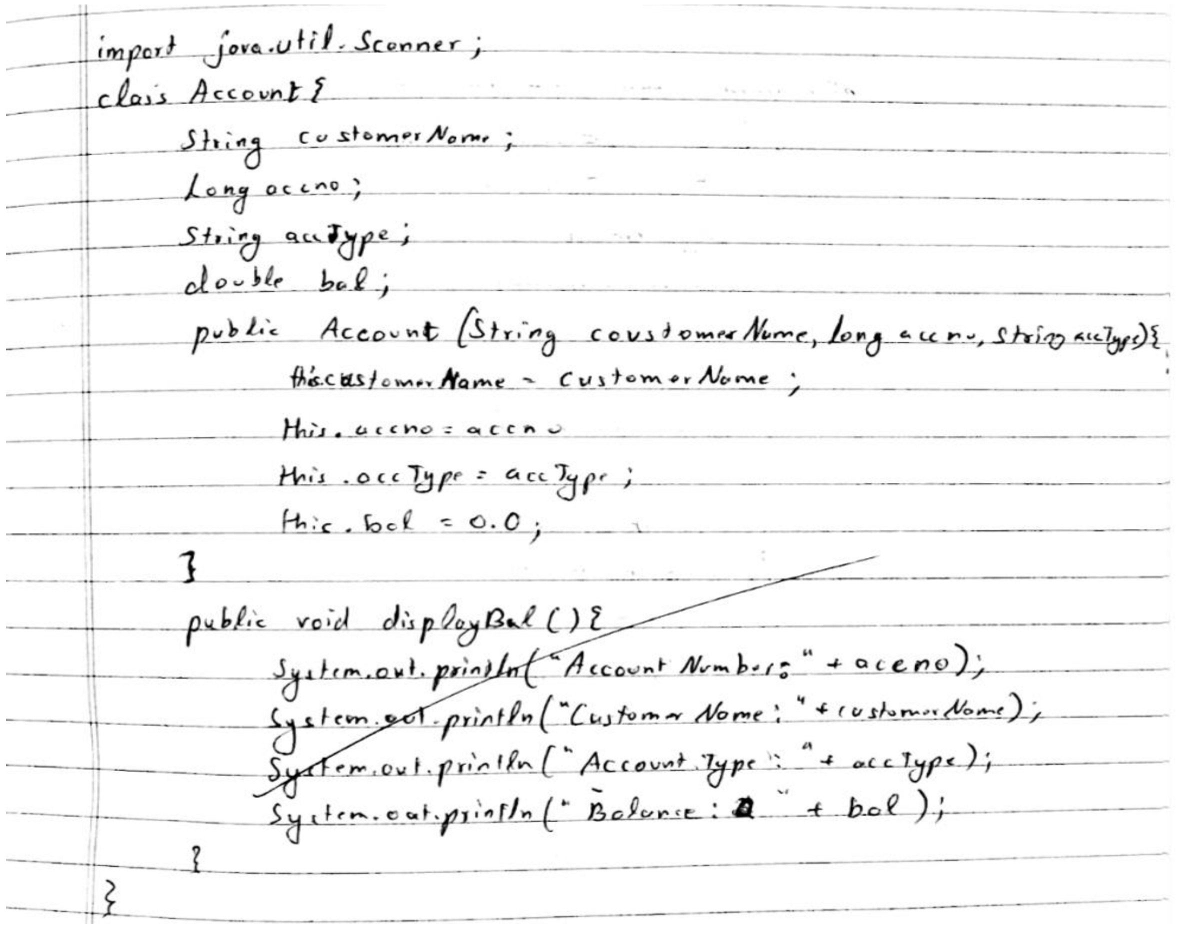
a) Accept deposit from customer and update the balance.

b) Display the balance.

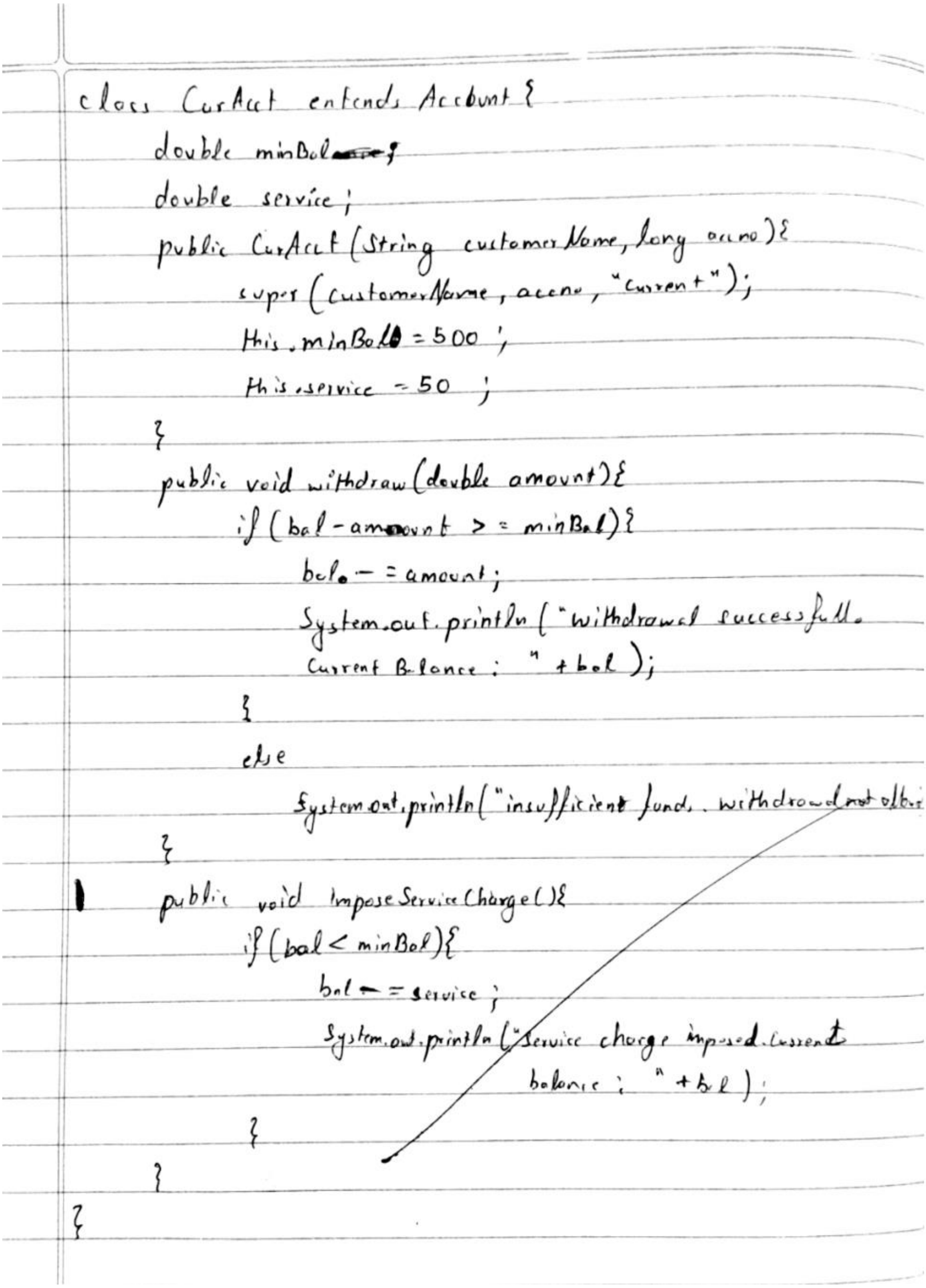
c) Compute and deposit interest

d) Permit withdrawal and update the balance

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

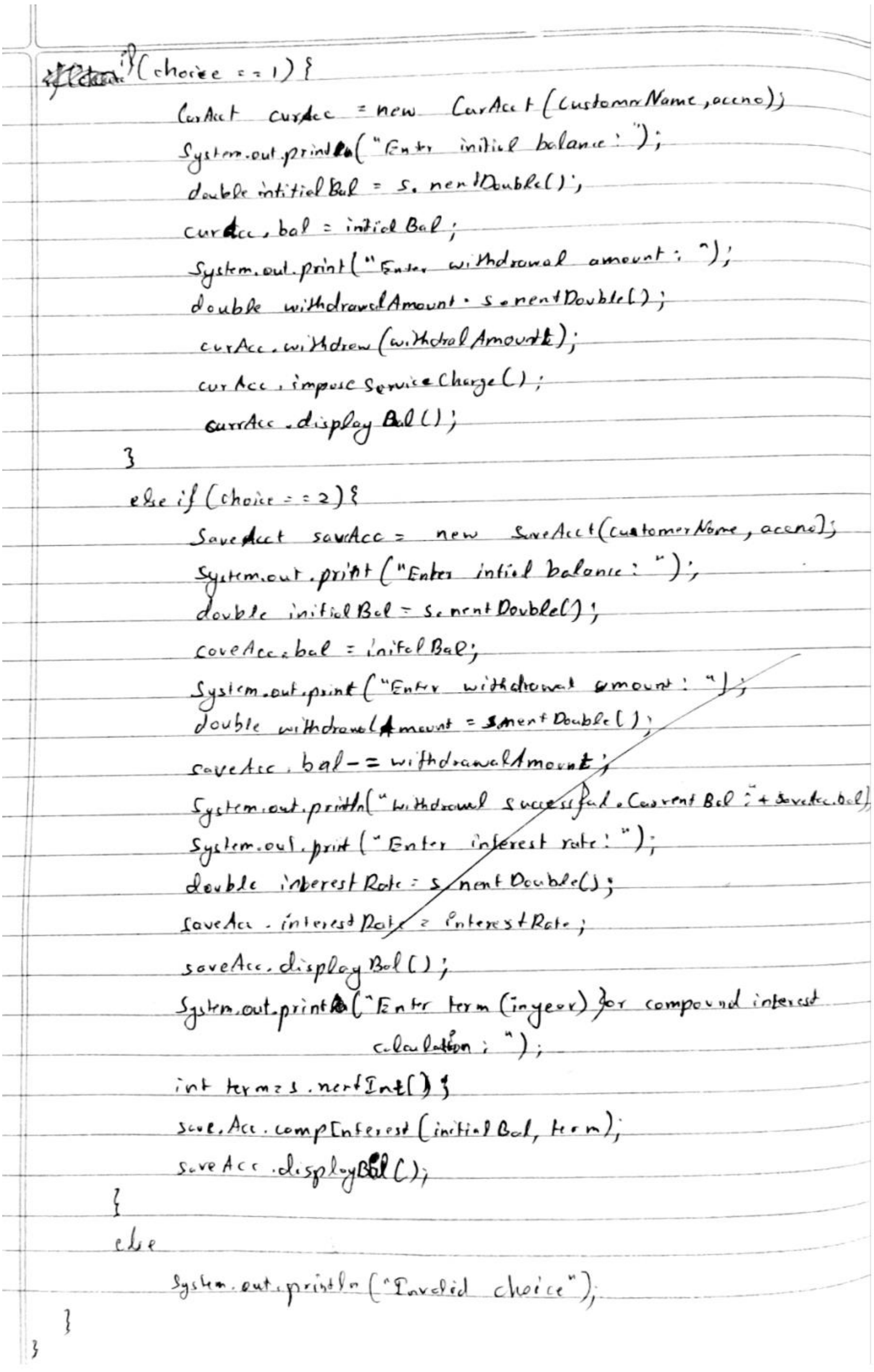


```
import java.util.Scanner;
class Account{
    String customerName;
    Long accno;
    String accType;
    double bal;
    public Account(String coustomerName, long accno, String accType){
        this.customerName = customerName;
        this.accno = accno
        this.accType = accType;
        this.bal = 0.0;
    }
    public void displayBal(){
        System.out.println("Account Number: " + accno);
        System.out.println("Customer Name: " + customerName);
        System.out.println("Account Type: " + accType);
        System.out.println("Balance: " + bal);
    }
}
```



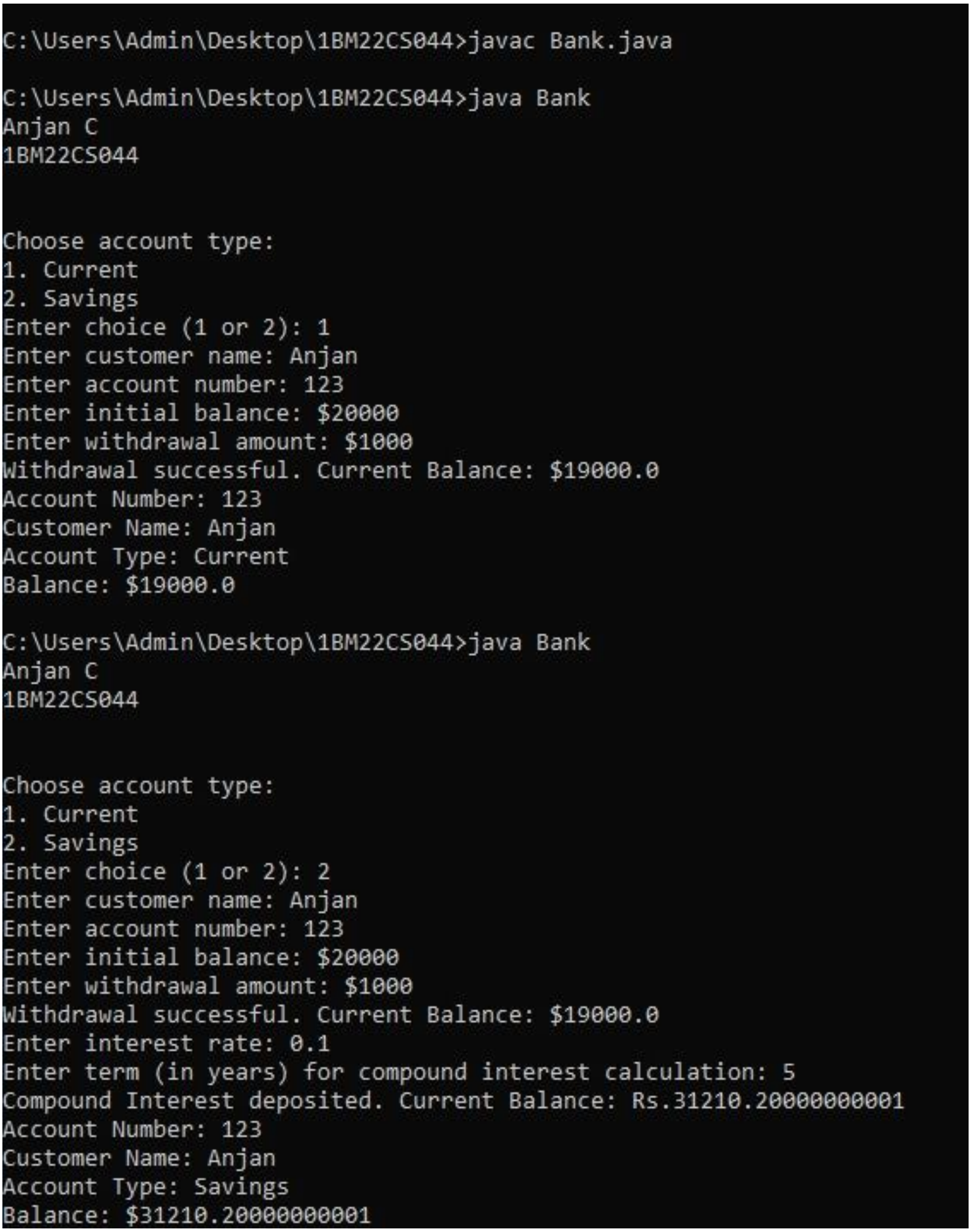
```
class CurAcct extends Account {
    double minBal;
    double service;
    public CurAcct(String customerName, long accno){
        super(customerName, accno, "current");
        this.minBal = 500 ;
        this.service = 50 ;
    }
    public void withdraw(double amount){
        if (bal-amount >= minBal){
            bal -= amount;
            System.out.println("withdrawal successfull.
            Current Balance : " + bal );
        }
        else
            System.out.println("insufficient fund. withdrowal not allo
    }
    public void ImposeServiceCharge(){
        if(bal < minBal){
            bal -= service ;
            System.out.println("Service charge imposed. Current
                          balance : " + bal );
        }
    }
}
```

```
class SavAcct extends Account {
      double intrestRate;
      public SavAcct (String customerName, long accno){
            super (customerName, accno, "savings");
             this.interestRate = 0.05;
      }
      ~~public void compintrest(double initial int Amount~~, ~~int term){~~
      . ~~doub~~
      public void depositIntrest(){
            double intrest = bal * intrestRate;
            bal += intrest;
            System.out.println("intrest deposited. Current Balance: " + bal);
      }
      public void compIntrest (double intialAmount, int term){
            double compintrest = initialAmount * Math.pow((1+intrestRate), term)
                                    - initialAmount;
            bal+ = compintrest;
            System.out.println("Compound Intrest deposited.
                                    Current Balance: " + bal);
      }
}
class Bank {
      public static void main (String args[]){
            Scanner s = new Scanner(System.in);
            System.out.println("Choose acc type");
            System.out.println("1. Current  2. Saving");
            int choice = s.nextInt();
            System.out.print("Enter customer name: ");
            String customerName = s.next();
            System.out.print("Enter acc number: ");
            long accno = s.nextLong();
```



```
if(choice ==1){
        CurAcct curAcc = new CurAcct(customerName,accno);
        System.out.println("Enter initial balance: ");
        double intitialBal = s.nextDouble();
        curAcc.bal = initialBal;
        System.out.print("Enter withdrawal amount: ");
        double withdrawalAmount = s.nextDouble();
        curAcc.withdraw(withdralAmount);
        curAcc.imposeServiceCharge();
        currAcc.displayBal();
    }
    else if(choice==2){
        SaveAcct savAcc = new SaveAcct(customerName, accno);
        System.out.print("Enter intial balance: ");
        double initialBal = s.nextDouble();
        coveAcc.bal = inifelBal;
        System.out.print("Enter withdrawal amount: ");
        double withdrawalAmount = s.nextDouble();
        saveAcc.bal-= withdrawalAmount;
        System.out.println("Withdrawal successful.Current Bal :"+saveAcc.bal);
        System.out.print("Enter interest rate:");
        double inberestRate = s.nextDouble();
        saveAcc.interestRate = interestRate;
        saveAcc.displayBal();
        System.out.print("Enter term (inyear) for compound interest
                        calculation : ");
        int term=s.nextInt()}
        save.Acc.compInterest(initialBal, term);
        saveAcc.displayBal();
    }
    else
        System.out.println("Invalid choice");
  }
}
```

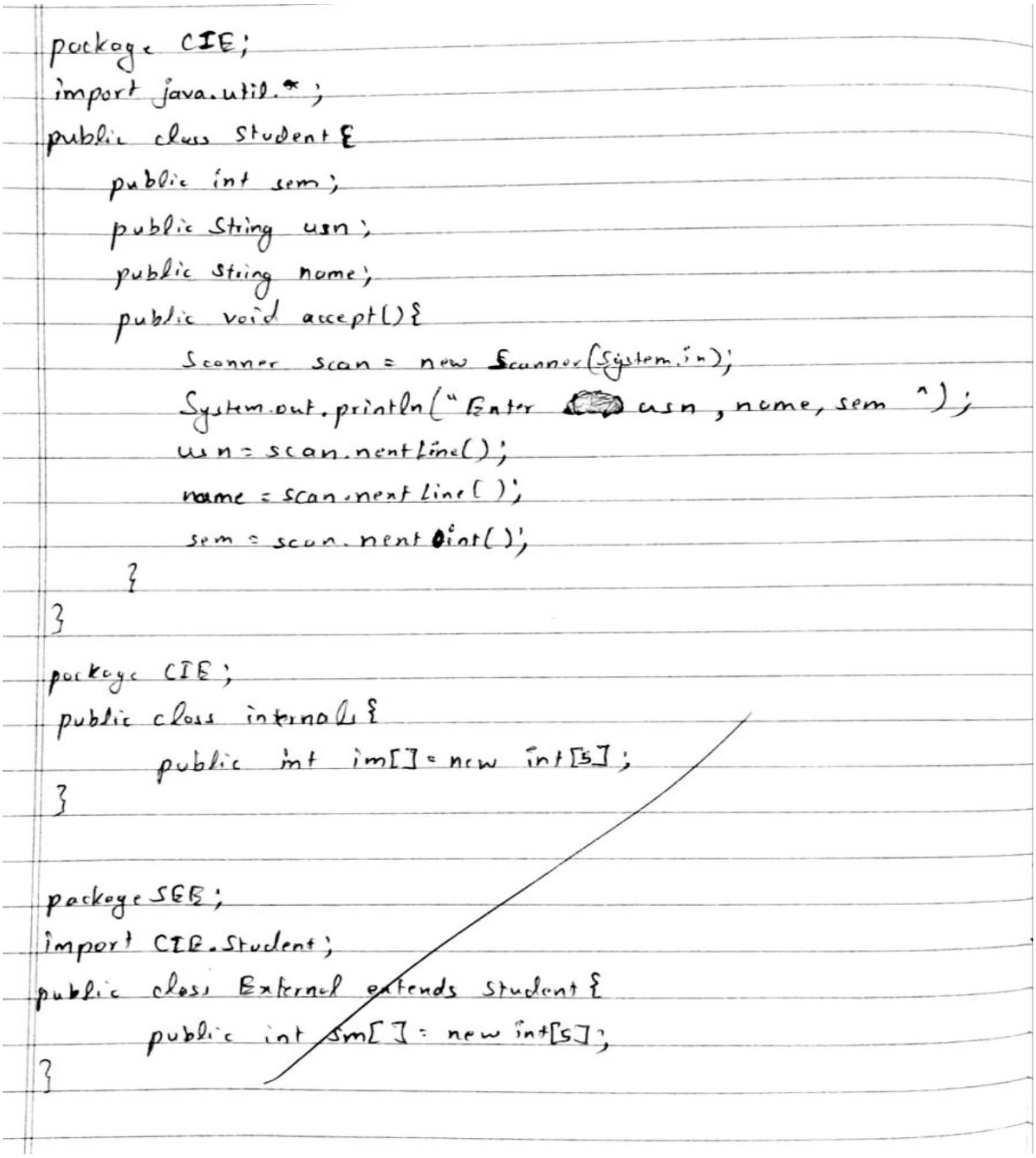
OUTPUT :



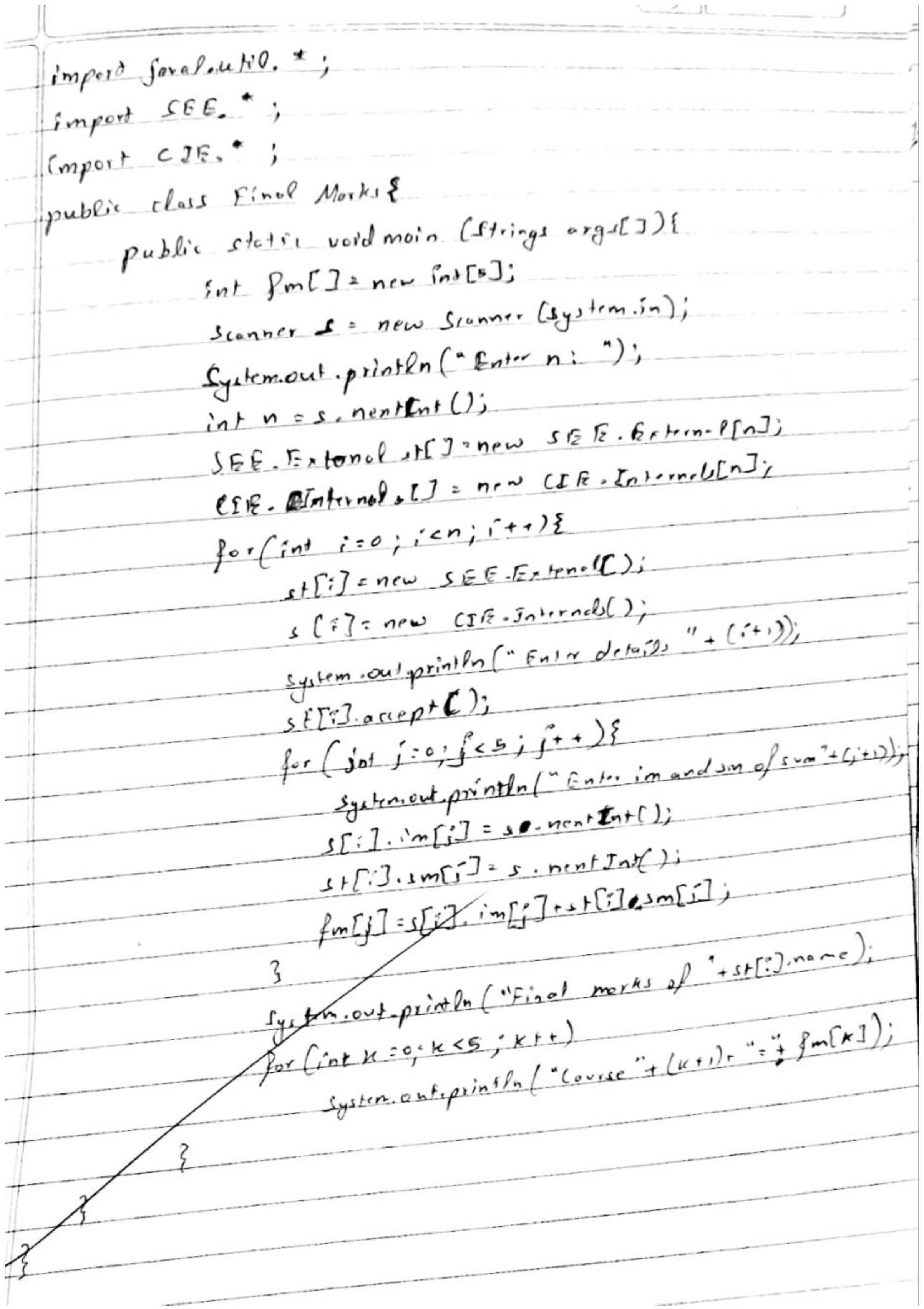
```
C:\Users\Admin\Desktop\1BM22CS044>javac Bank.java

C:\Users\Admin\Desktop\1BM22CS044>java Bank
Anjan C
1BM22CS044


Choose account type:
1. Current
2. Savings
Enter choice (1 or 2): 1
Enter customer name: Anjan
Enter account number: 123
Enter initial balance: $20000
Enter withdrawal amount: $1000
Withdrawal successful. Current Balance: $19000.0
Account Number: 123
Customer Name: Anjan
Account Type: Current
Balance: $19000.0

C:\Users\Admin\Desktop\1BM22CS044>java Bank
Anjan C
1BM22CS044


Choose account type:
1. Current
2. Savings
Enter choice (1 or 2): 2
Enter customer name: Anjan
Enter account number: 123
Enter initial balance: $20000
Enter withdrawal amount: $1000
Withdrawal successful. Current Balance: $19000.0
Enter interest rate: 0.1
Enter term (in years) for compound interest calculation: 5
Compound Interest deposited. Current Balance: Rs.31210.20000000001
Account Number: 123
Customer Name: Anjan
Account Type: Savings
Balance: $31210.20000000001
```

LAB-6: CALCULATION OF MARKS

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.

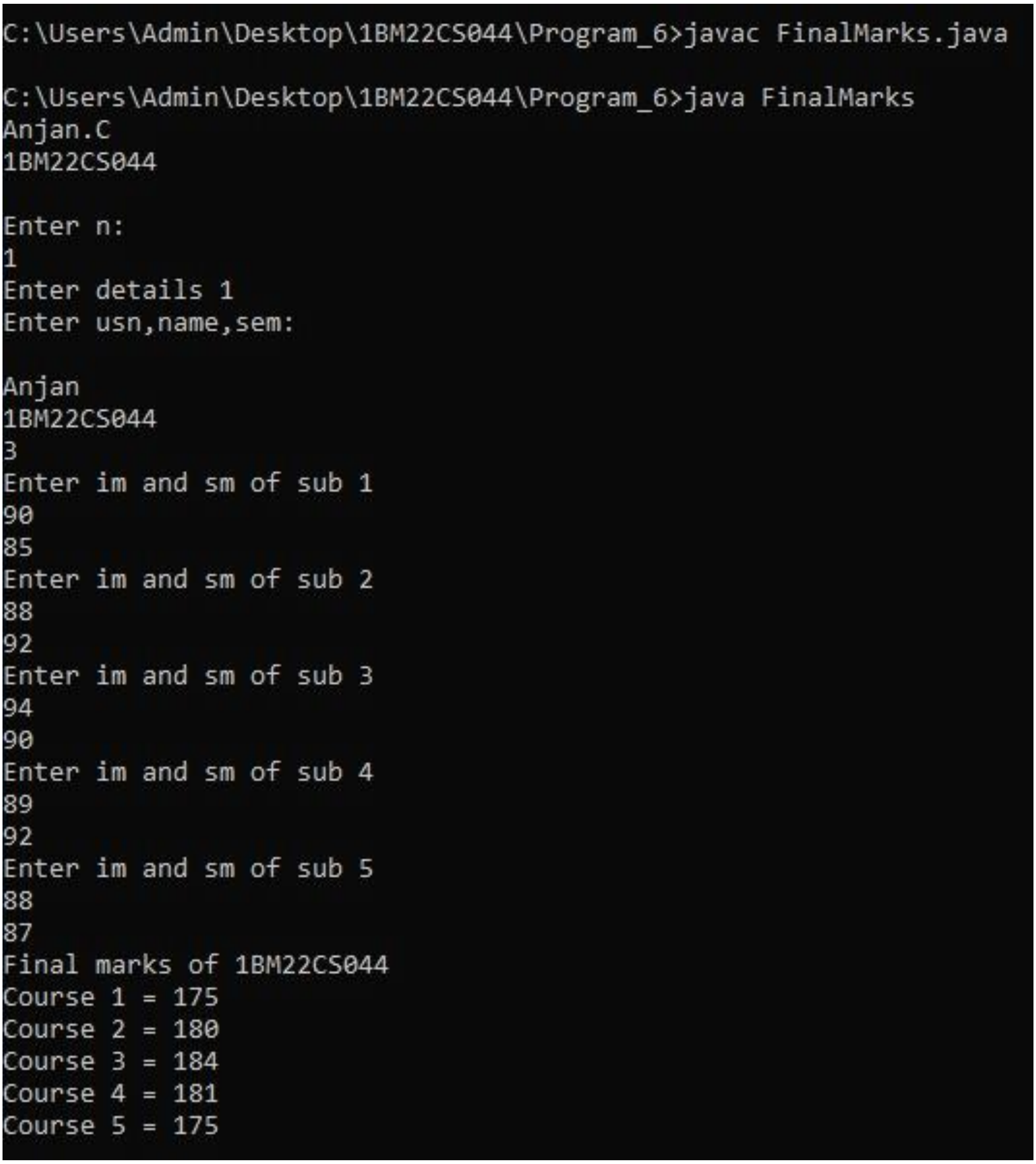


```
package CIE;
import java.util.*;
public class Student{
    public int sem;
    public String usn;
    public String name;
    public void accept(){
        Scanner scan = new Scanner(System.in);
        System.out.println("Enter usn, name, sem ");
        usn = scan.nextLine();
        name = scan.nextLine();
        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 Final Marks{
        public static void main (Strings args[]){
                int fm[] = new int[5];
                Scanner s = new Scanner (System.in);
                Sytem.out.println("Enter n: ");
                int n = s.nextInt();
                SEE.Extenol st[] = new SEE.External[n];
                CIE.Internal s[] = new CIE.Internals[n];
                for(int i=0; i<n; i++){
                        st[i] = new SEE.Extenol();
                        s [i] = new CIE.Internals();
                        System.out.println("Entr details " + (i+1));
                        st[i].accept();
                        for (int j=0; j<5; j++){
                                System.out.println("Enter im and sm of sum "+(j+1));
                                s[i].im[j] = s.nextInt();
                                st[i].sm[j] = s.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]);
                }
        }
}
```

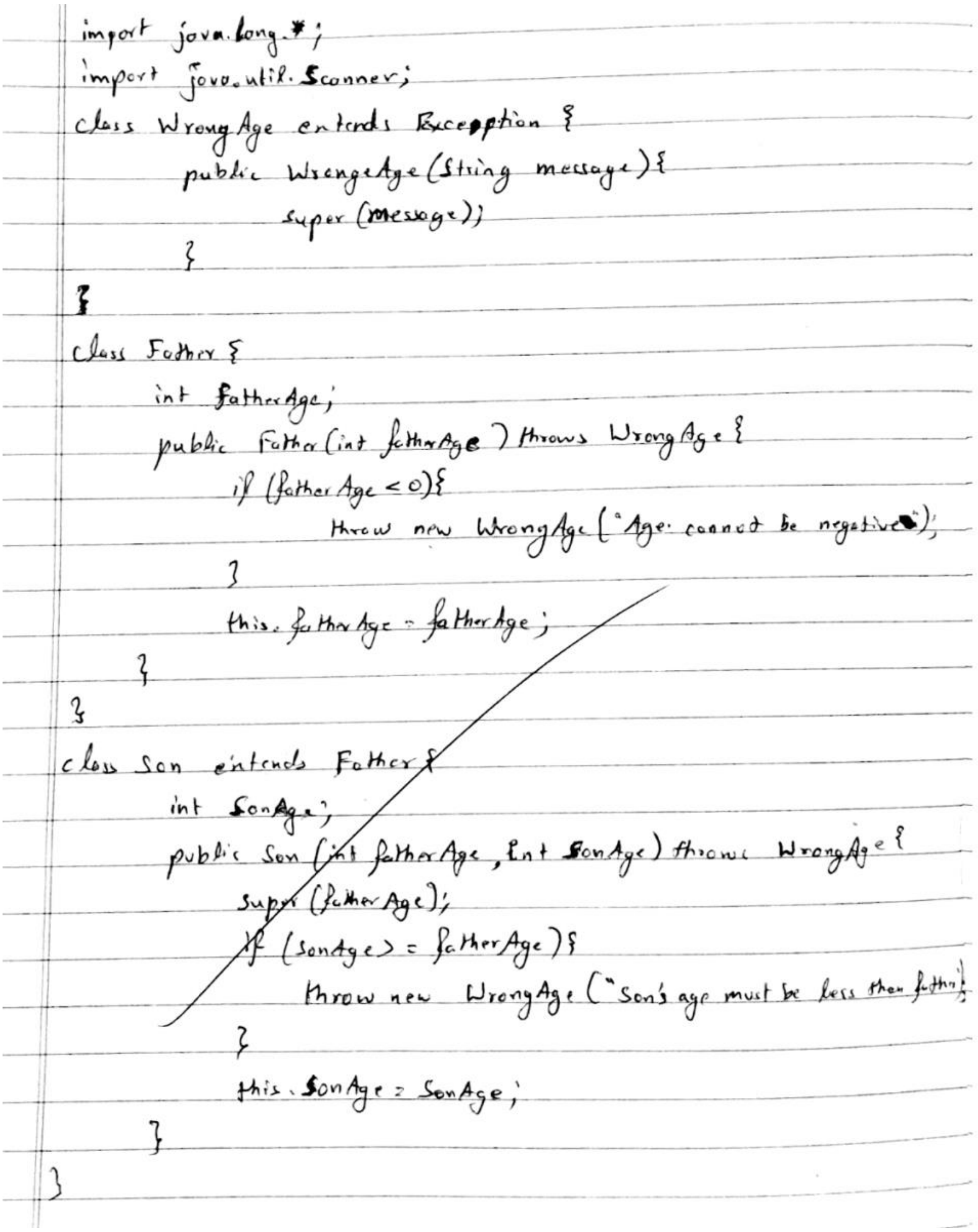
OUTPUT :



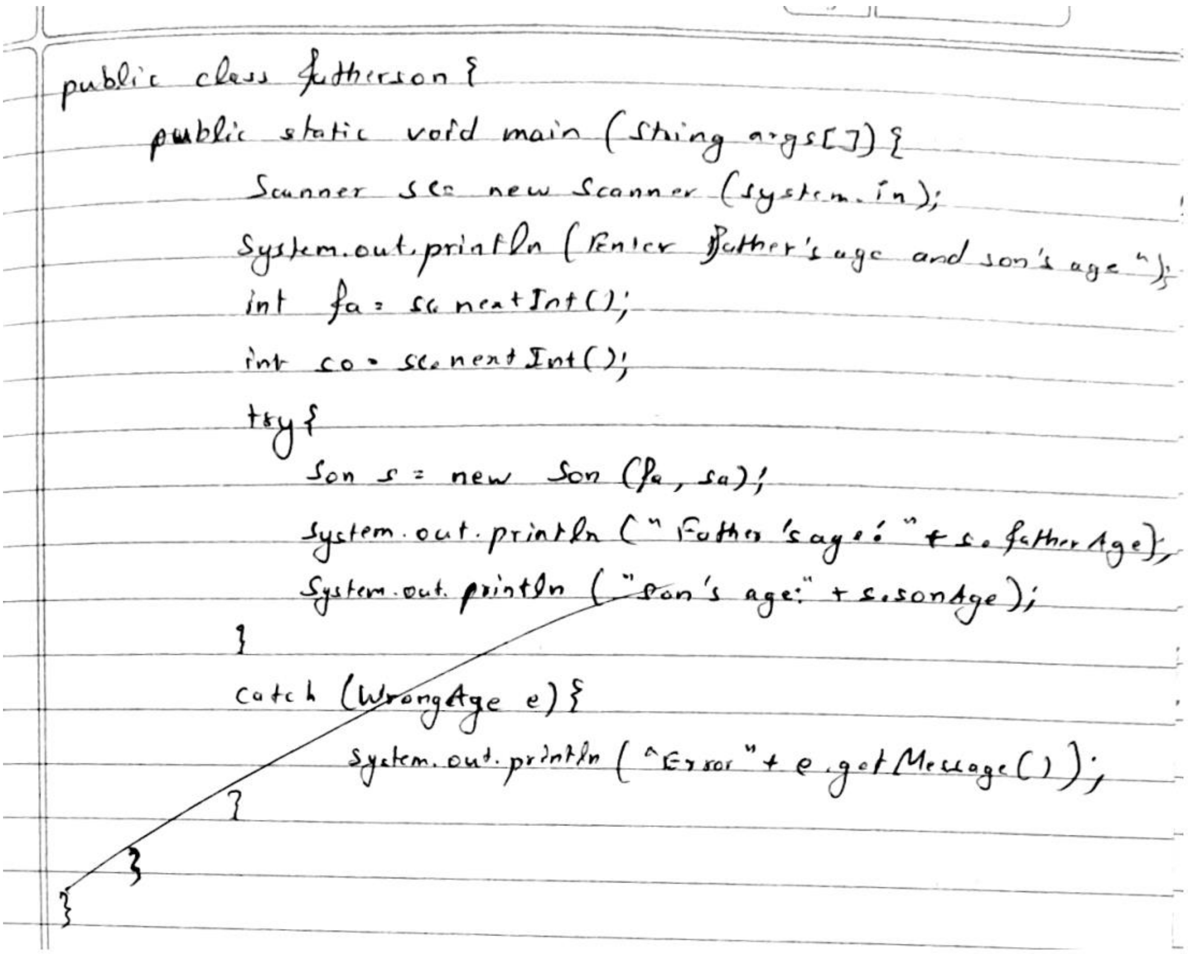
```
C:\Users\Admin\Desktop\1BM22CS044\Program_6>javac FinalMarks.java

C:\Users\Admin\Desktop\1BM22CS044\Program_6>java FinalMarks
Anjan.C
1BM22CS044

Enter n:
1
Enter details 1
Enter usn,name,sem:

Anjan
1BM22CS044
3
Enter im and sm of sub 1
90
85
Enter im and sm of sub 2
88
92
Enter im and sm of sub 3
94
90
Enter im and sm of sub 4
89
92
Enter im and sm of sub 5
88
87
Final marks of 1BM22CS044
Course 1 = 175
Course 2 = 180
Course 3 = 184
Course 4 = 181
Course 5 = 175
```

LAB-7: EXCEPTION HANDLING

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.

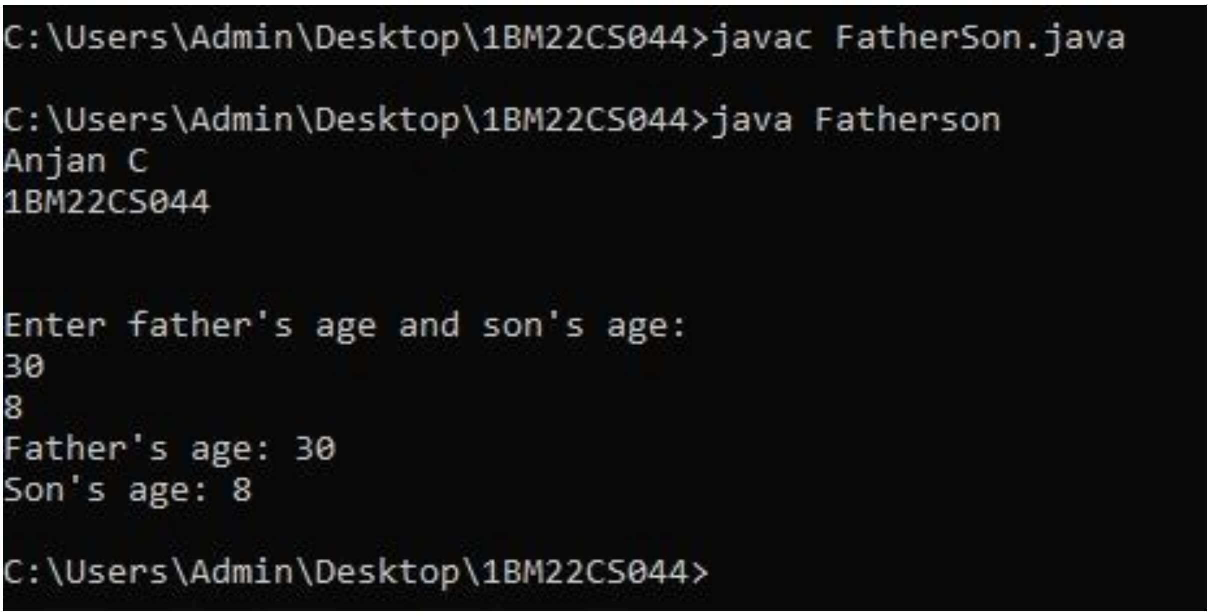


```
import java.lang.*;
import java.util.Scanner;
class WrongAge extends Exception {
        public WrongeAge(String message){
                super(message));
        }
}
class Father {
    int fatherAge;
    public Father(int fatherAge ) throws WrongAge {
        if (fatherAge < 0){
                Throw new WrongAge("Age cannot be negative");
        }
        this.fatherAge = fatherAge;
    }
}
class Son extends Father{
    int SonAge;
    public Son (int fatherAge, int SonAge) throws WrongAge{
        super(fatherAge);
        if (SonAge>=fatherAge){
            throw new WrongAge("Son's age must be less then father");
        }
        this.SonAge = SonAge;
    }
}
```



```
public class fatherson {
    public static void main (String args[]) {
        Scanner sc= new Scanner (system.in);
        System.out.println ("Enter father's age and son's age");
        int fa= sc.nextInt();
        int co= sc.nextInt();
        try{
            Son s = new Son (fa, sa);
            System.out.println (" Father's age: " + s.fatherAge);
            System.out.println ("Son's age:" + s.sonAge);
        }
        catch (WrongAge e){
            System.out.println ("Error" + e.getMessage());
        }
    }
}
```

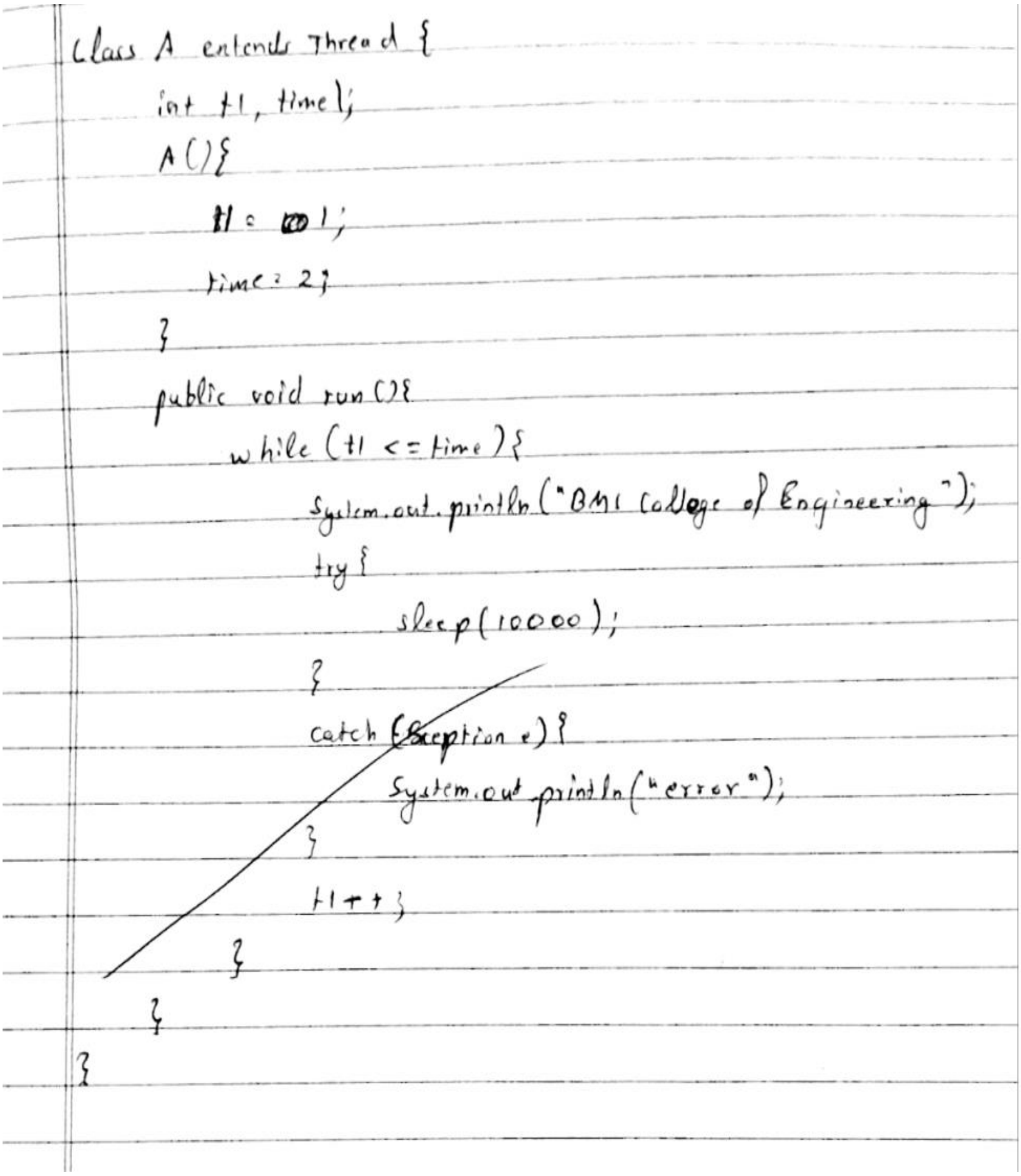
OUTPUT :



```
C:\Users\Admin\Desktop\1BM22CS044>javac FatherSon.java

C:\Users\Admin\Desktop\1BM22CS044>java Fatherson
Anjan C
1BM22CS044


Enter father's age and son's age:
30
8
Father's age: 30
Son's age: 8

C:\Users\Admin\Desktop\1BM22CS044>
```

LAB-8: MULTITHREADING

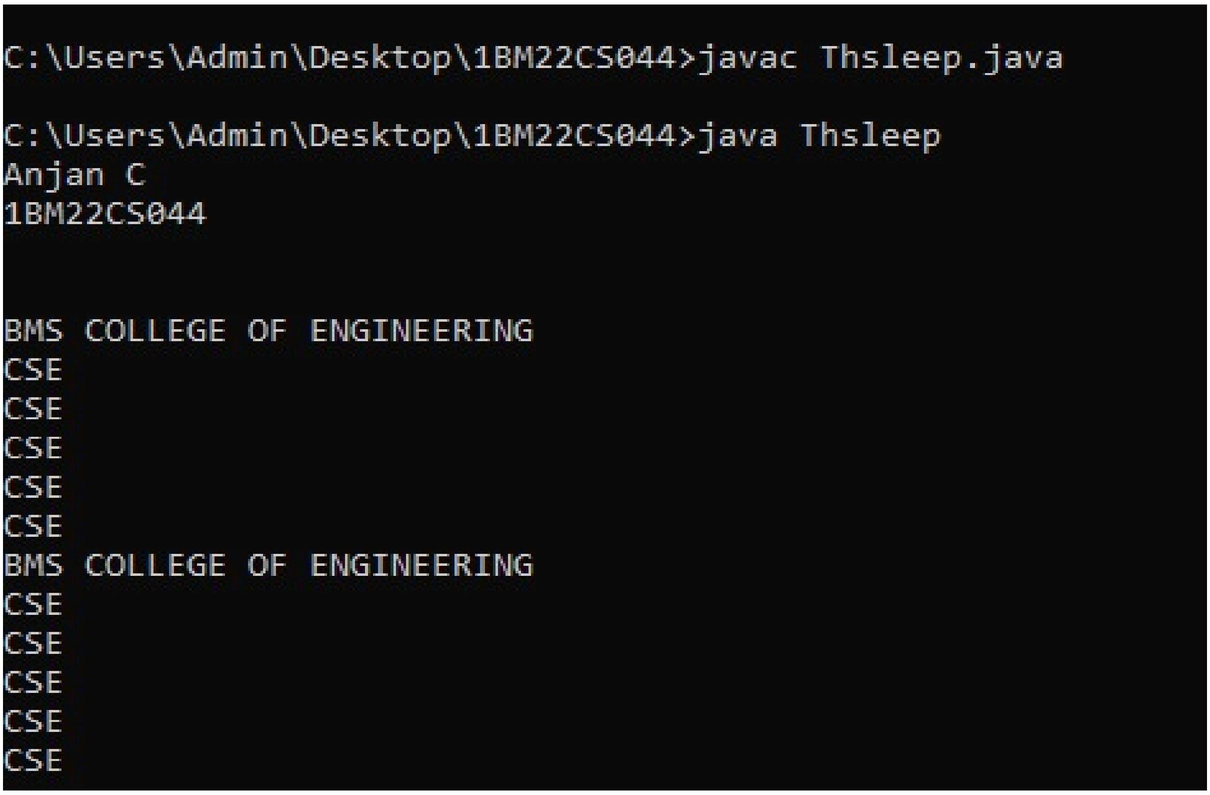
Write a program which creates two threads, one thread displaying “BMS College of Engineering” once every ten seconds and another displaying “CSE” once every two seconds.



```
class A extends Thread {
        int t1, time);
        A(){
            t1 = 1;
            time = 2;
        }
        public void run(){
            while (t1 <= time){
                System.out.println("BMS College of Engineering");
                try{
                    sleep(10000);
                }
                catch(Exception e){
                    System.out.println("error");
                }
                t1++;
            }
        }
}
```

```
class B extends Thread {
        int t2, time2;
        B() {
            t2 = 1;
            time2= 10;
        }
        public void run() {
              while (t2 <= time2) {
                    system.out.printlm ("CSE");
                    try {
                          sleep(2000);
                    }
                    catch (Exception e) {
                          system.out.println("error");
                    }
                    t2++;
              }
        }
}
class Thsleep {
    public static voidmain (string args[]) {
        A a = new A();
        B b = new B();
        a.start();
        b.start();
    }
}
```

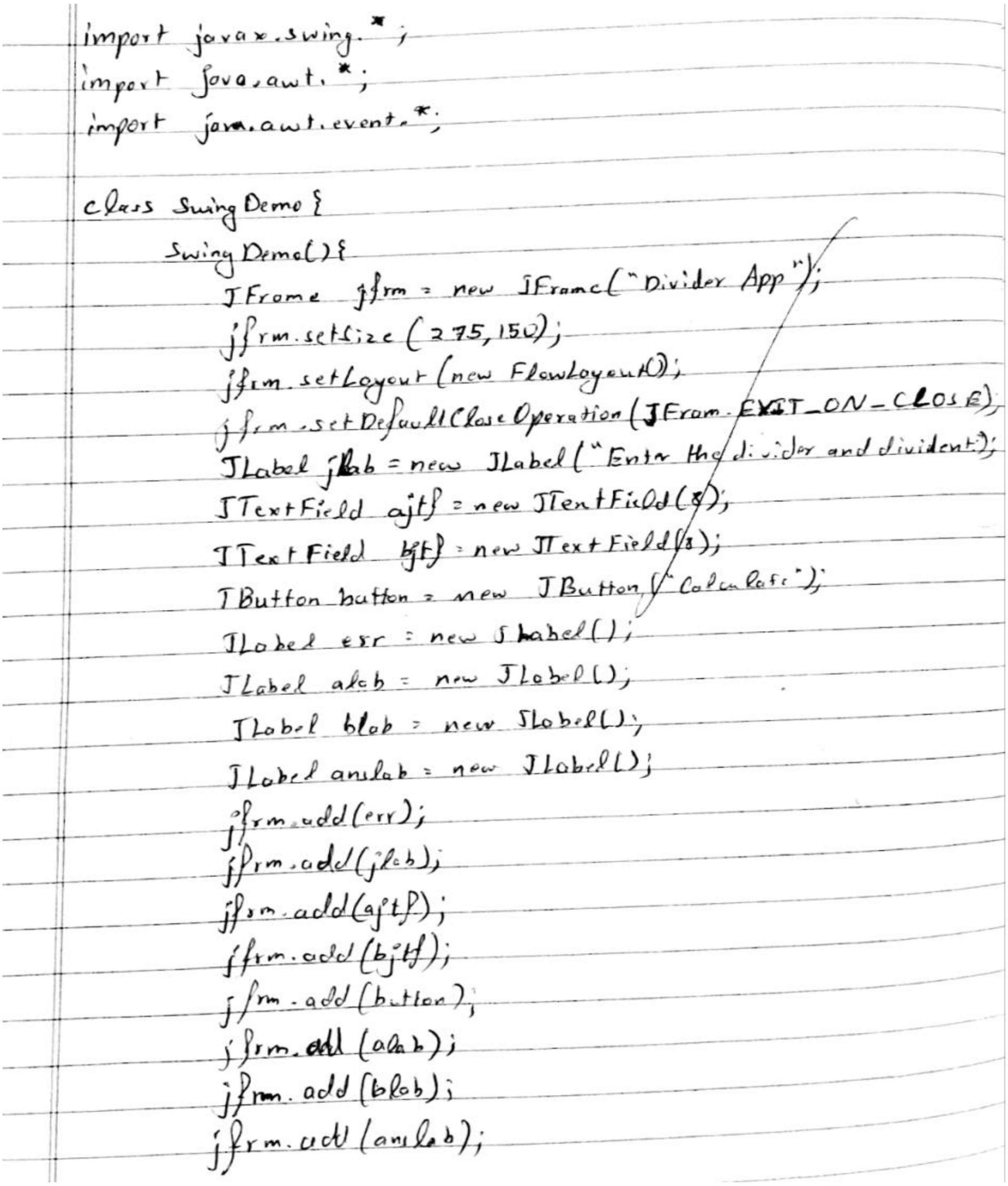
OUTPUT :



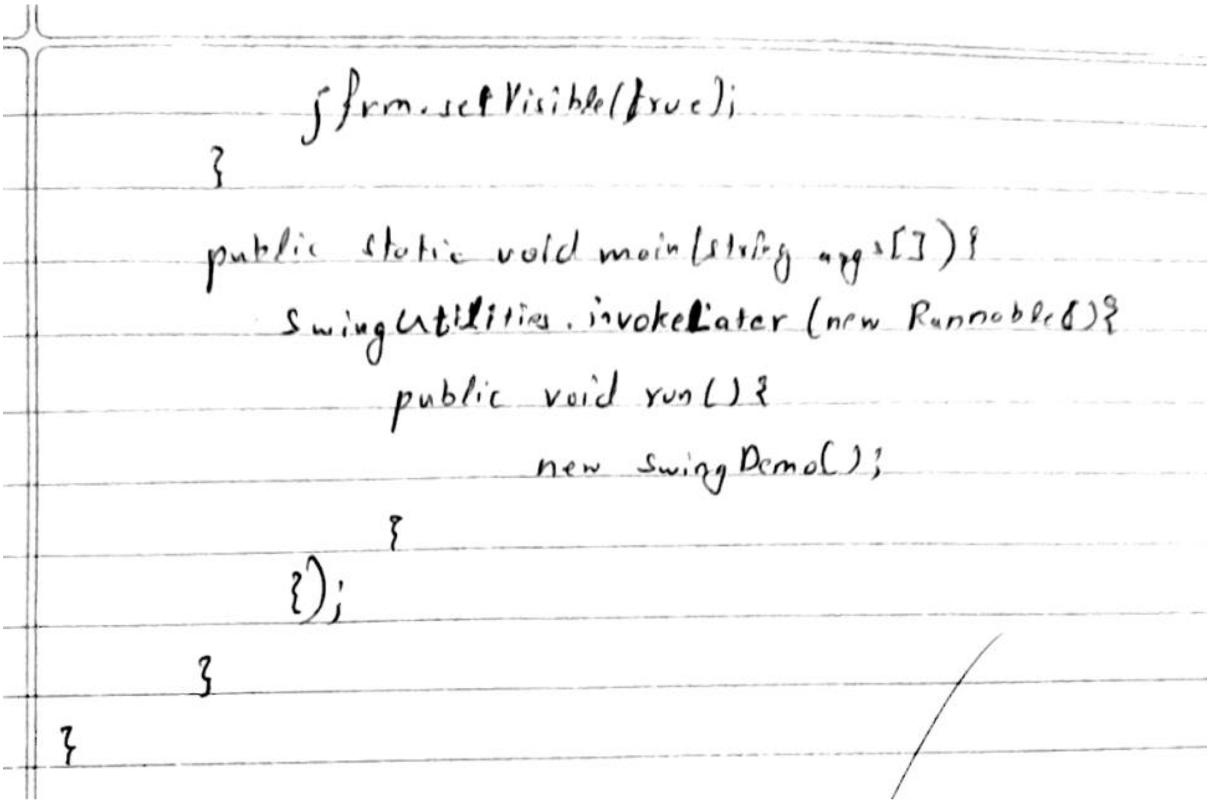
```
C:\Users\Admin\Desktop\1BM22CS044>javac Thsleep.java

C:\Users\Admin\Desktop\1BM22CS044>java Thsleep
Anjan C
1BM22CS044


BMS COLLEGE OF ENGINEERING
CSE
CSE
CSE
CSE
CSE
BMS COLLEGE OF ENGINEERING
CSE
CSE
CSE
CSE
CSE
```

LAB-9: SWING AND AWT

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.

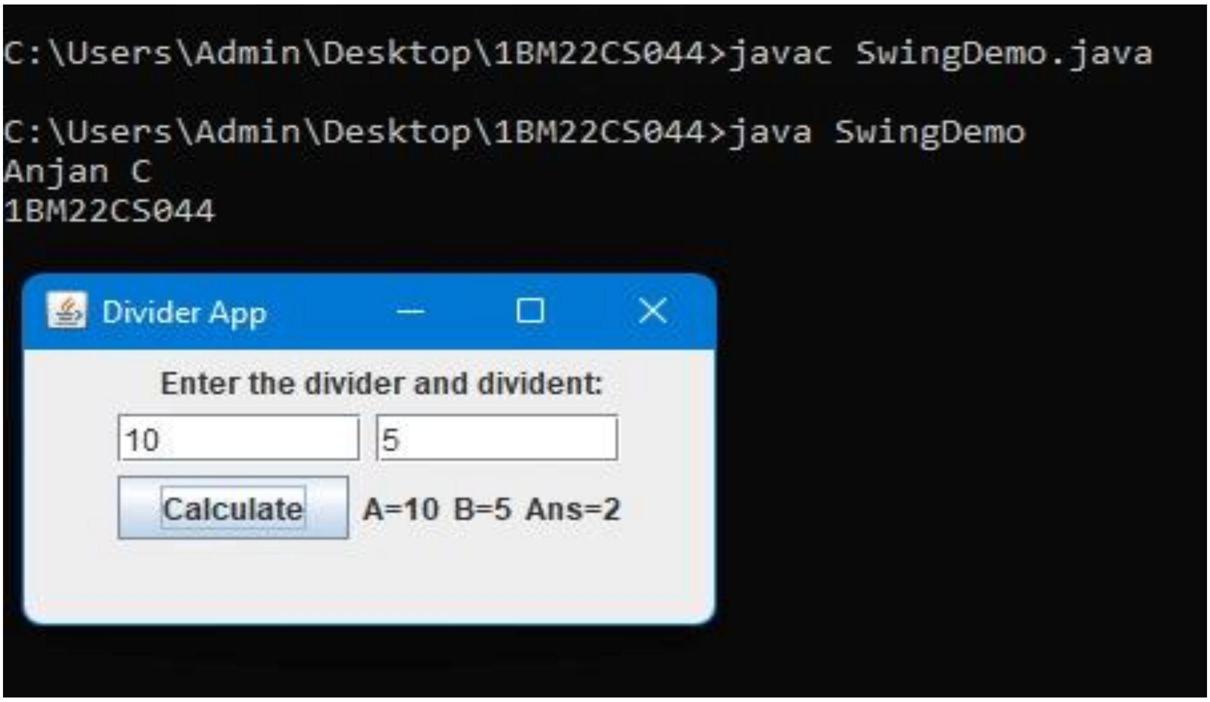


```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

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 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 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 I = new ActionListener (){
        public void actionPerformed ( ActionEvent evt){
                System.out.println("Action event from a text field");
        }

};
ajtf. add ActionListener(I);
bjtf.addActionListener(I);
button. addActionListener(new ActionListener()){
        public void actionPerformed(ActionEvent evt){
                try{
                        int a= Integer.parseInt(ajt).getText());
                        int b= Integer.parseInt(bjt).getText());
                        int ans = a/b;
                        alab.setText ("\n A = " + a);
                        blab.setText ("\n B= " + b);
                        anslab.setText ("\n Ans= " +ans);
                }
                catch (NumberFormatException e) {
                        alab.setText("");
                        blab.setText("");
                        anslab.setText("");
                        err.setText("Enter only Integers!");
                }
                Catch (ArithmeticException e){
                        alab.setText("");
                        blab.setText(" ");
                        anslab.setText(" ");
                        err.setText("B should be NON zero!");
                }
        }
});
```



```
            {frm.setVisible(true);
      }
      public static void main(String args[]){
          SwingUtilities.invokeLater(new Runnable(){
              public void run(){
                   new SwingDemo();
              }
          });
      }
}
```

OUTPUT :



```
C:\Users\Admin\Desktop\1BM22CS044>javac SwingDemo.java

C:\Users\Admin\Desktop\1BM22CS044>java SwingDemo
Anjan C
1BM22CS044
```

Divider App

Enter the divider and divident:

10 5

Calculate A=10 B=5 Ans=2