VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

Object Oriented Java Programming

(23CS3PCOOJ)

Submitted by

Chirag S (1BM23CS079)

in partial fulfilment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)

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B.M.S. College of Engineering,

Bull Temple Road, Bengaluru 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)
Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "Object Oriented Java Programming (23CS3PCOOJ)" carried out by **Chirag S (1BM23CS079),** who is bonafide student of **B.M.S. College of Engineering.** It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of an Object Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

Ambuja Assistant Professor Department of CSE, BMSCE	Dr. Jyothi S Nayak Professor & HOD Department of CSE, BMSCE

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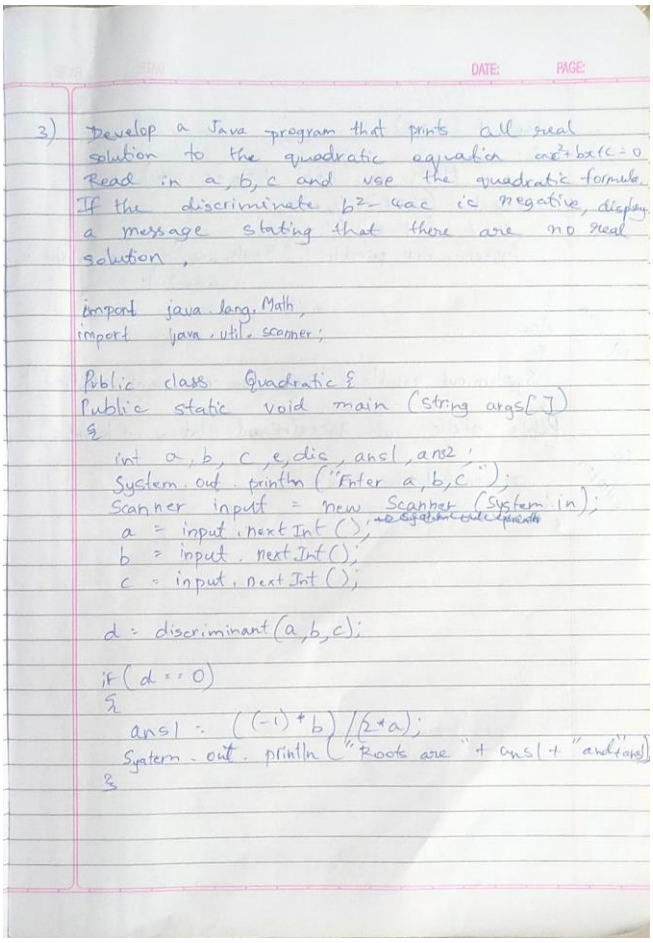
GitHub Link:
https://github.com/ChiragS-Git/OOJ_LAB_079.git

Program 1

Implement Quadratic Equation

Algorithm:



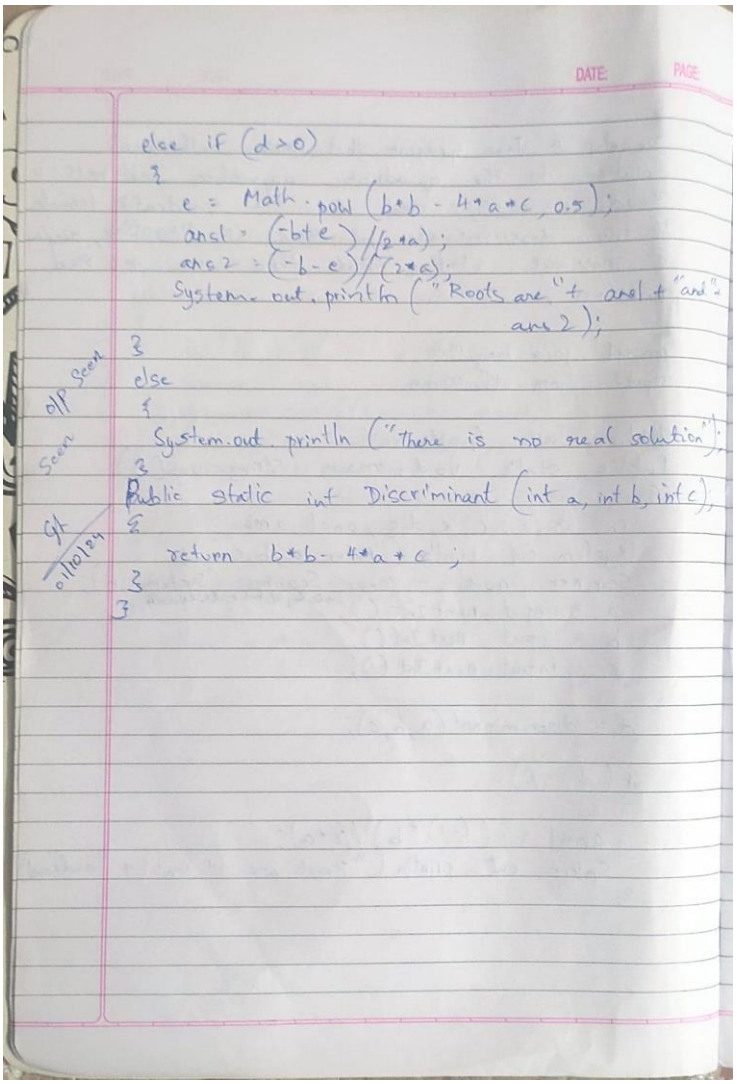
3) Develop a Java program that prints all real solution to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula. If the discriminate b^2-4ac is negative, display a message stating that there are no real solution.

```
import java.lang.Math;
import java.util.scanner;

Public class Quadratic{
Public static void main (string args[])
{
  int a,b,c,e,dis,ans1,ans2;
  System.out.println("Enter a,b,c");
  Scanner input = new Scanner (System.in);
  a = input.nextInt();
  b = input.nextInt();
  c = input.nextInt();

  d = discriminant(a,b,c);

  if(d==0)
  {
    ans1 = ((-1)*b)/(2*a);
    System.out.println("Roots are "+ans1+"and"+ans2)
  }
```



Code:

```
import java.util.Scanner;
public class Quadratic

{
   public static void main(String[] args)
   {
      int a;
      int b;
      int c;
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter 'a' value: ");
      a= sc.nextInt();
```

```
        System.out.print("Enter 'b' value: ");
        b=sc.nextInt();
        System.out.print("Enter 'c' value: ");
        c=sc.nextInt();
        float disc = ((b*b)-4*a*c);
        System.out.println(disc);
        if (a==0)
        {
           System.out.println("Not Quadratic");
        }
        else
        {
           if (disc<0)
           {
           System.out.println("No real roots ");
           }
           else if (disc>0)
           {
           double root1= (-b + Math.sqrt(disc))/(2*a);
           double root2= (-b - Math.sqrt(disc))/(2*a);
           System.out.println("Real roots ");
           System.out.println("Root-1: "+root1);
           System.out.println("Root-2: "+root2);
           }
           else
           {
           double root1=(-b)/(2*a);
             System.out.println("Real and equal");
           System.out.println("Root-1: "+root1);
           System.out.println("Root-2: "+root1);
           }
         System.out.println("Chirag S");
         System.out.println("1BM23CS079");

        }
    }
}
```

```
C:\Users\Chirag\Desktop\college\jlab>javac Quadratic.java

C:\Users\Chirag\Desktop\college\jlab>java Quadratic
Enter 'a' value: 3
Enter 'b' value: 8
Enter 'c' value: 1
52.0
Real roots
Root-1: -0.13148290817867028
Root-2: -2.5351837584879964
Chirag S
1BM23CS079

C:\Users\Chirag\Desktop\college\jlab>java Quadratic
Enter 'a' value: 4
Enter 'b' value: 4
Enter 'c' value: 1
0.0
Real and equal
Root-1: 0.0
Root-2: 0.0
Chirag S
1BM23CS079

C:\Users\Chirag\Desktop\college\jlab>java Quadratic
Enter 'a' value: 0
Enter 'b' value: 1
Enter 'c' value: 2
1.0
Not Quadratic

C:\Users\Chirag\Desktop\college\jlab>java Quadratic
Enter 'a' value: 1
Enter 'b' value: 1
Enter 'c' value: 1
-3.0
No real roots
Chirag S
1BM23CS079
```

Program 2

SGPA Calculator

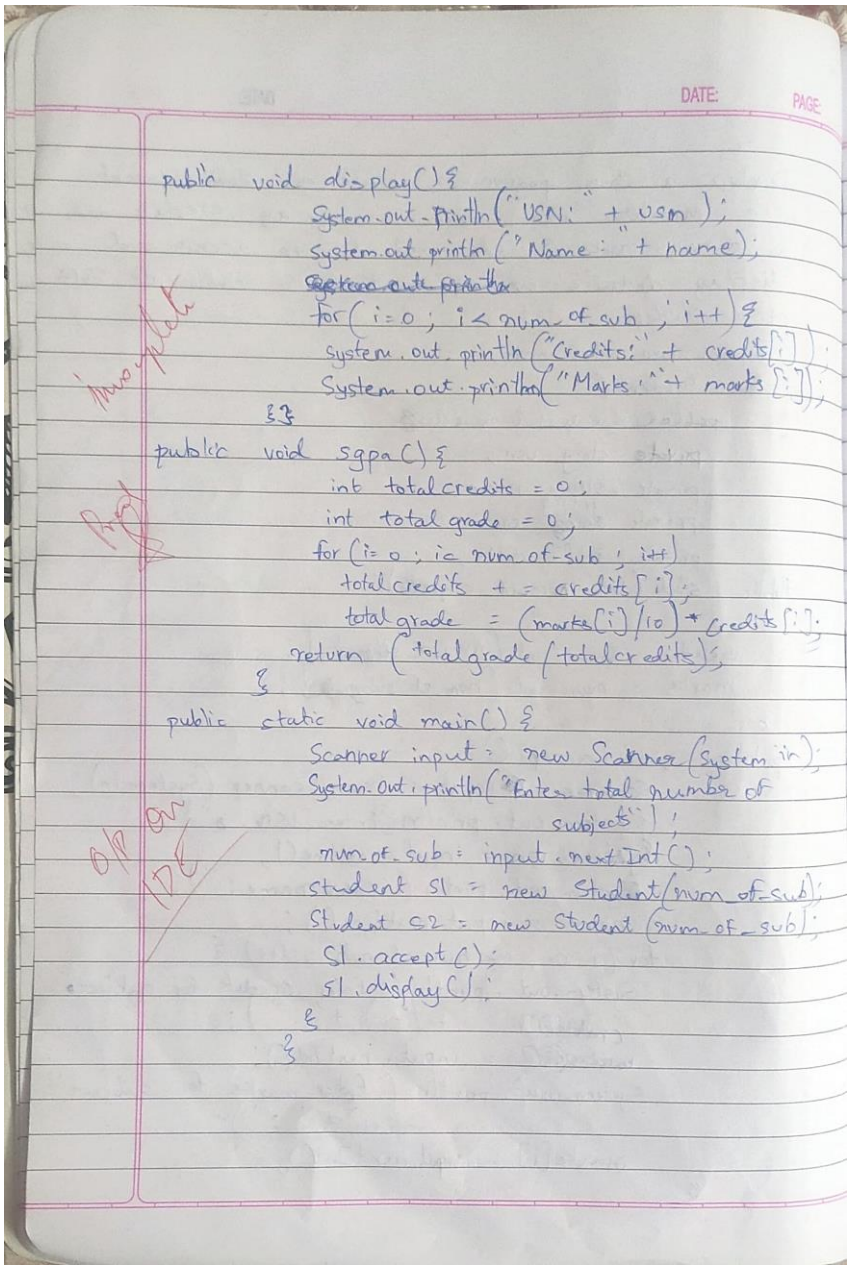
Algorithm:

DATE: PAGE:

4. 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{
    private string usn;
    private string name;
    private int[] credits;
    private int[] marks;
Public Stud(int num_of_subjects){

    credits = new int[num_of_subjects];
    marks = new int[num_of_subjects];
}
public void accept(){
    Scanner input = new Scanner(System.in);
    System.out.println("Enter USN: ");
    usn = input.nextLine();
    System.out.println("Enter name: ");
    name = input.nextLine();
    for(i=0; i<num_of_sub; i++){
    System.out.println("Enter credits for subject"
    credits[i]      + (i+1) + ":");
    marks[i] = input.nextInt();
    System.out.println("Enter marks for subject"
                    + (i+1) + ":");
    marks[i] = input.nextInt();
}
```



```
public void display(){
    System.out.println("USN: " + usn);
    System.out.println("Name: " + name);
    for(i=0; i<num_of_sub; i++){
    System.out.println("Credits:" + credits[i]);
    System.out.println("Marks:" + marks[i]);
}}
public void sgpa(){
    int totalcredits = 0;
    int totalgrade = 0;
    for(i=0; i<num_of_sub; i++)
    totalcredits += credits[i];
    totalgrade = (marks[i]/10) * credits[i];
    return (totalgrade/totalcredits);
}
public static void main(){
    Scanner input = new Scanner(System.in);
    System.out.println("Enter total number of
                        subjects");
    num_of_sub = input.nextInt();
    student s1 = new Student(num_of_sub);
    Student s2 = new Student(num_of_sub);
    s1.accept();
    s1.display();
}
}
```

Code:

```
import java.util.Scanner;

class Student {
    private String name;
    private String usn;
    private double total_credit;
```

```
private double[] marks;
private Scanner sc = new Scanner(System.in);

void getInfo() {
    System.out.print("Enter Name: ");
    name = sc.nextLine();

    System.out.print("Enter USN: ");
    usn = sc.nextLine();

    System.out.print("Enter Total Credits: ");
    total_credit = sc.nextDouble();
    sc.nextLine();
}

double grade(double mark) {
    if (mark <= 39) {
        return 0;
    } else if (mark >= 40 && mark <= 49) {
        return 4;
    } else if (mark >= 50 && mark <= 54) {
        return 5;
    } else if (mark >= 55 && mark <= 59) {
        return 6;
    } else if (mark >= 60 && mark <= 69) {
        return 7;
    } else if (mark >= 70 && mark <= 79) {
        return 8;
    } else if (mark >= 80 && mark <= 89) {
        return 9;
    } else {
        return 10;
    }
}

void getMarks() {
    marks = new double[8];
    for (int i = 0; i < 8; i++) {
        System.out.println("Enter the marks for subject " + (i + 1) + ": ");
        double mark = sc.nextDouble();
```

```
            System.out.println("Enter the credit for subject " + (i + 1) + ": ");
            double credit = sc.nextDouble();

            double grade = grade(mark);
            marks[i] = grade * credit;
        }
        sc.nextLine();
    }

    void calSgpa() {
        double totalMarks = 0;
        for (int i = 0; i < 8; i++) {
            totalMarks += marks[i];
        }
        System.out.println("Name: " + name);
        System.out.println("USN: " + usn);
        System.out.println("SGPA: " + (totalMarks / total_credit));
    }
}

public class Main {
    public static void main(String args[]) {
        boolean cond = true;
        Scanner sc = new Scanner(System.in);
        while (cond) {
            Student s1 = new Student();


            s1.getInfo();
            s1.getMarks();
            s1.calSgpa();

            System.out.println("Do you want to calculate SGPA for another student?
(yes/no): ");
            String check = sc.nextLine();
            if (check.equalsIgnoreCase("yes")) {
                continue;
            } else {
                cond = false;
```

```
            }
        }
          System.out.println("Chirag S");
        System.out.println("1BM23CS079");
        sc.close();
    }
}
```

```
C:\Users\Chirag\Desktop\college\jlab>java Main
Enter Name: Chirag
Enter USN: 079
Enter Total Credits: 20
Enter the marks for subject 1:
78
Enter the credit for subject 1:
2
Enter the marks for subject 2:
98
Enter the credit for subject 2:
2
Enter the marks for subject 3:
65
Enter the credit for subject 3:
2
Enter the marks for subject 4:
87
Enter the credit for subject 4:
2
Enter the marks for subject 5:
45
Enter the credit for subject 5:
2
Enter the marks for subject 6:
92
Enter the credit for subject 6:
2
Enter the marks for subject 7:
94
Enter the credit for subject 7:
4
Enter the marks for subject 8:
97
Enter the credit for subject 8:
4
Name: Chirag
USN: 079
SGPA: 8.8
Do you want to calculate SGPA for another student? (yes/no):
no
Chirag S
1BM23CS079
```

Program 3

Method overriding

Algorithm:

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5. 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.

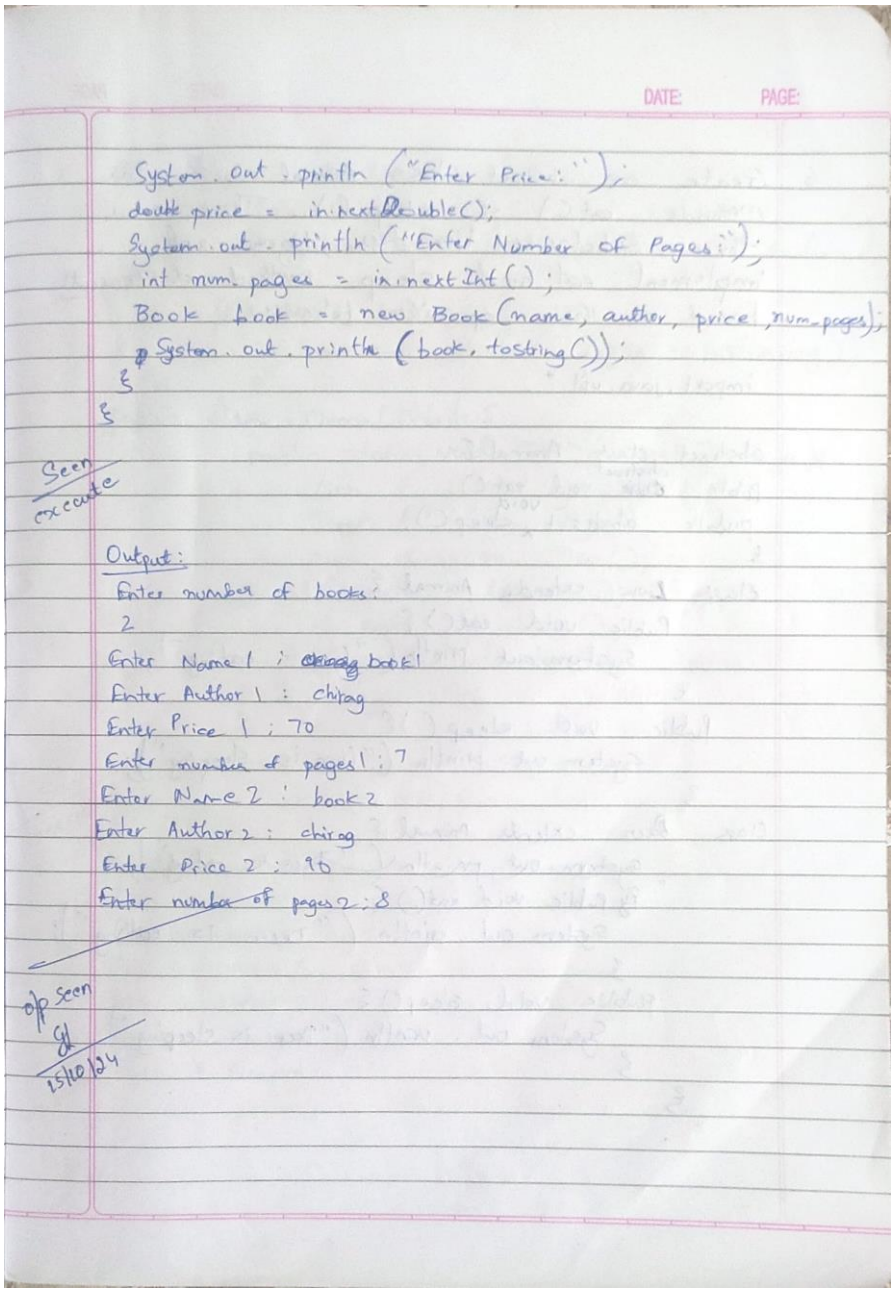
```
import
 java.util.Scanner;

class Book {
        private String name;
        private string author;
        private double price;
        private int num_pages;

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

DATE: PAGE:

```
public void setNum_pages (int num_pages){
        this.num_pages = num_pages;
    }
public String getName() {
        return name;
    }
public String getAuthor(){
        return author;
    }
public double getPrice(){
        return price;
    }
public int getNum_pages() {
        return num_pages
    }
public String
toString(){
        return "Book details: \n" + "Name: \n" + name
            + "Author: \n" + author + "Price: \n" +
            price + "Number of Pages: \n" + num_pages;
    }
}
class Book{
    public static void main(String[] args){
        Scanner in = new Scanner(System.in);
        System.out.println("Enter number of books:");
        int n = in.nextInt();
        for(i=0; i<n; i++){
        System.out.println("Enter Name:");
            name = in.nextline();
        System.out.println("Enter Author:");
            author = in.nextline();
```



Code:

```
import java.util.Scanner;

class Book {
    public String book_name;
    public String author_name;
    public int price;
    public int num_pages;
```

```
    Book(String book_name, String author_name, int price, int num_pages) {
        this.book_name = book_name;
        this.author_name = author_name;
        this.price = price;
        this.num_pages = num_pages;
    }

    @Override
    public String toString() {
        String name, author, price, numPages;
        name = "Book Name: " + this.book_name + "\n";
        author = "Author Name: " + this.author_name + "\n";
        price = "Price: " + this.price + "\n";
        numPages = "Number of Pages: " + this.num_pages + "\n";
        return name + author + price + numPages;
    }
}

public class ride {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Number of books: ");
        int count = sc.nextInt();
        sc.nextLine();

        Book[] arr = new Book[count];
        for (int i = 0; i < count; i++) {
            System.out.print("Enter book " + (i + 1) + " name: ");
            String name = sc.nextLine();
            System.out.print("Enter author " + (i + 1) + " name: ");
            String author = sc.nextLine();
            System.out.print("Enter book " + (i + 1) + " price: ");
            int price = sc.nextInt();
            System.out.print("Enter book " + (i + 1) + " pages: ");
            int pages = sc.nextInt();
            sc.nextLine();

            arr[i] = new Book(name, author, price, pages);
            System.out.println(arr[i]);
```

```
        }

        sc.close();

        System.out.println("Chirag S");
        System.out.println("1BM23CS079");
    }
}
```

```
C:\Users\Chirag\Desktop\college\jlab>java ride
Number of books: 2
Enter book 1 name: ncos
Enter author 1 name: jsdc
Enter book 1 price: 250
Enter book 1 pages: 200
Book Name: ncos
Author Name: jsdc
Price: 250
Number of Pages: 200

Enter book 2 name: sdfse
Enter author 2 name: sdcfsv
Enter book 2 price: 300
Enter book 2 pages: 250
Book Name: sdfse
Author Name: sdcfsv
Price: 300
Number of Pages: 250

Chirag S
1BM23CS079
```

Program 4

Abstract Classes

Algorithm:

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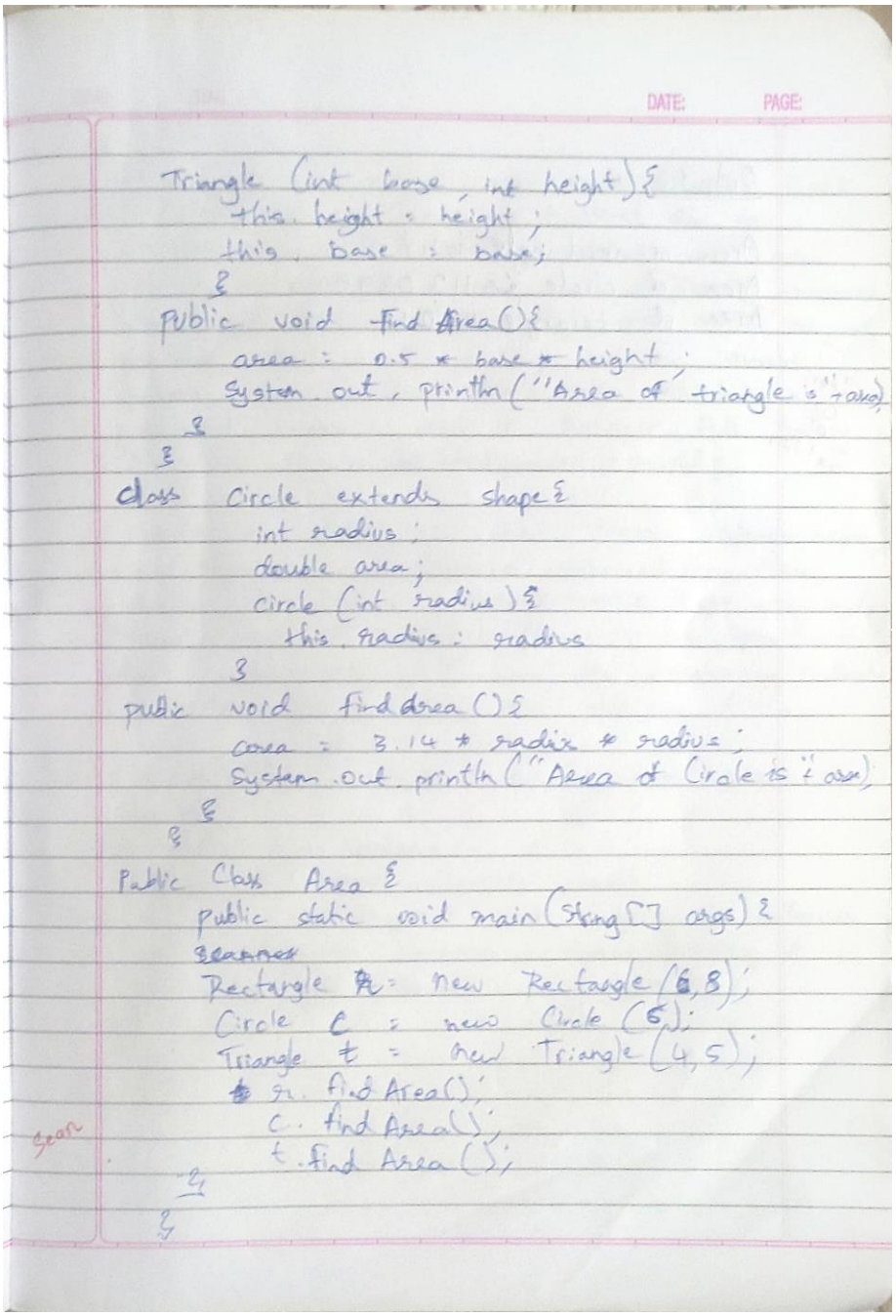
Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provid three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea().

```
import java.util.*;
abstract class shape{
    public abstract void findArea();
}
class Rectangle extends shape{
    int length; int area;
    int breadth;
    Rectangle(int length, int breadth){
        this.length = length;
        this.breadth = breadth;
    }
    public void find Area(){
        area = length * breadth;
        System.out.println("Area of
        rectangle is " + area);
    }
}
class Triangle extends shape{
    int base;
    int height;
    double area;
```



```
Triangle (int base, int height){
    this.height = height;
    this.base = base;
}
public void FindArea(){
    area = 0.5 * base * height;
    System.out.println("Area of triangle is"+area);
}
}
class Circle extends Shape{
    int radius;
    double area;
    Circle(int radius){
        this.radius = radius
    }
public void findArea(){
    area = 3.14 * radius * radius;
    System.out.println("Area of Circle is"+area);
}
}
Public Class Area{
    public static void main(String[] args){
    Rectangle R = new Rectangle(6,8);
    Circle C = new Circle(5);
    Triangle t = new Triangle(4,5);
    R.findArea();
    C.findArea();
    t.findArea();
}
}
```

Code:

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

```
abstract class Shape {
    double dim1;
    double dim2;

    abstract void printarea();
}

class Rectangle extends Shape {
    Rectangle(double d1, double d2) {
        this.dim1 = d1;
        this.dim2 = d2;
    }

    @Override
    void printarea() {
        double area = dim1 * dim2;
        System.out.println("Area of Rectangle: " + area);
    }
}

class Triangle extends Shape {
    Triangle(double base, double height) {
        this.dim1 = base;
        this.dim2 = height;
    }

    @Override
    void printarea() {
        double area = 0.5 * dim1 * dim2;
        System.out.println("Area of Triangle: " + area);
    }
}

class Circle extends Shape {
    Circle(double radius) {
        this.dim1 = radius;
    }

    @Override
```

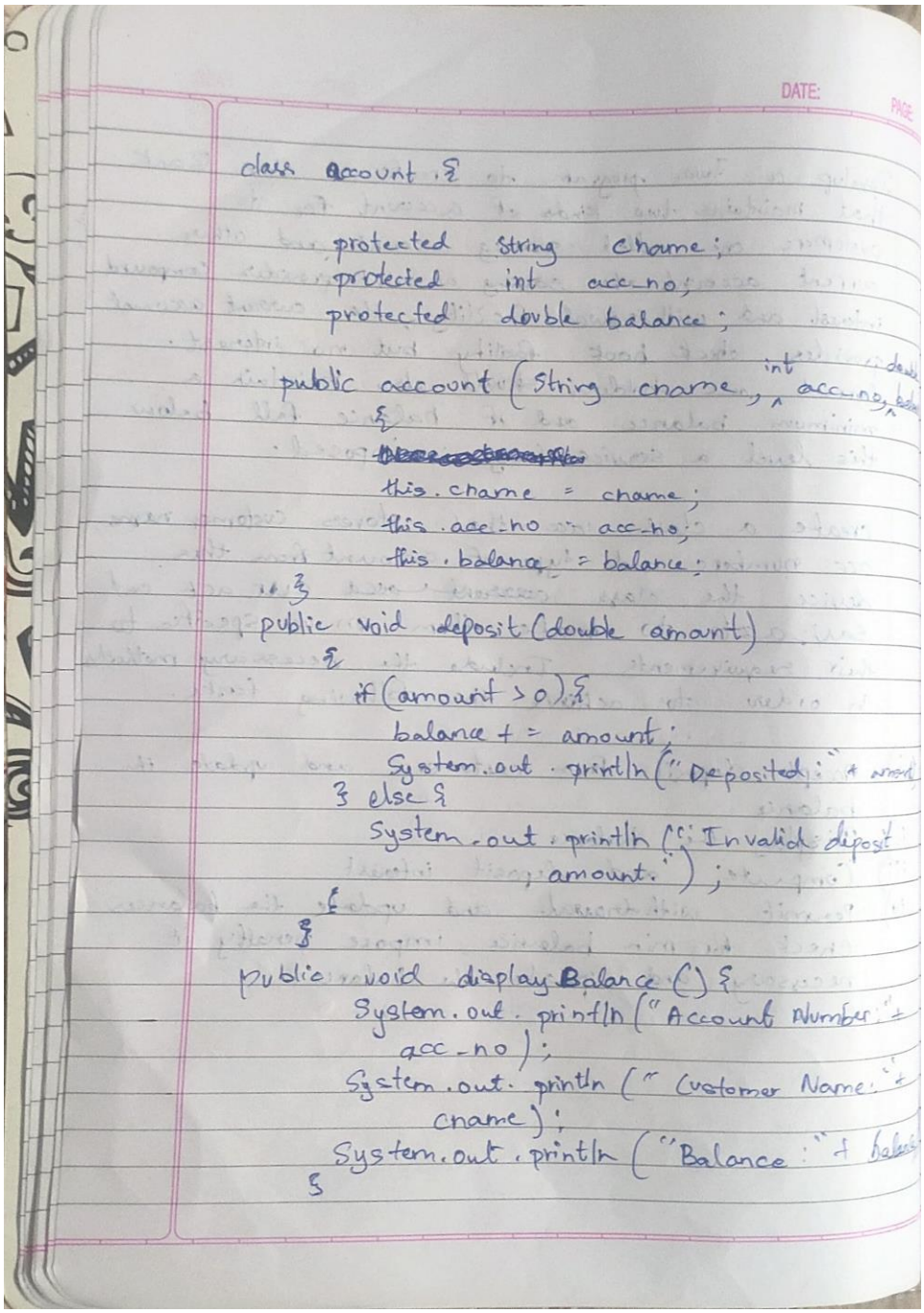
```
    void printarea() {
        double area = 3.14 * dim1 * dim1;
        System.out.println("Area of Circle: " + area);
    }
}

public class area {
    public static void main(String[] args) {
        try (Scanner sc = new Scanner(System.in)) {
            System.out.println("Enter length and breadth of Rectangle:");
            double rl = sc.nextDouble();
            double rb = sc.nextDouble();
            Rectangle r1 = new Rectangle(rl, rb);
            r1.printarea();

            System.out.println("Enter base and height of Triangle:");
            double base = sc.nextDouble();
            double height = sc.nextDouble();
            Triangle t1 = new Triangle(base, height);
            t1.printarea();

            System.out.println("Enter the Radius:");
            double radius = sc.nextDouble();
            Circle c1 = new Circle(radius);
            c1.printarea();
        }

        System.out.println("Chirag S");
        System.out.println("1BM23CS079");
    }
}
```

```
C:\Users\Chirag\Desktop\college\jlab>java area
Enter length and breadth of Rectangle:
4
5
Area of Rectangle: 20.0
Enter base and height of Triangle:
5
4
Area of Triangle: 10.0
Enter the Radius:
5
Area of Circle: 78.5
Chirag S
1BM23CS079
```

Program 5

Bank Account

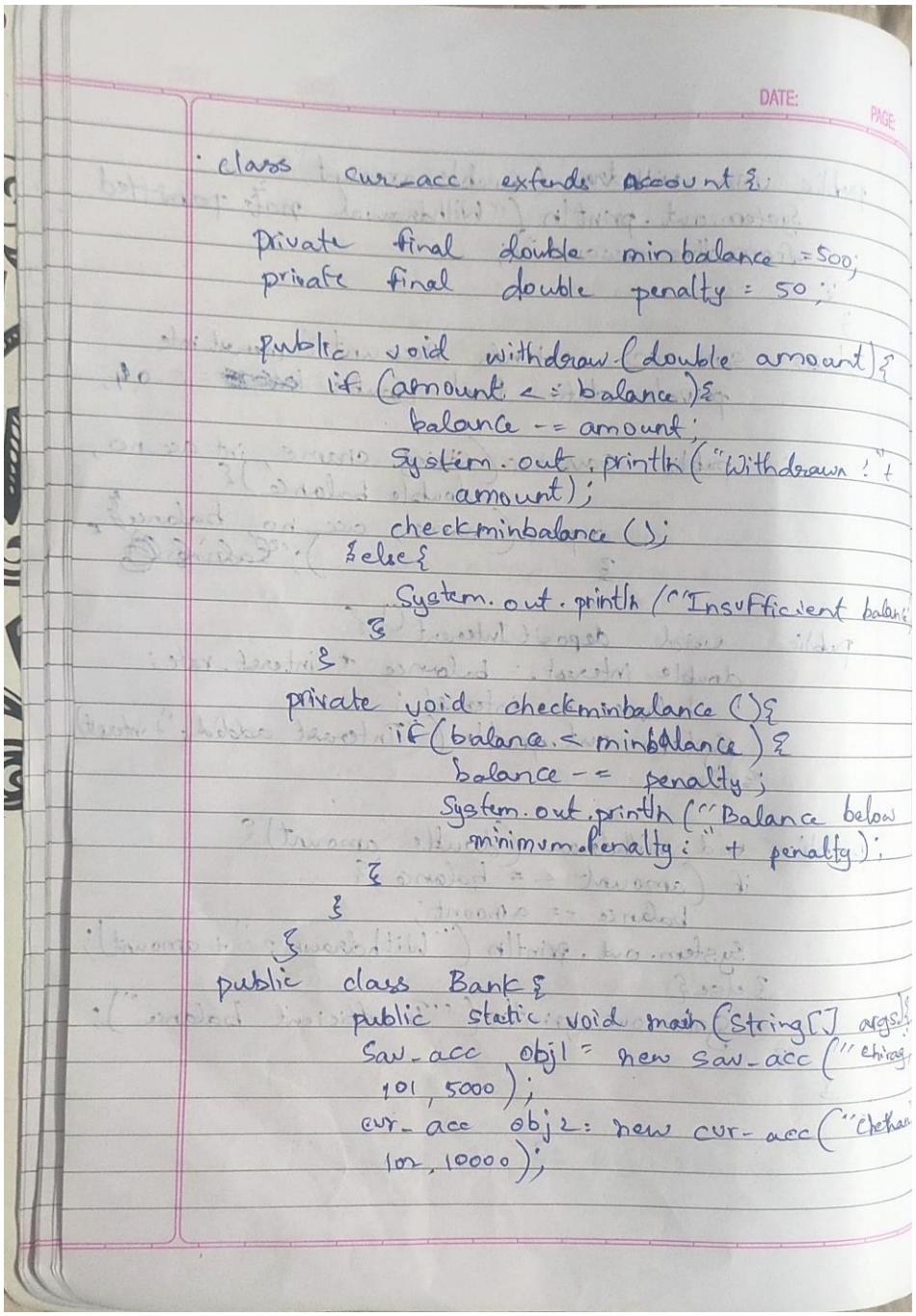
Algorithm:



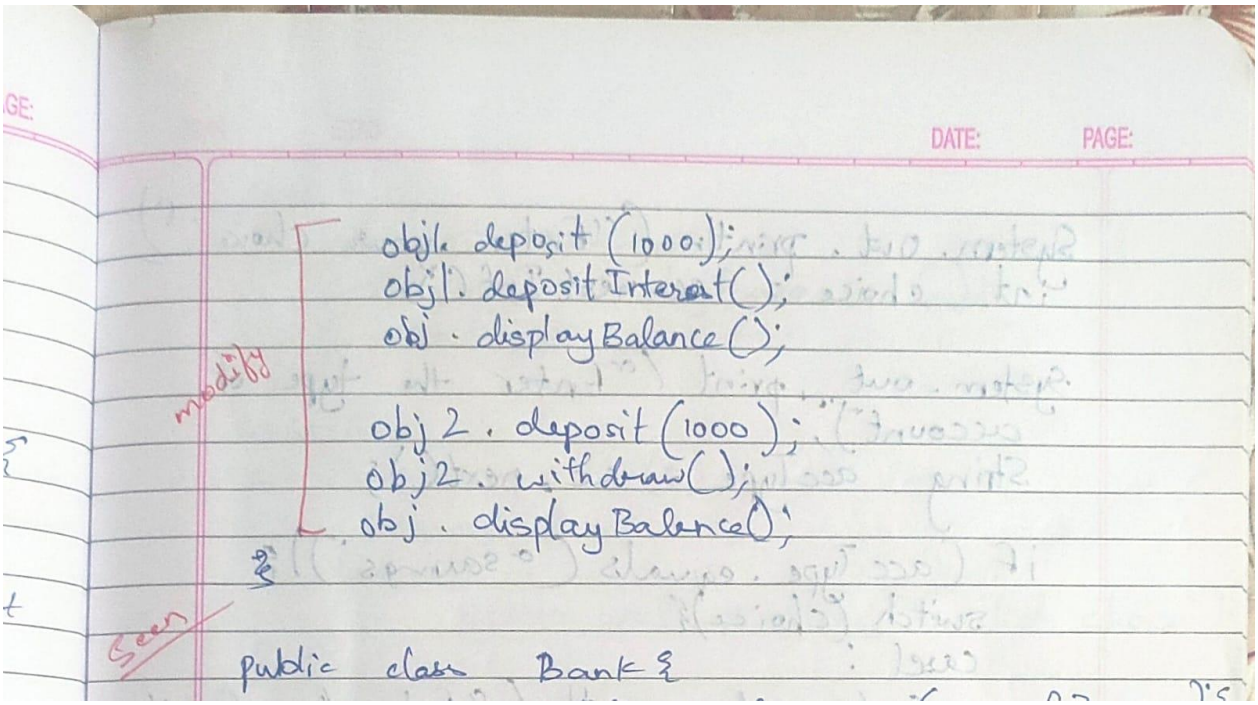
```
class Account {

    protected String cname;
    protected int acc_no;
    protected double balance;

    public account (String cname, int acc_no, double balance)
    {
        this.cname = cname;
        this.acc_no = acc_no;
        this.balance = balance;
    }
    public void deposit (double amount)
    {
        if (amount > 0) {
            balance += amount;
            System.out.println("Deposited: " + amount);
        } else {
            System.out.println("Invalid deposit
                amount.");
        }
    }
    public void displayBalance () {
        System.out.println("Account Number: " +
            acc_no);
        System.out.println("Customer Name: " +
            cname);
        System.out.println("Balance: " + balance);
    }
```

DATE: PAGE:

```
public void withdraw (double amount) {
    System.out.println ("Withdrawal not permitted
    from this account");
  }
}

class sav_acc extends Account { interest rate
    private static final double = 0.04;

    public sav_acc (String cname, int acc_no,
                    double balance) {
        super (cname, acc_no, balance);
    }

public void depositInterest () {
    double interest = balance * interest_rate;
      balance += interest;
    System.out.println ("Interest added: " + interest);
}

public void withdraw (double amount) {
    if (amount <= balance) {
        balance -= amount;
      System.out.println ("Withdrawn: " + amount);
    } else {
      System.out.println ("Insufficient balance");
    }
}
```



```
class cur_acc extends Account {
    private final double minbalance = 500;
    private final double penalty = 50;

    public void withdraw(double amount) {
        if (amount <= balance) {
            balance -= amount;
            System.out.println("Withdrawn : " +
                amount);
            checkminbalance();
        } else {
            System.out.println("Insufficient balance");
        }
    }
    private void checkminbalance() {
        if (balance < minbalance) {
            balance -= penalty;
            System.out.println("Balance below
                minimum.Penalty: " + penalty);
        }
    }
}
public class Bank {
    public static void main(String[] args) {
        Sav_acc obj1 = new Sav_acc("chirag
            101, 5000);
        cur_acc obj2 = new cur_acc("chetan
            102, 10000);
```



Code:

```
import java.util.Scanner;

class Account{
  Scanner sc=new Scanner(System.in);

  String name="Chirag";
  int money;
  String type;
  int accno;
  Account(String acctype,int accno){
    this.type=acctype;
    this.money=0;
    this.accno=accno;

  }
  void accdetail(){
    System.out.println("Account Holder Name: "+name);
    System.out.println("Account No: "+accno);
    System.out.println("Balance: "+money);
```

```
  System.out.println(this.type);
}

void deposit(){
  int mon;
  System.out.println(accno);
  System.out.println(type);
  System.out.println("Enter the Amount: ");
  mon=sc.nextInt();
  money+=mon;
  System.out.println("Balance: "+money);
}

void withdraw(){
  System.out.println(this.accno);
  System.out.println(type);
  int mon;
  System.out.println("Enter the Amount: ");
  mon=sc.nextInt();
  money-=mon;
  System.out.println("Balance: "+money);
  if((money<=100) && this.type=="current_account")
  {
    System.out.println("Minimum balance is 100");
    System.out.println("Deposite money now and pay the fine of 50");
  }
}
void cal_intrest(){
  if(this.type=="saving_account")
  {

    System.out.println(this.type);
    double temp=this.money;

    double intrest=((temp)*0.5)+temp;
    System.out.println("The intrest: "+intrest);
  }

  else
  {
```

```
      System.out.println("Not a saving account");
    }

  }
}

public class Sys {
    public static void main(String[] args) {
      Account c1=new Account("saving_account",1);
      Account c2=new Account("current_account",2);

      while(true)
      {
        Scanner sc=new Scanner(System.in);

        int choice;
        System.out.println("Enter the choice:\n1.Deposite\n2.Withdraw\n3.Compute
intrest\n4.Display acc details\n5.Exit");
        choice=sc.nextInt();
        if (choice==1)
        {
          c1.deposit();
          c2.deposit();
        }

        if(choice==2){
           c1.withdraw();
           c2.withdraw();
        }

        if(choice==3){
          c1.cal_intrest();
          c2.cal_intrest();
       }

       if(choice==4){
        c1.accdetail();
        c2.accdetail();
     }
```

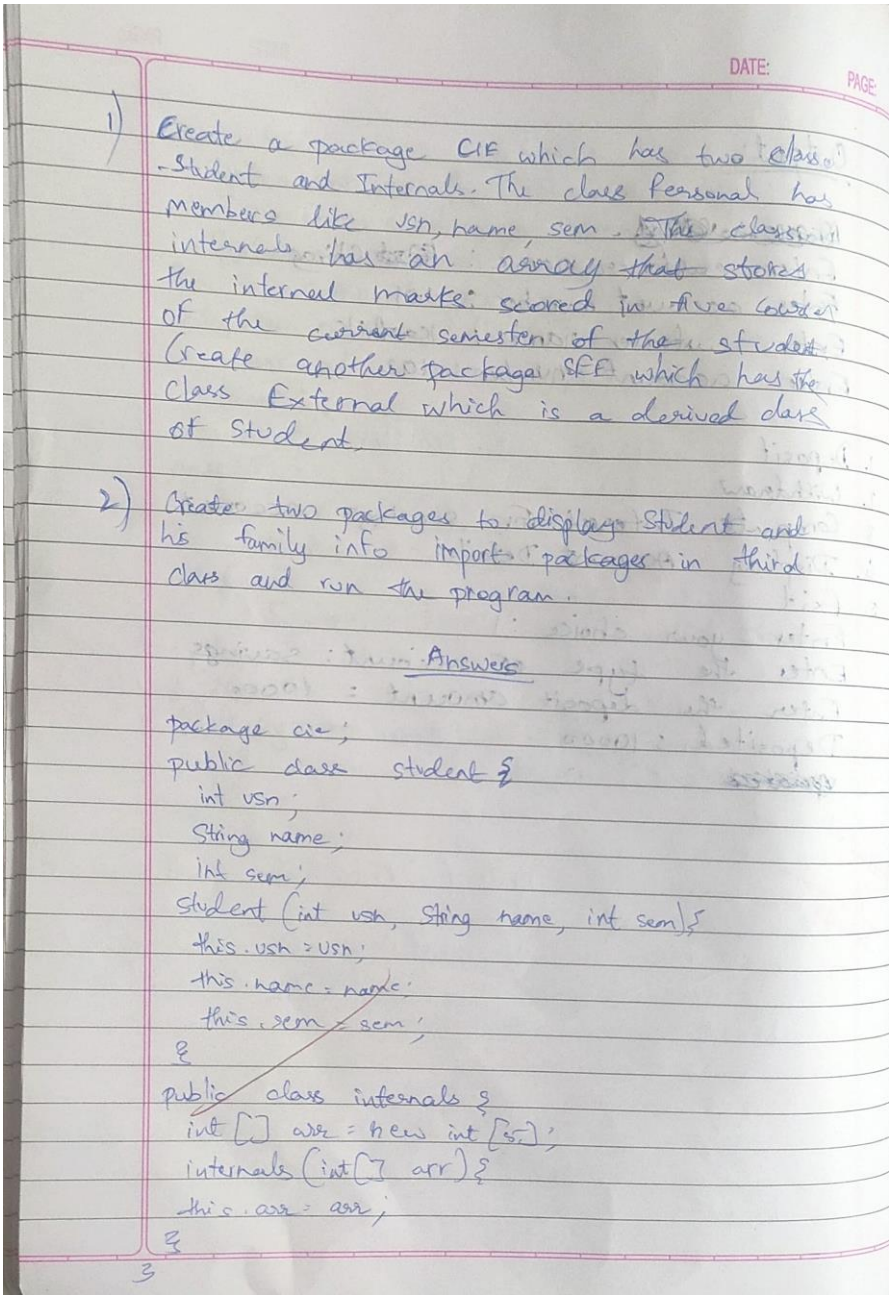
```
     if(choice==5){
      break;
      }
    }

    System.out.println("Chirag S");
    System.out.println("1BM23CS079");
  }
}
```

```
C:\Users\Chirag\Desktop\college\jlab>javac Sys.java

C:\Users\Chirag\Desktop\college\jlab>java Sys
Enter the choice:
1.Deposit
2.Withdraw
3.Compute intrest
4.Display acc details
5.Exit
1
1
saving_account
Enter the Amount:
350
Balance: 350
2
current_account
Enter the Amount:
400
Balance: 400
Enter the choice:
1.Deposit
2.Withdraw
3.Compute intrest
4.Display acc details
5.Exit
4
Account Holder Name: Chirag
Account No: 1
Balance: 350
saving_account
Account Holder Name: Chirag
Account No: 2
Balance: 400
current_account
Enter the choice:
1.Deposit
2.Withdraw
3.Compute intrest
4.Display acc details
5.Exit
5
Chirag S
1BM23CS079
```

Program 6

Packages

Algorithm:

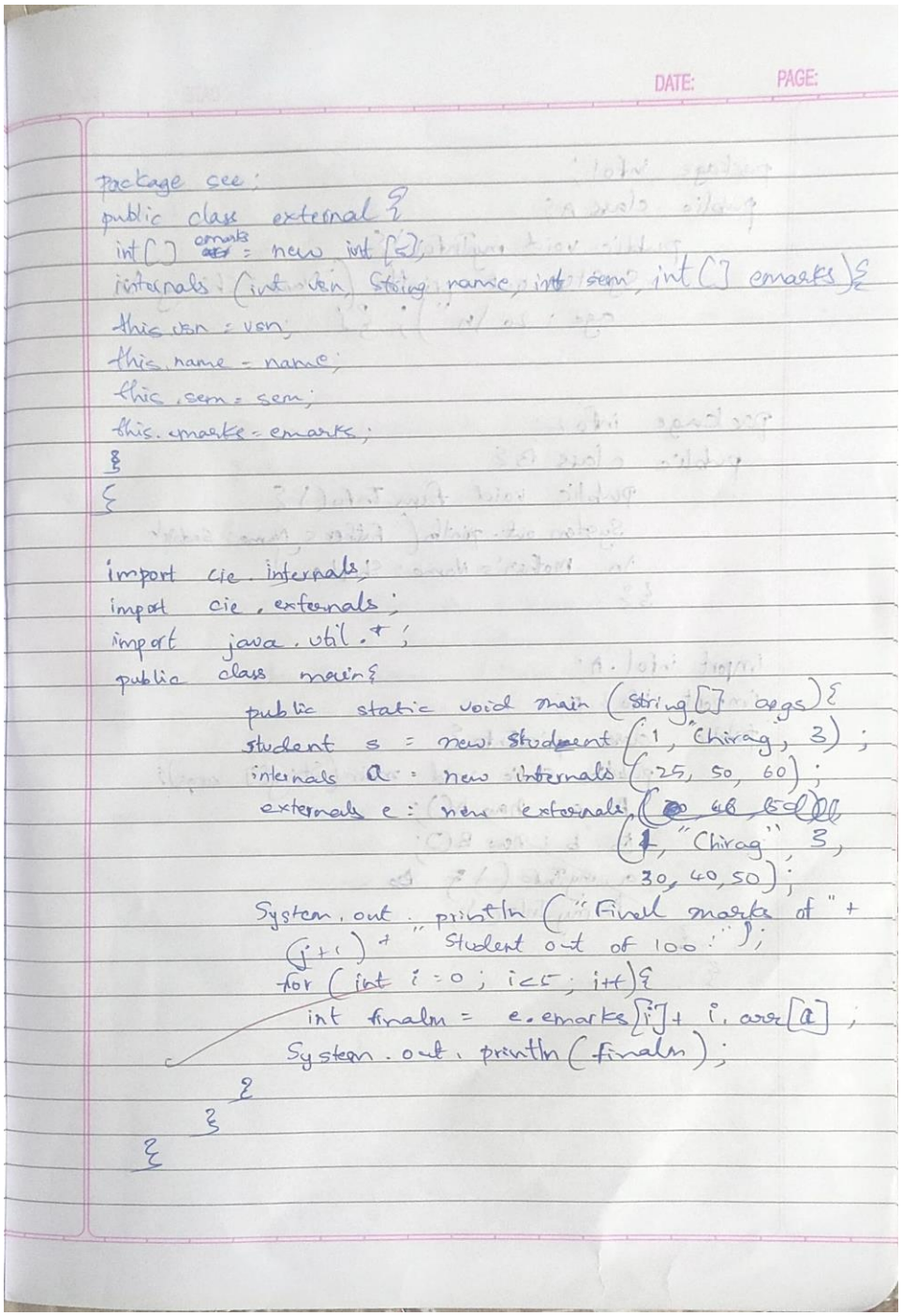


1) Create a package CIE which has two class - Student and Internals. The class Personal has members like usn, name, sem. The class internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student.

2) Create two packages to displays Student and his family info import packages in third class and run the program.

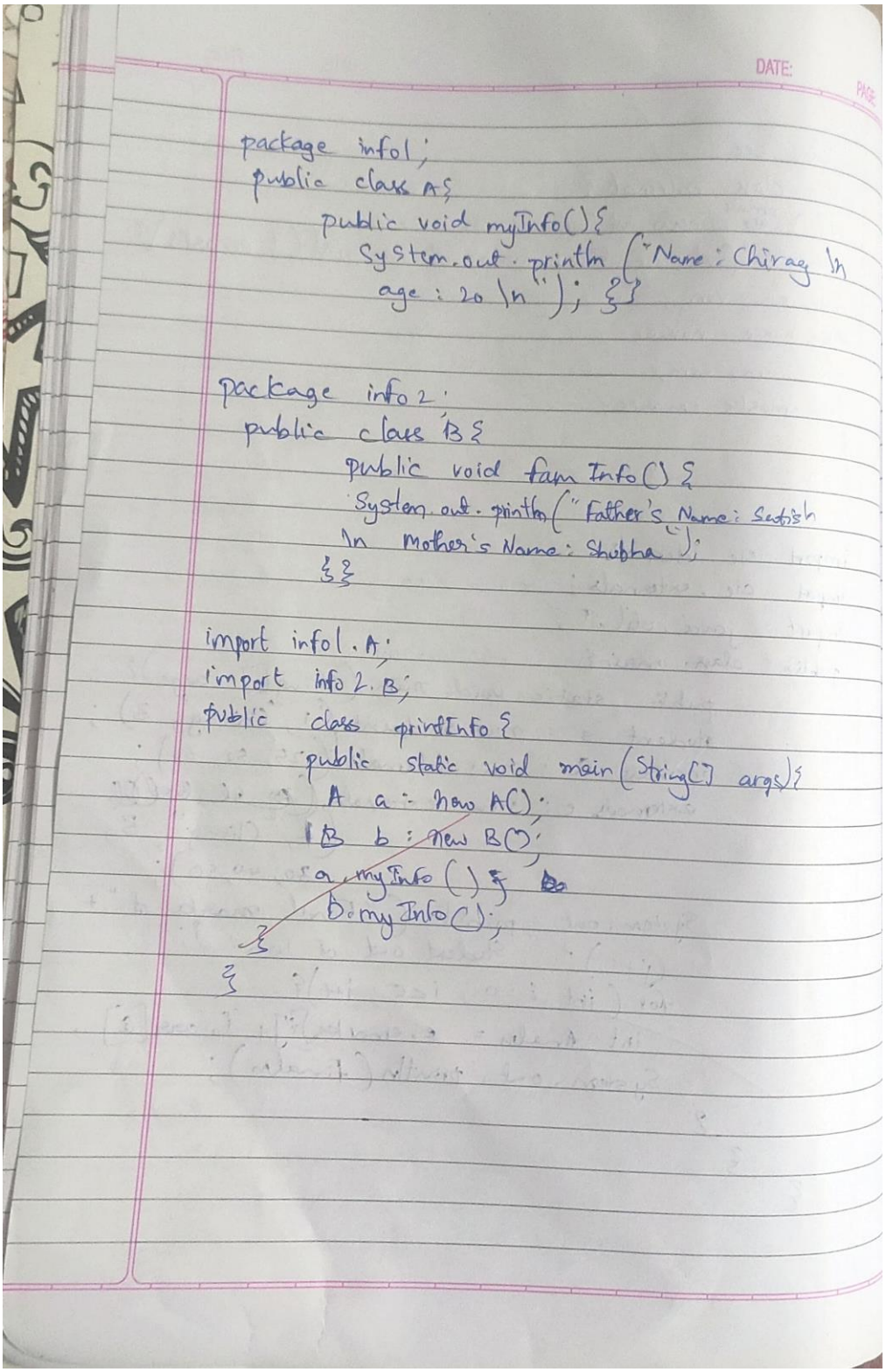
Answers

```
package cie;
public class student {
  int usn;
  String name;
  int sem;
  Student (int usn, String name, int sem){
  this.usn = usn;
  this.name = name;
  this.sem = sem;
}
public class internals {
 int [] arr = new int [5];
 internals (int[] arr){
 this.arr = arr;
}
```



DATE: PAGE:

```
package cce;
public class external {
int[] emarks = new int[5];
internals (int vsn, String name, int sem, int[] emarks){
this.vsn = vsn;
this.name = name;
this.sem = sem;
this.emarks = emarks;
}
}

import cie.internals;
import cie.externals;
import java.util.*;
public class main{
        public static void main (String[] args){
        student s = new student (1, Chirag, 3);
        internals a = new internals (25, 50, 60);
        externals e = new externals ((1, "Chirag", 3,
                                      30, 40, 50);
        System.out.println ("Final marks of " +
          (j+1) + " student out of 100:");
        for (int i=0; i<5; i++){
            int finalm = e.emarks[i] + i.asv[a];
            System.out.println (finalm);
        }
    }
}
```



```
package info1;
public class A{
    public void myInfo(){
        System.out.println("Name: Chirag \n
        age: 20 \n"); {}

package info2;
public class B{
    public void famInfo(){
    System.out.println("Father's Name: Satish
    \n Mother's Name: Shubha");
    }}

import info1.A;
import info2.B;
public class printInfo{
    public static void main(String[] args){
        A a = new A();
        B b = new B();
        a.myInfo();
        b.myInfo();
    }
}
```

Code:

```
package CIE;

import java.util.Scanner;

public class Internals extends Student {

    int[] cieMarks = new int[5];

    public void inputCIEMarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter CIE marks for 5 subjects:");
        for (int i = 0; i < 5; i++) {
            System.out.print("Subject " + (i + 1) + ": ");
            cieMarks[i] = s.nextInt();
        }
    }

    public int[] getCieMarks() {
        return cieMarks;
    }
}
```

```
package CIE;

import java.util.Scanner;

public class Student {
    protected String usn;
    protected String name;
    protected int sem;

    public void inputStudentDetails() {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter USN: ");
        usn = s.nextLine();
        System.out.print("Enter Name: ");
        name = s.nextLine();
```

```
        System.out.print("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.Student;
import java.util.Scanner;

public class External extends Student {
    int[] seeMarks = new int[5];

    public void inputSEEMarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter SEE marks for 5 subjects:");
        for (int i = 0; i < 5; i++) {
            System.out.print("Subject " + (i + 1) + ": ");
            seeMarks[i] = s.nextInt();
        }
    }

    public int[] getSeeMarks() {
        return seeMarks;
    }
}


import CIE.Internals;
import SEE.External;
import java.util.Scanner;

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

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

System.out.print("Enter the number of students: ");
int numStudents = sc.nextInt();
sc.nextLine();

Internals[] cieStudents = new Internals[numStudents];
External[] seeStudents = new External[numStudents];

for (int i = 0; i < numStudents; i++) {
   System.out.println("\nEnter details for student " + (i + 1) + ":");

   cieStudents[i] = new Internals();
   cieStudents[i].inputStudentDetails();
   cieStudents[i].inputCIEMarks();

   seeStudents[i] = new External();
   seeStudents[i].inputSEEMarks();
}

System.out.println("\nFinal marks for each student:");
for (int i = 0; i < numStudents; i++) {
   System.out.println("\nDetails for student " + (i + 1) + ":");
   cieStudents[i].displayStudentDetails();

   int[] cieMarks = cieStudents[i].getCieMarks();
   int[] seeMarks = seeStudents[i].getSeeMarks();
   int[] finalMarks = new int[5];

   System.out.println("Final marks in each subject:");
   for (int j = 0; j < 5; j++) {
      finalMarks[j] = cieMarks[j] + seeMarks[j];
      System.out.println("Subject " + (j + 1) + ": " + finalMarks[j]);
   }
}

sc.close();

System.out.println("Chirag S");
System.out.println("1BM23CS079");
```

```
    }
}
```

```
C:\Users\Chirag\Desktop\college\java\Main>javac CIE/Internals.java CIE/Student.java SEE/External.java Main.java

C:\Users\Chirag\Desktop\college\java\Main>java Main
Enter the number of students: 1

Enter details for student 1:
Enter USN: 079
Enter Name: Chirag
Enter Semester: 3
Enter CIE marks for 5 subjects:
Subject 1: 67
Subject 2: 89
Subject 3: 65
Subject 4: 98
Subject 5: 87
Enter SEE marks for 5 subjects:
Subject 1: 87
Subject 2: 66
Subject 3: 78
Subject 4: 97
Subject 5: 56

Final marks for each student:

Details for student 1:
USN: 079
Name: Chirag
Semester: 3
Final marks in each subject:
Subject 1: 154
Subject 2: 155
Subject 3: 143
Subject 4: 195
Subject 5: 143
Chirag S
1BM23CS079
```

Program 7

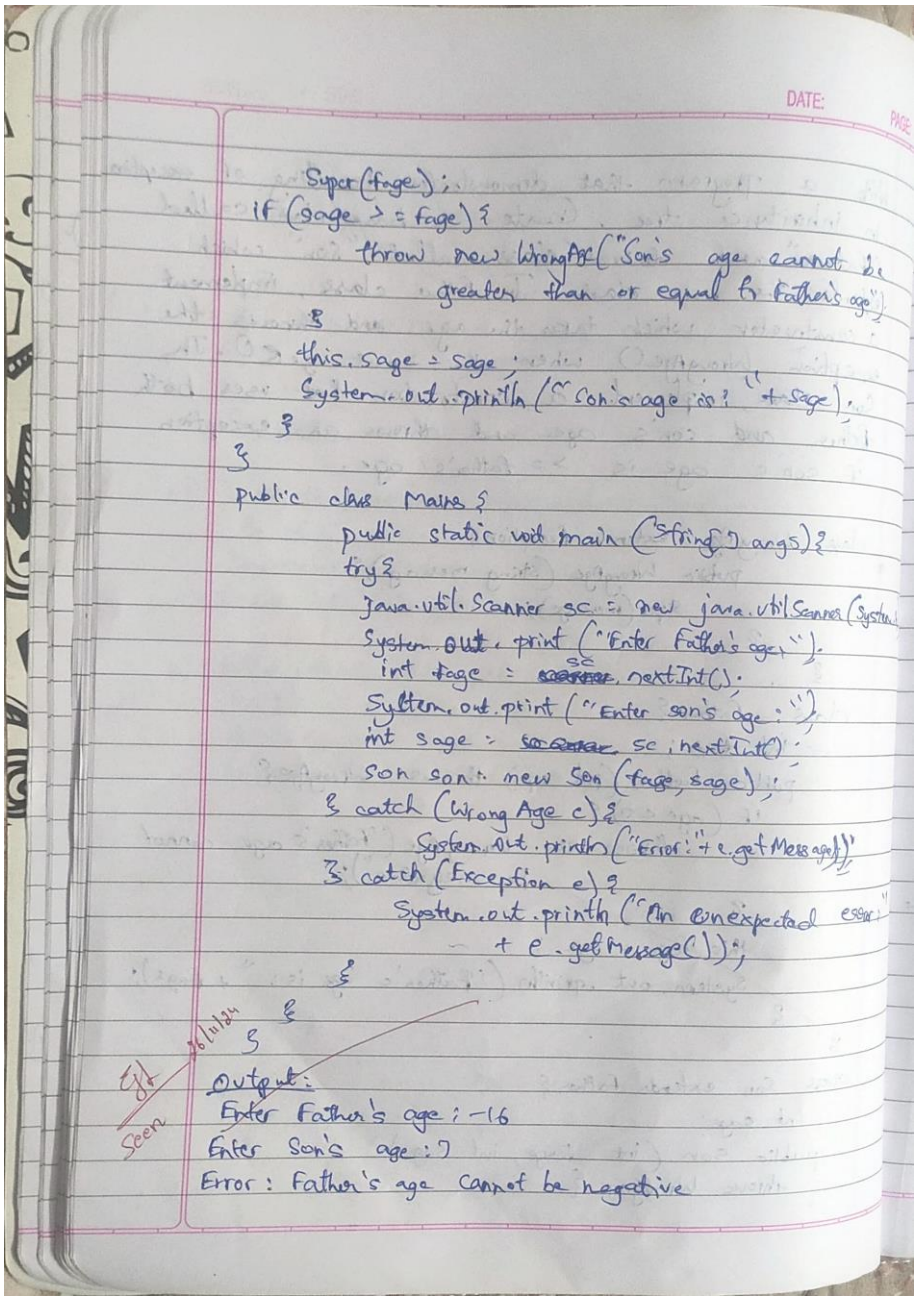
Exception handling

Algorithm:

DATE: PAGE:

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

```
class WrongAge extends Exception{
        public WrongAge (String message){
            super(message);
        }
    }
class Father{
    int fage;
    public Father (int age) throws WrongAge{
      if (age<0){
            throw new WrongAge ("Father's age cannot
                    be negative");
      }
      this.fage = age;
      System.out.println ("Father's age is: " + fage);
    }
}
class Son extends Father{
    int sage;
    public Son (int forge, int sage)
      throws Wrongage{
```



```
        super(fage);
    if (sage >= fage){
        throw new WrongAge("Son's age cannot be
                greater than or equal to Father's age");
    }
    this.sage = sage;
    System.out.println("Son's age is: "+sage);
    }
}
public class Main{
    public static void main(String[] args){
    try{
    java.util.Scanner sc = new java.util.Scanner(System.
    System.out.print("Enter Father's age: ");
    int fage = sc.nextInt();
    System.out.print("Enter son's age: ");
    int sage = sc.nextInt();
    Son son = new Son(fage, sage);
    } catch (WrongAge e){
        System.out.println("Error: "+e.getMessage());
    } catch (Exception e){
        System.out.println("An unexpected error
            + e.getMessage());
    }
}
```

Output:

```
Enter Father's age: -16
Enter Son's age: 7
Error: Father's age cannot be negative
```

Code:

import java.util.Scanner;

```
class WrongAge extends Exception {

    public WrongAge() {
        super("Age Error");
    }

    public WrongAge(String message) {
        super(message);
    }
}

class Father {
    protected int fatherAge;

    public Father() throws WrongAge {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter Father's Age: ");
        fatherAge = s.nextInt();
        if (fatherAge < 0) {
            throw new WrongAge("Age cannot be negative");
        }
    }

    public void display() {
        System.out.println("Father's Age: " + fatherAge);
    }
}

class Son extends Father {
    private int sonAge;

    public Son() throws WrongAge {
        super();
        Scanner s = new Scanner(System.in);
        System.out.print("Enter Son's Age: ");
        sonAge = s.nextInt();
        if (sonAge < 0) {
            throw new WrongAge("Age cannot be negative");
        } else if (sonAge >= fatherAge) {
            throw new WrongAge("Son's age cannot be greater than or equal to Father's
```

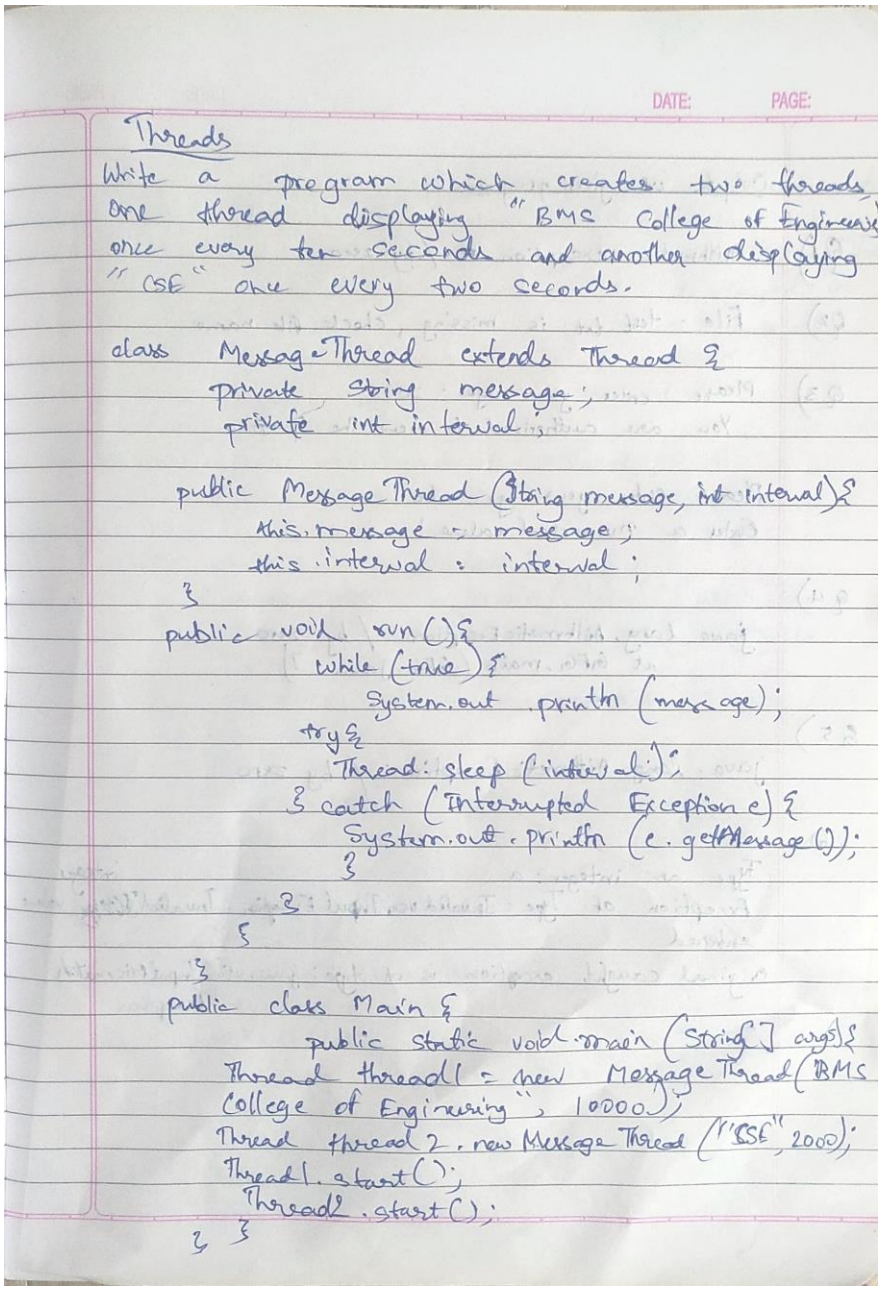
```
age");
        }
    }

    @Override
    public void display() {
        super.display();
        System.out.println("Son's Age: " + sonAge);
    }
}

public class Main7 {
    public static void main(String[] args) {
        try {
            Son son = new Son();
            son.display();
        } catch (WrongAge e) {
            System.out.println("Exception Caught: " + e.getMessage());
        }

        System.out.println("Chirag S");
        System.out.println("1BM23CS079");
    }
}
```

```
C:\Users\Chirag\Desktop\college\jlab>javac Main7.java

C:\Users\Chirag\Desktop\college\jlab>java Main7
Enter Father's Age: 50
Enter Son's Age: 20
Father's Age: 50
Son's Age: 20
Chirag S
1BM23CS079
```

Program 8

Threads

Algorithm:



Code:

```
import java.util.Scanner;

class WrongAge extends Exception {

    public WrongAge() {
        super("Age Error");
    }
```

```
    public WrongAge(String message) {
        super(message);
    }
}

class Father {
    protected int fatherAge;

    public Father() throws WrongAge {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter Father's Age: ");
        fatherAge = s.nextInt();
        if (fatherAge < 0) {
            throw new WrongAge("Age cannot be negative");
        }
    }

    public void display() {
        System.out.println("Father's Age: " + fatherAge);
    }
}

class Son extends Father {
    private int sonAge;

    public Son() throws WrongAge {
        super();
        Scanner s = new Scanner(System.in);
        System.out.print("Enter Son's Age: ");
        sonAge = s.nextInt();
        if (sonAge < 0) {
            throw new WrongAge("Age cannot be negative");
        } else if (sonAge >= fatherAge) {
            throw new WrongAge("Son's age cannot be greater than or equal to Father's
age");
        }
    }

    @Override
    public void display() {
```

```
        super.display();
        System.out.println("Son's Age: " + sonAge);
    }
}

public class Main8 {
    public static void main(String[] args) {
        try {
            Son son = new Son();
            son.display();
        } catch (WrongAge e) {
            System.out.println("Exception Caught: " + e.getMessage());
        }

        System.out.println("Chirag S");
        System.out.println("1BM23CS079");
    }
}
```

```
C:\Users\Chirag\Desktop\college\jlab>javac Main8.java

C:\Users\Chirag\Desktop\college\jlab>java Main8
Chirag S
1BM23CS079
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
BMS College of Engineering
```

Program 9

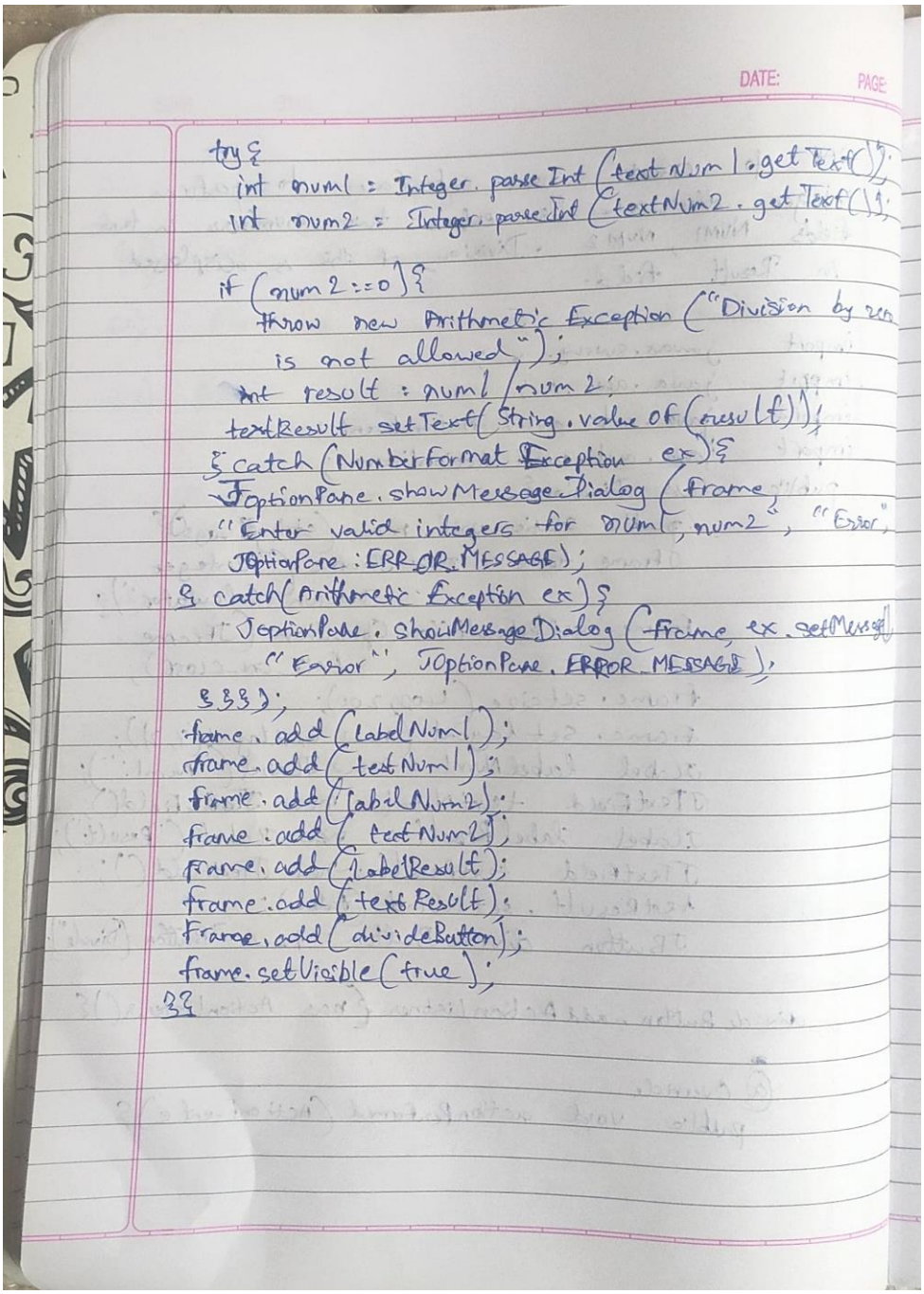
Calculator

Algorithm:

DATE: PAGE:

WAP to create user interface to perform integer division. User enters two numbers in text fields Num1, Num2. Division of this is displayed in Result field.

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListner;
public class Division{
    public static void main (String[] args){
    JFrame frame = new JFrame ("Integer
                    Division Calculator");
    frame.setDefaultCloseOperation (JFrame.
                    EXIT_ON_CLOSE);
    frame.setsize (400, 200);
    frame.setLayout (new GridLayout(4, 2));
    JLabel labelNum1 = new JLabel ("Num1:");
    JTextField textNum1 = new JTextField();
    JLabel labelResult = new JLabel ("Result:");
    JTextField textResult = new JTextField();
    textResult.setEditable (false);
    JButton divideButton = new JButton ("Divide"

divideButton.addActionListner {new ActionListener(){

@Override
public void actionPerformed (ActionEvent e){
```

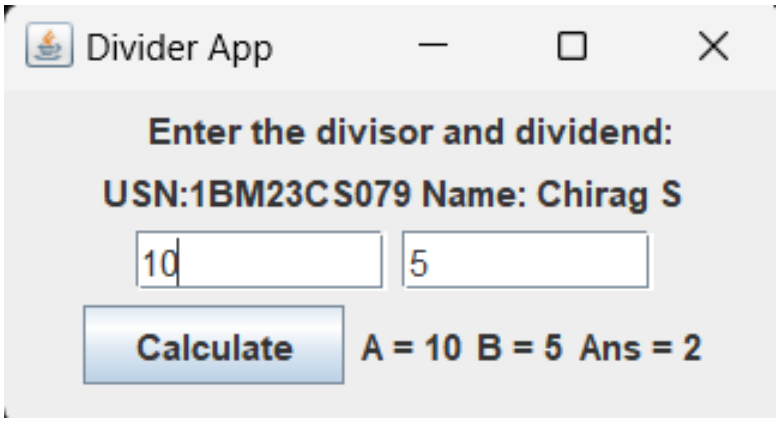


Code:

```
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 divisor and dividend:");
      JLabel jlab1 = new JLabel("USN:1BM23CS079 Name: Chirag S");
      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(jlab1);
      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("A = " + a);
                blab.setText("B = " + b);
                anslab.setText("Ans = " + ans);
                err.setText("");
            } 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();
      }
    });
  }
}
```


Divider App
Enter the divisor and dividend:
USN:1BM23CS079 Name: Chirag S
10
5
Calculate
A = 10 B = 5 Ans = 2