VISVESVARAYA TECHNOLOGICAL UNIVERSITY
“JnanaSangama”, Belgaum -590014, Karnataka.

LAB REPORT
on

OBJECT ORIENTED JAVA PROGRAMMING

Submitted by
P Sai Krishna (1BM21CS123)

in partial fulfillment 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)
BENGALURU-560019
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B. M. S. College of Engineering,
Bull Temple Road, Bangalore 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 lab” carried out by P Sai Krishna (1BM21CS123), who is bonafide student of B.M. S. College of Engineering. It is in partial fulfillment for the award of Bachelorof Engineering in Computer Science and Engineering of the Visvesvaraya Technological University, Belgaum during the year 2022-23. The Lab report has been approved as it satisfies the academic requirements in respect of Object oriented java programming Lab - (21CS3PCOOJ) work prescribed for the said degree.

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Index Sheet

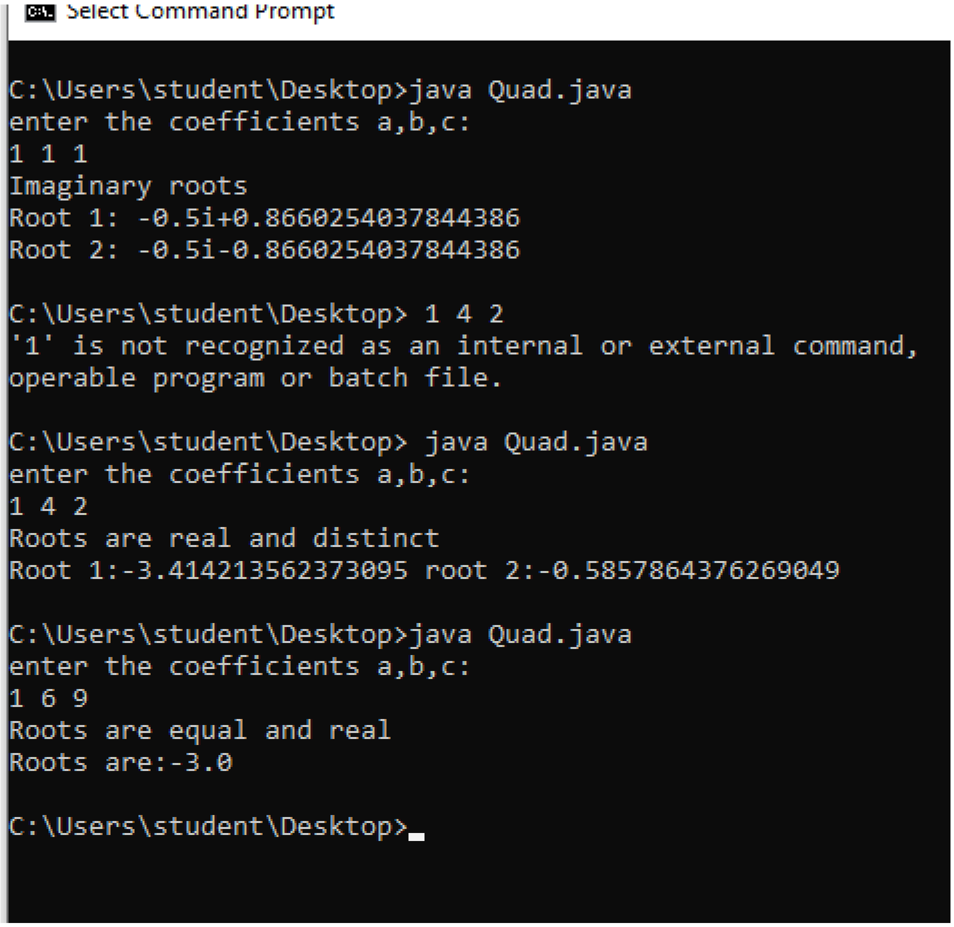
Course Outcome

CO1	Apply the knowledge of Java concepts to find the solution for a given problem.
CO2	Analyze the given Java application for correctness/functionalities.
CO3	Develop Java programs / applications for a given requirement.
CO4	Conduct practical experiments for demonstrating features of Java.

LAB PROGRAM 1: QUADRATIC EQUATIONS

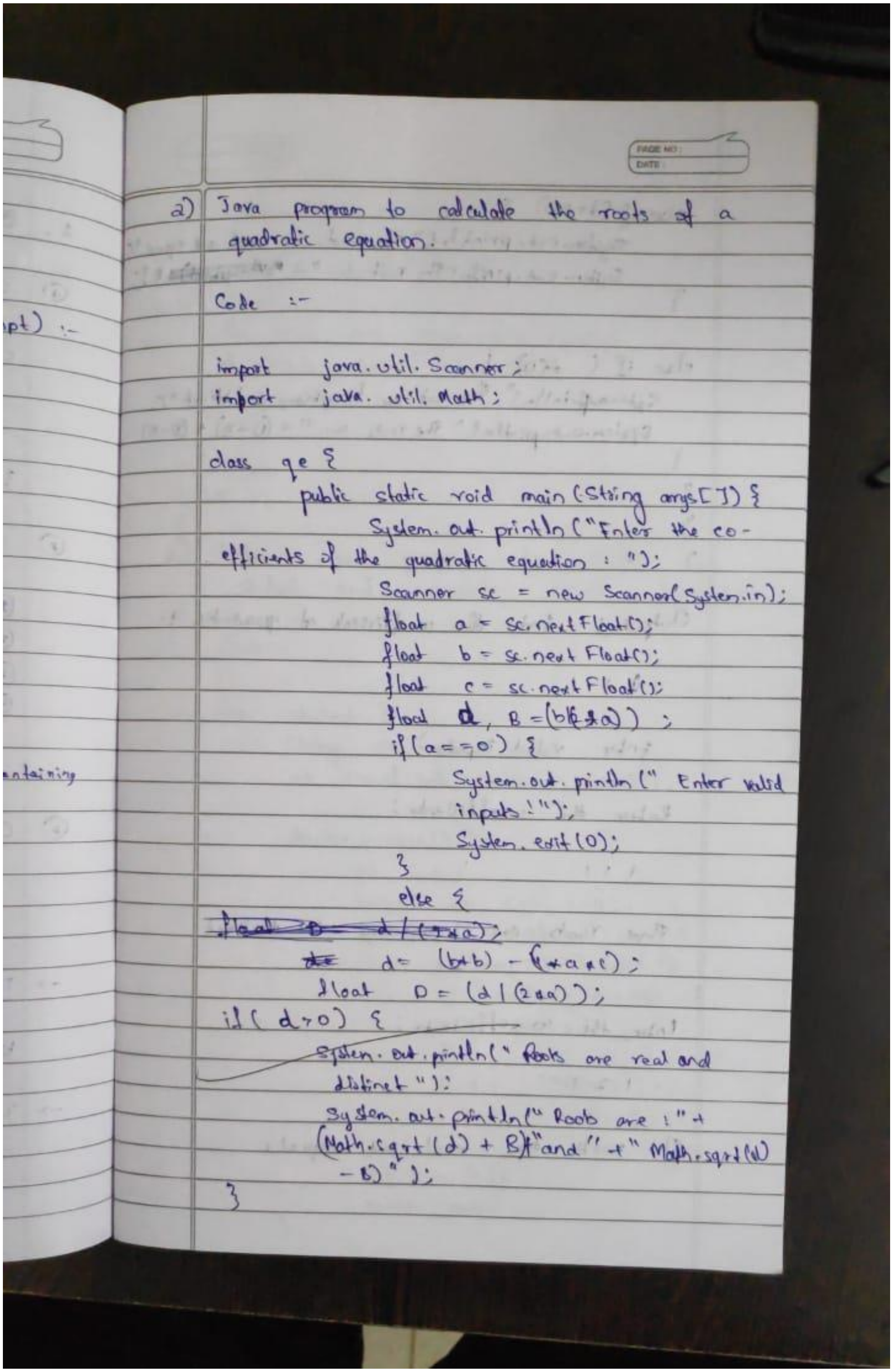
CODE:

```
import java.util.Scanner;
import java.lang.Math;
public class Trial
{
    public static void main(String[] args)
        {
            Scanner s = new Scanner(System.in);
            System.out.println("Enter the coefficients: ");
            float a = s.nextFloat();
            float b = s.nextFloat();
            float c = s.nextFloat();
            double r1,r2;
            float d = (b*b)-(4.0f*a*c);
            if(d>0)
            {
                r1=(-b+Math.sqrt(d))/(2*a);
                r2=(-b-Math.sqrt(d))/(2*a);
                System.out.println("Roots are Real");
                System.out.println("Root 1: "+r1+" Root 2: "+r2);
            }
             else if(d==0)
            {
                r1=(-b)/(2*a);
                System.out.println("Roots are Equal");
                System.out.println("Root is: "+r1);
            }


        else
            {
                double e =(-b)/(2.0f*a);
                double f =(Math.sqrt(-d))/(2*a);
                System.out.println("Roots are imaginary");
                System.out.println("Root 1: "+e+"i+"+f);
                System.out.println("Root 2: "+e+"i-"+f);
            }
        }
}
```



```
C:\Users\student\Desktop>java Quad.java
enter the coefficients a,b,c:
1 1 1
Imaginary roots
Root 1: -0.5i+0.8660254037844386
Root 2: -0.5i-0.8660254037844386

C:\Users\student\Desktop> 1 4 2
'1' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\student\Desktop> java Quad.java
enter the coefficients a,b,c:
1 4 2
Roots are real and distinct
Root 1:-3.414213562373095 root 2:-0.5857864376269049

C:\Users\student\Desktop>java Quad.java
enter the coefficients a,b,c:
1 6 9
Roots are equal and real
Roots are:-3.0

C:\Users\student\Desktop>
```

Observation Book:



PAGE NO:
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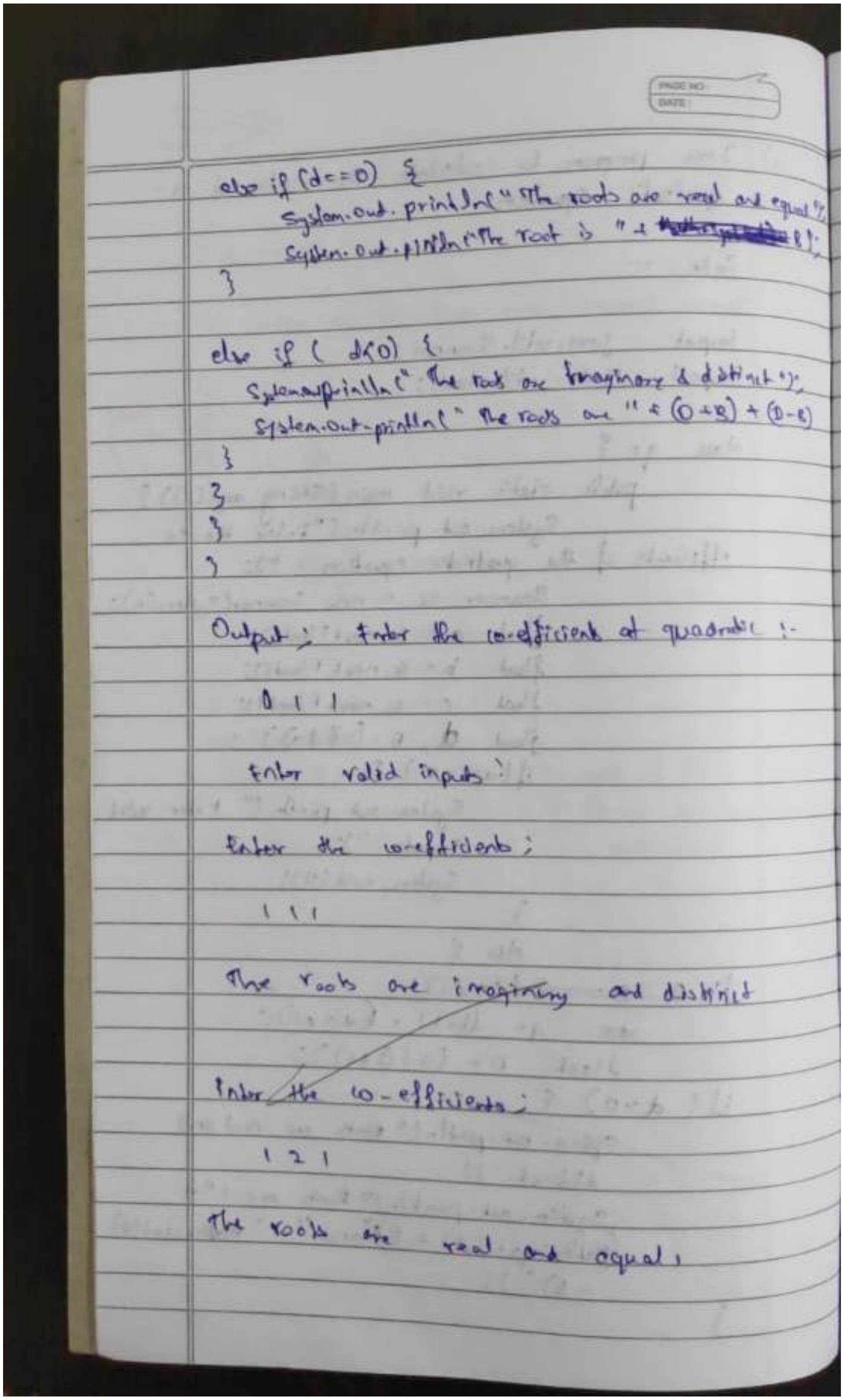
a) Java program to calculate the roots of a quadratic equation.

Code :-

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

class qe {
        public static void main(String args[]) {
                System.out.println("Enter the co-
efficients of the quadratic equation : ");
                Scanner sc = new Scanner(System.in);
                float  a = sc.nextFloat();
                float  b = sc.nextFloat();
                float  c = sc.nextFloat();
                float  d, B =(b/(2*a)) ;
                if(a==0) {
                        System.out.println(" Enter valid
                        inputs!");
                        System.exit(0);
                }
                else {
~~float B = d/(2*a);~~
        ~~de~~   d= (b*b) - (4*a*c);
        float   D = (d/(2*a));
if( d>0) {
        System.out.println(" Roots are real and
        distinct ");
        System.out.println(" Roots are :" +
        (Math.sqrt(d) + B)+"and" +" Math.sqrt(d)
         - B)" );
}
```



```
else if (d==0) {
    System.out.println("The roots are real and equal");
    System.out.println("The root is " + [illegible] B);
}

else if ( d<0) {
    System.out.println(" The roots are imaginary & distinct ");
    System.out.println(" The roots are " + (D+B) + (D-B)
}
}
}
}
```

Output ; Enter the co-efficient of quadratic :-

```
0 1 1
        h
Enter valid inputs !

Enter the co-efficients ;

1 1 1

The roots are imaginary and distinct

Enter the co-efficients ;

1 2 1

The roots are real and equal ,
```

LAB PROGRAM 2: SGPA CALCULATION

CODE:

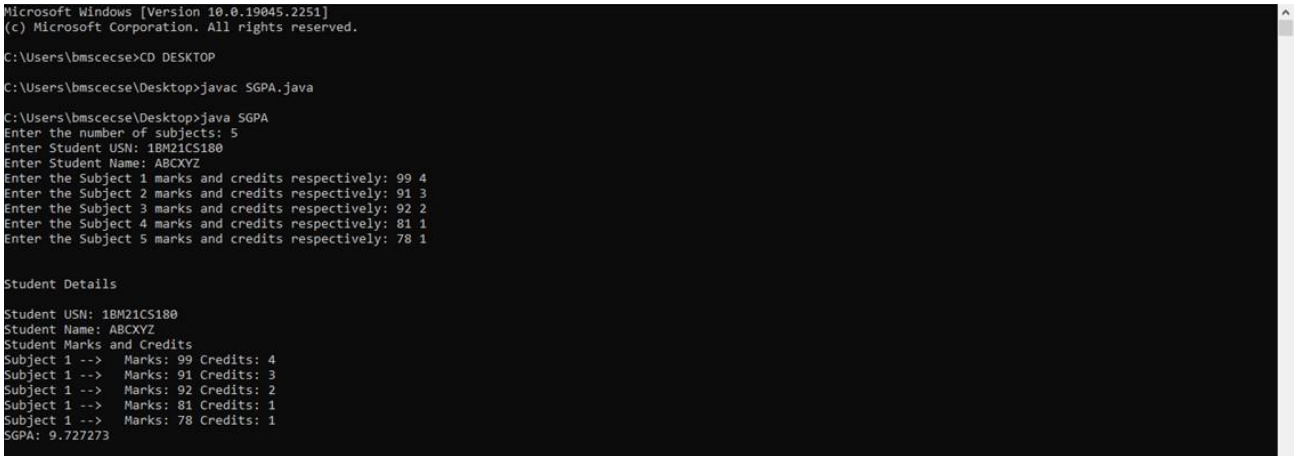
```
import java.util.Scanner;
class Student
{
    String  USN;
    String name;
    int[] credits = new int[20];
    int[] marks = new int[20];
    void input(int n)
    {
    Scanner s = new Scanner(System.in);
    System.out.print("Enter Student USN: ");
    USN = s.nextLine();
    System.out.print("Enter Student Name: ");
    name = s.nextLine();
    for(int i=0;i<n;i++)
    {
    System.out.print("Enter the Subject "+(i+1)+" marks and credits respectively: ");
    marks[i] = s.nextInt();
credits[i] = s.nextInt();
}
}
float calculate(int n)
{
int sum_of_credits = 0;
float result=0.0f;
for(int i=0;i<n;i++)
{
sum_of_credits+=credits[i];
  if(calculate_grade_point(marks[i])==-1)
            return -1.0f;
else
{
            result = result +(float) (calculate_grade_point(marks[i])*credits[i]);
}
}

return (result/sum_of_credits);
}


int calculate_grade_point(int marks)
```

```
{
if(marks>=90)
return 10;
else if ((marks>=80)&&(marks<90))
return 9;
else if ((marks>=70)&&(marks<80))
return 8;
else if ((marks>=60)&&(marks<70))
return 7;
else if ((marks>=50)&&(marks<60))
return 6;
else if ((marks>=40)&&(marks<50))
return 5;
return -1;
}

void display(int n,float result)
{
System.out.println("\n");
System.out.println("Student Details");
System.out.println();
```

```
        System.out.println("Student USN: "+USN);

        System.out.println("Student Name: "+name);

        System.out.println("Student Marks and Credits");

        for(int i=0;i<n;i++)

        {

        System.out.println("Subject 1 -->\tMarks: "+marks[i]+" Credits:
"+credits[i]);

        }

        System.out.println("SGPA: "+result);

        }

}

public class Lab_02_SGPA

{

        public static void main(String[] args)

        {

        Scanner s = new Scanner(System.in);

        Student s1 = new Student();

        System.out.print("Enter the number of subjects: ");

        int n = s.nextInt();

        s1.input(n);

        float result = s1.calculate(n);

        if(result == -1.0f)
```

```
		{
		System.out.println();
		System.out.println("The Student has failed in a subject. SGPA cannot be calculated!");
		System.exit(0);
		}
		s1.display(n,result);
		}
	}
```

Output:



```
Microsoft Windows [Version 10.0.19045.2251]
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C:\Users\bmscecse>CD DESKTOP

C:\Users\bmscecse\Desktop>javac SGPA.java

C:\Users\bmscecse\Desktop>java SGPA
Enter the number of subjects: 5
Enter Student USN: 1BM21CS180
Enter Student Name: ABCXYZ
Enter the Subject 1 marks and credits respectively: 99 4
Enter the Subject 2 marks and credits respectively: 91 3
Enter the Subject 3 marks and credits respectively: 92 2
Enter the Subject 4 marks and credits respectively: 81 1
Enter the Subject 5 marks and credits respectively: 78 1


Student Details

Student USN: 1BM21CS180
Student Name: ABCXYZ
Student Marks and Credits
Subject 1 -->   Marks: 99 Credits: 4
Subject 1 -->   Marks: 91 Credits: 3
Subject 1 -->   Marks: 92 Credits: 2
Subject 1 -->   Marks: 81 Credits: 1
Subject 1 -->   Marks: 78 Credits: 1
SGPA: 9.727273
```
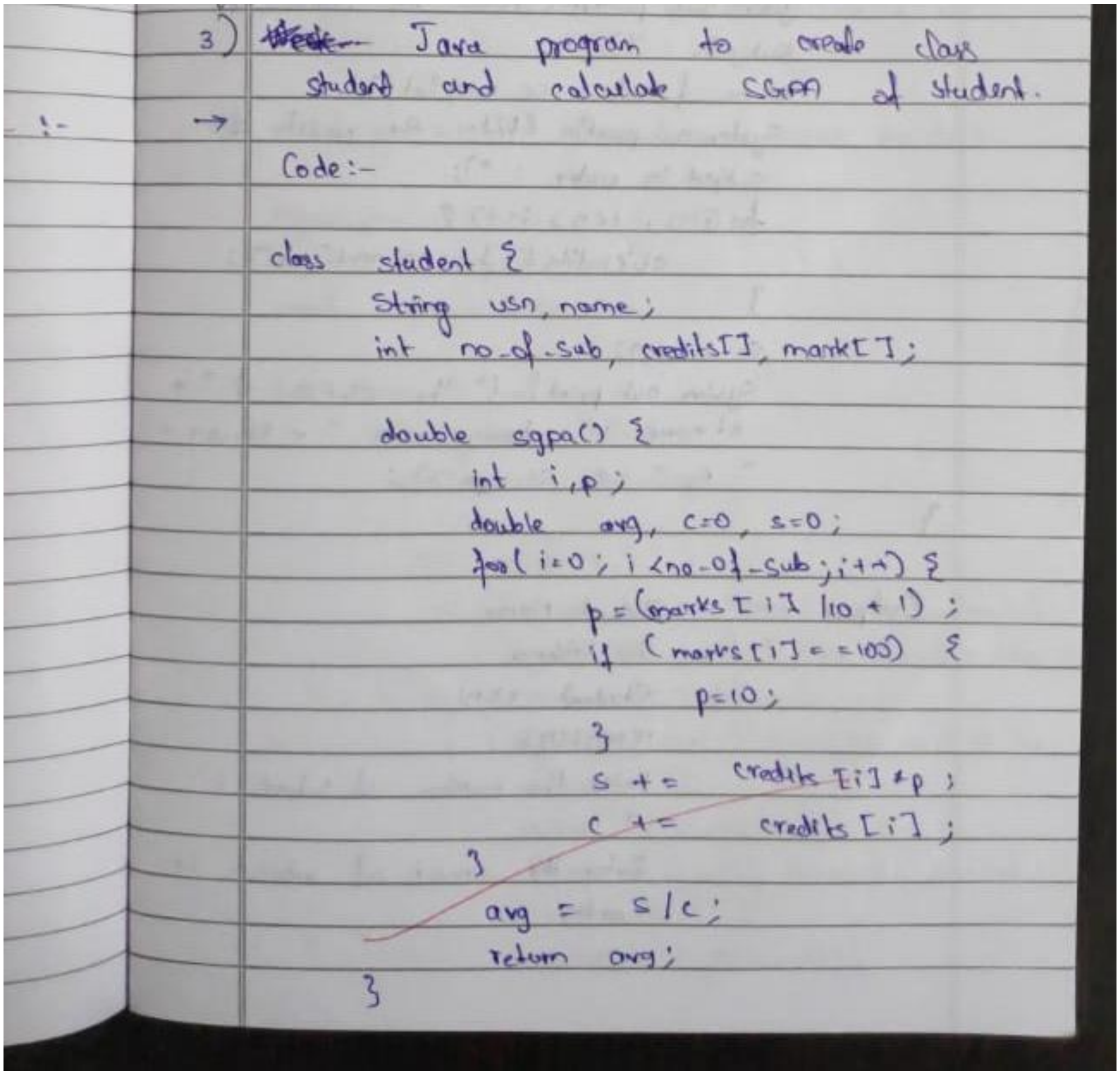

Observation Book:

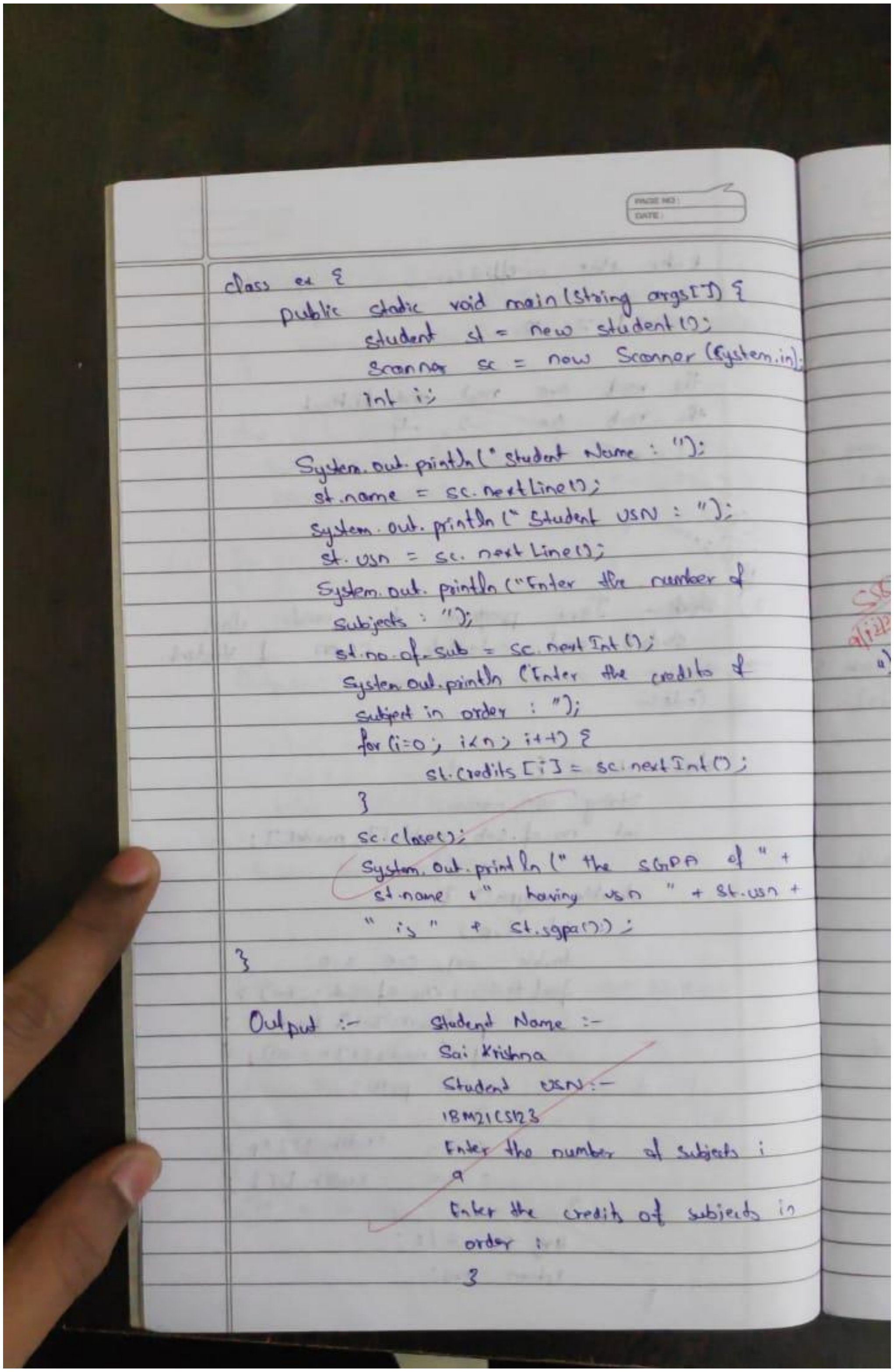


3) ~~Week~~ Java program to create class student and calculate SGPA of student.

→

Code:-

```
class student {
    String usn, name;
    int no_of_sub, credits[], mark[];

    double sgpa() {
        int i,p;
        double avg, c=0, s=0;
        for( i=0; i<no_of_sub; i++) {
            p=(marks[i] /10 + 1) ;
            if (marks[i]==100) {
                p=10;
            }
            s += credits[i]*p ;
            c += credits[i] ;
        }
        avg = s/c;
        return avg;
}
```



```
class ex {
    public static void main(String args[]) {
            student st = new student();
            Scanner sc = now Scanner (System.in);
            int i;

      System.out.println(" student Name : ");
       st.name = sc.nextLine();
       system.out.println(" Student USN : ");
        st.usn = sc.nextLine();
        System.out.println("Enter the number of
         subjects : ");
         st.no.of.sub = sc.nextInt();
          System.out.println ("Enter the credits of
           subject in order : ");
           for (i=0; i<n; i++) {
                  st.credits [i] = sc.nextInt();
           }
           sc.close();
           System.out.println(" the SGPA of " +
            st.name +" having usn " + st.usn +
            " is " + st.sgpa());
}

Output :-        Student Name :-
                  Sai Krishna
                  Student USN :-
                  1BM21CS123
                  Enter the number of subjects :
                  9
                  Enter the credits of subjects in
                    order :
                    3
```

LAB PROGRAM 3: IMPLEMENTING ARRAY OF OBJECTS

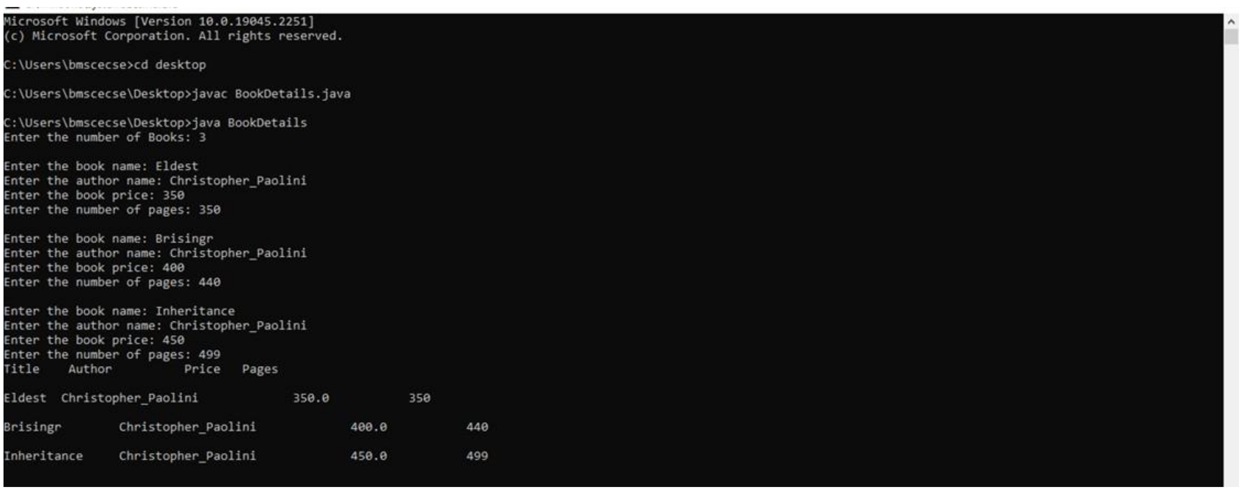
CODE

```
import java.util.*;
import java.io.*;

class Book
{
String title,author;
float price;
int num_pages;

Book()
{
title = "Default Value";
author = "Default Value";
price = 0.0f;
num_pages = 0;
}

void setTitle(String title)
{
```

```
this.title=title;
}

void setAuthor(String author)
{
this.author=author;
}

void setPrice(float price)
{
this.price=price;
}

void setPages(int num_pages)
{
this.num_pages = num_pages;
}


public String toString()
{
return title+"\t\t"+author+"\t\t"+price+"\t\t"+num_pages+"\n";
```

```
}



}


public class BookDetails


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


String t, a;
float p;
int np,n;
Scanner s = new Scanner(System.in);
System.out.print("Enter the number of Books: ");
n = s.nextInt();
Book[] b = new Book[n];
for(int i=0;i<n;i++)
{
System.out.println();
System.out.print("Enter the book name: ");
t = s.next();
System.out.print("Enter the author name: ");
a = s.next();
System.out.print("Enter the book price: ");
p = s.nextFloat();
System.out.print("Enter the number of pages: ");
np = s.nextInt();

b[i] = new Book();
b[i].setTitle(t);
b[i].setAuthor(a);
b[i].setPrice(p);
b[i].setPages(np);
}
System.out.println("Title \t\t Author \t\t Price \t\t Pages\n");
for(int i=0; i<n;i++)
{
System.out.println(b[i]);
}
}
}
```

Output:



```
Microsoft Windows [Version 10.0.19045.2251]
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C:\Users\bmscecse>cd desktop

C:\Users\bmscecse\Desktop>javac BookDetails.java

C:\Users\bmscecse\Desktop>java BookDetails
Enter the number of Books: 3

Enter the book name: Eldest
Enter the author name: Christopher_Paolini
Enter the book price: 350
Enter the number of pages: 350

Enter the book name: Brisingr
Enter the author name: Christopher_Paolini
Enter the book price: 400
Enter the number of pages: 440

Enter the book name: Inheritance
Enter the author name: Christopher_Paolini
Enter the book price: 450
Enter the number of pages: 499
Title    Author          Price   Pages

Eldest  Christopher_Paolini             350.0           350

Brisingr        Christopher_Paolini             400.0           440

Inheritance     Christopher_Paolini             450.0           499
```
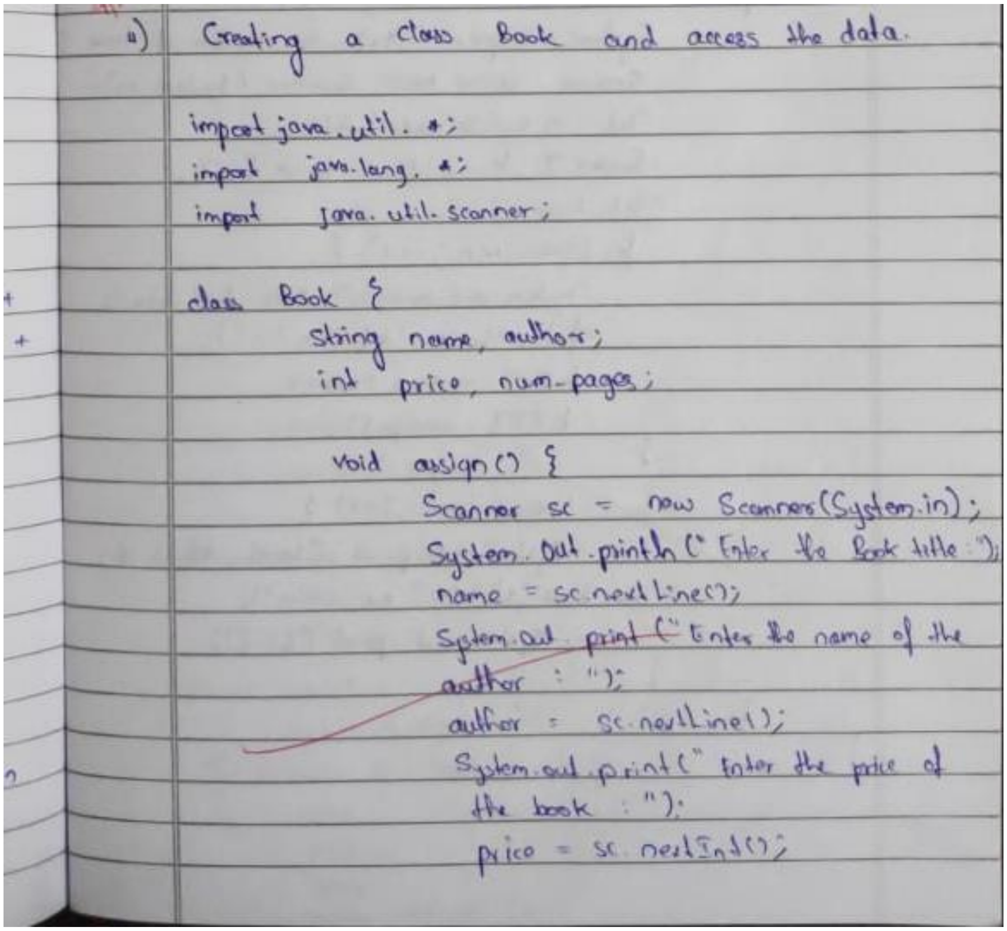
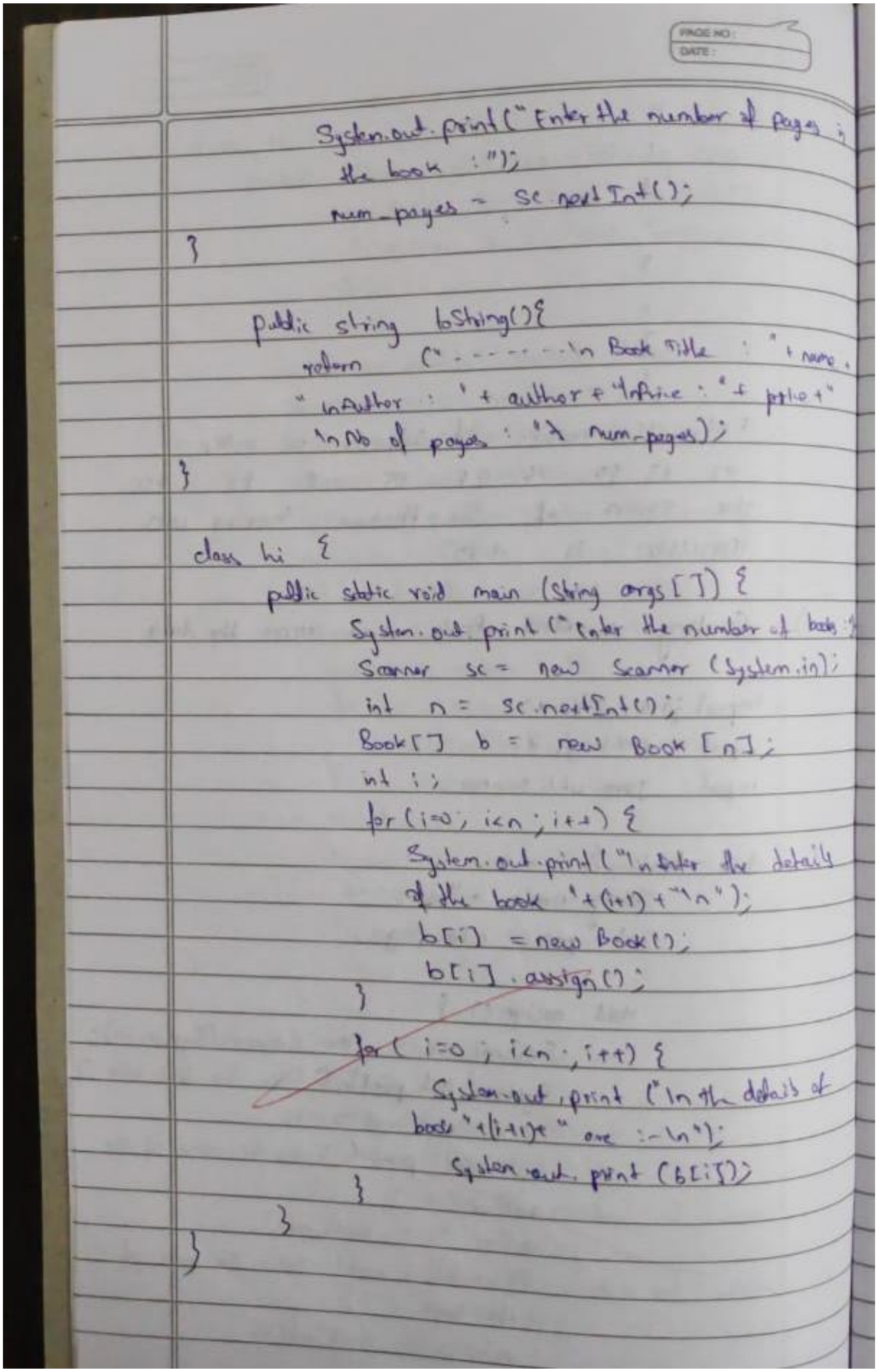

Observation Book:



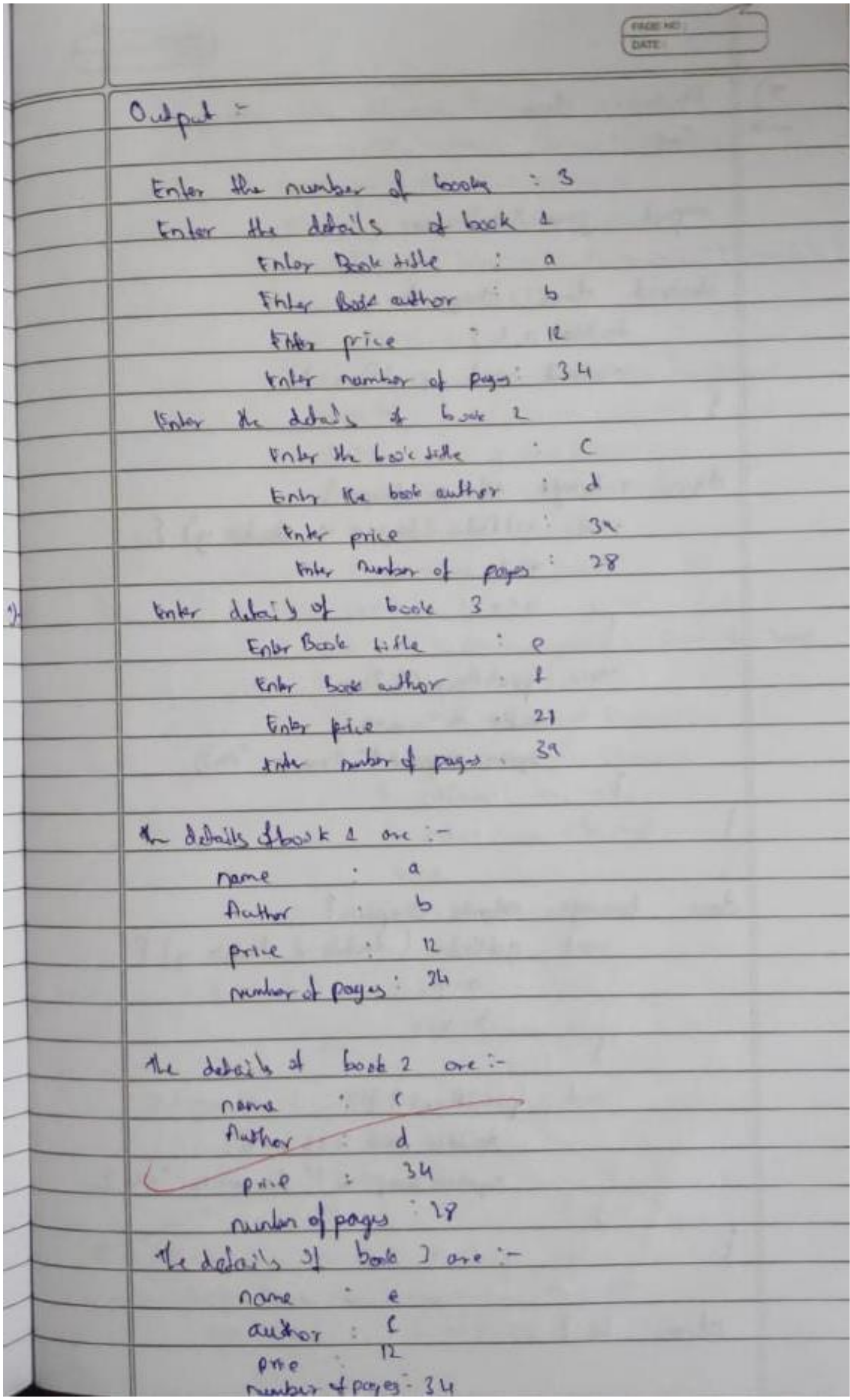
ii) Creating a class Book and access the data.

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

class  Book {
        String  name, author;
        int  price, num-pages;

          void  assign() {
                Scanner  sc  =  new  Scanners(System.in);
                System. out. println (" Enter  the  Book title :");
                name  = sc.nextLine();
                System.out. print (" Enter the name of the
                author  :  ");
                author  =  sc.nextLine();
                System.out.print(" Enter the price of
                the book  : ");
                price  =  sc. nextInt();
```



PAGE NO :
DATE :

```
        System.out.print("Enter the number of pages in
        the book :");
        num_pages = sc.nextInt();
}

    public string toString(){
        return ("------\n Book Title : " + name +
        "\nAuthor : " + author + "\nPrice : " + price + "
        \nNo of pages : " + num_pages);
}

class hi {
    public static void main (String args[]) {
        System.out.print("Enter the number of books :");
        Scanner sc = new Scanner (System.in);
        int n = sc.nextInt();
        Book[] b = new Book [n];
        int i;
        for (i=0; i<n; i++) {
            System.out.print("\n Enter the details
            of the book "+(i+1)+"\n");
            b[i] = new Book();
            b[i].assign();
        }
        for ( i=0 ; i<n ; i++) {
            System.out.print ("\n the details of
            book "+(i+1)+" are :-\n");
            System.out.print (b[i]);
        }
    }
}
```



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DATE:

Output :-

```
Enter the number of books   : 3
Enter the details of book 1
          Enter Book title      :  a
          Enter Book author     :  b
          Enter price           :  12
          Enter number of pages :  34
Enter the details of book 2
          Enter the book title      :  c
          Enter the book author     :  d
          Enter price               :  34
          Enter number of pages     :  28
Enter details of book 3
          Enter Book title      :  e
          Enter book author     :  f
          Enter price           :  21
          Enter number of pages :  39

The details of book 1 are :-
       name      :  a
       Author    :  b
       price     :  12
       number of pages :  34

The details of book 2 are :-
       name      :  c
       Author    :  d
       price     :  34
       number of pages :  28
The details of book 3 are :-
       name    :  e
       author  :  f
       price   :  12
       number of pages :  34
```

LAB

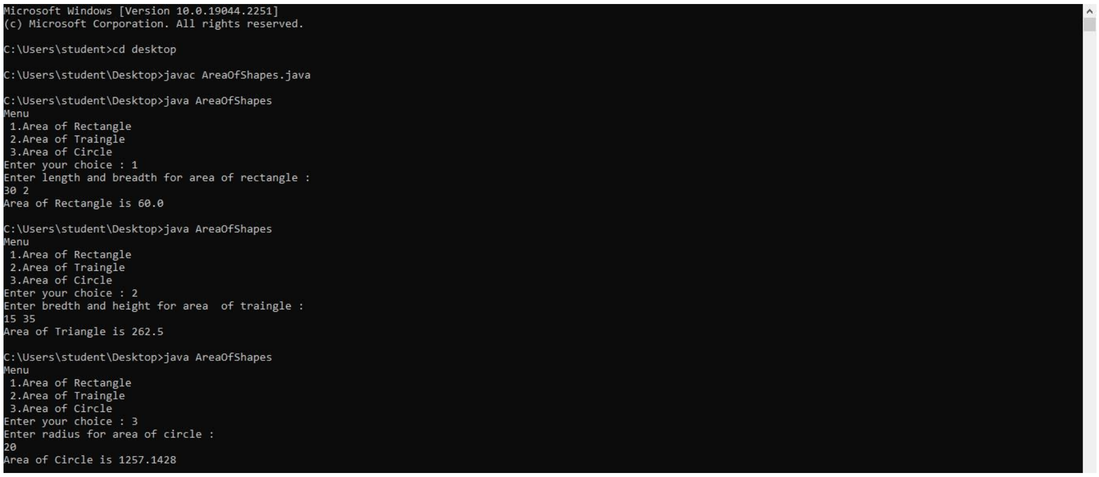
PROGRAM 4: CALCULATING AREA OF SHAPES (ABSTRACT CLASS)

CODE

```
import java.util.Scanner;
public class Shape1
{
    public static void main(String args[])
    {
    int choice;
    Scanner s = new Scanner(System.in);
    do
    {
    System.out.println("1. Calculate Area of Rectangle\n2. Calculate Area of Triangle\n3. Calculate Area of " +
        "Circle\n4. Exit the Program\n\nEnter the choice: ");
    choice = s.nextInt();
    switch(choice)
    {
        case 1: Rectangle r = new Rectangle();
        r.printArea();
        break;
        case 2: Triangle t = new Triangle();
        t.printArea();
        break;
        case 3: Circle c = new Circle();
        c.printArea();
        break;
        case 4: System.out.println("Exiting the program!");
        System.exit(0);
        break;
        default: System.out.println("\nInvalid Choice!\n");
    }
    }while(true);
    }
}

abstract class Shape
{
    int a,b;
    abstract void printArea();
}

class Rectangle extends Shape
{
    void printArea()
    {
    int area;
    Scanner s = new Scanner(System.in);
    System.out.println("Enter the length and breadth of rectangle: ");
    a = s.nextInt();
    b = s.nextInt();
    area = a*b;
    System.out.println("\nArea of Rectangle: "+area+"\n");
    }
}

class Triangle extends Shape
{
    void printArea()
    {
    float area;
    Scanner s = new Scanner(System.in);
    System.out.println("Enter the base and height of triangle: ");
    a = s.nextInt();
    b = s.nextInt();
    area = 0.5f*a*b;
```

```
        System.out.println("\nArea of triangle: "+area+"\n");
        }
}


class Circle extends Shape
{
        void printArea()
        {
        double area;
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the radius of circle: ");
        a = s.nextInt();
        area = Math.PI*a;
        System.out.println("Area of Circle: "+area+"\n");
        }
}
```

Output:



```
Microsoft Windows [Version 10.0.19044.2251]
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C:\Users\student>cd desktop

C:\Users\student\Desktop>javac AreaOfShapes.java

C:\Users\student\Desktop>java AreaOfShapes
Menu
 1.Area of Rectangle
 2.Area of Traingle
 3.Area of Circle
Enter your choice : 1
Enter length and breadth for area of rectangle :
30 2
Area of Rectangle is 60.0

C:\Users\student\Desktop>java AreaOfShapes
Menu
 1.Area of Rectangle
 2.Area of Traingle
 3.Area of Circle
Enter your choice : 2
Enter bredth and height for area  of traingle :
15 35
Area of Triangle is 262.5

C:\Users\student\Desktop>java AreaOfShapes
Menu
 1.Area of Rectangle
 2.Area of Traingle
 3.Area of Circle
Enter your choice : 3
Enter radius for area of circle :
20
Area of Circle is 1257.1428
```
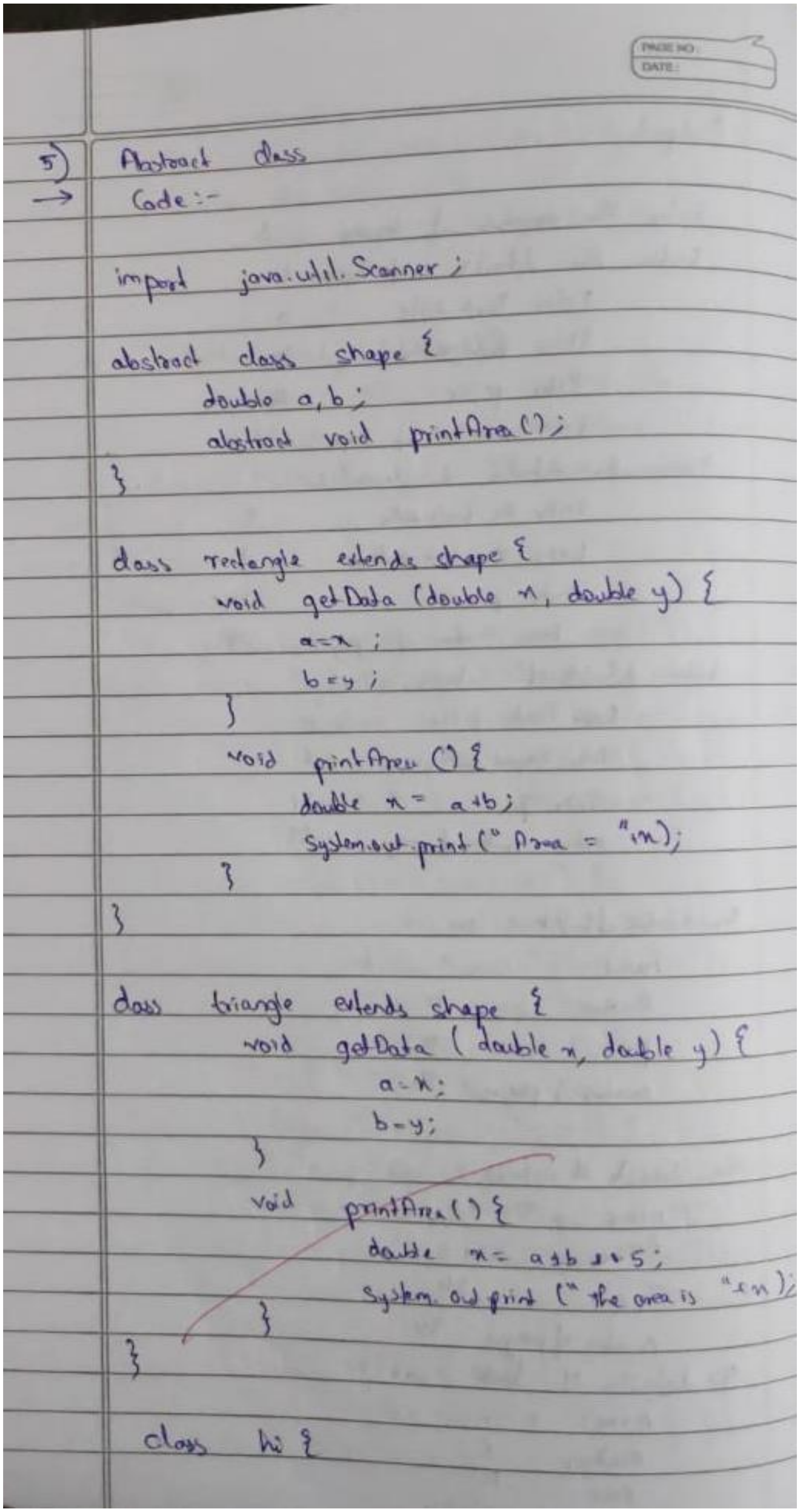

Observation Book:



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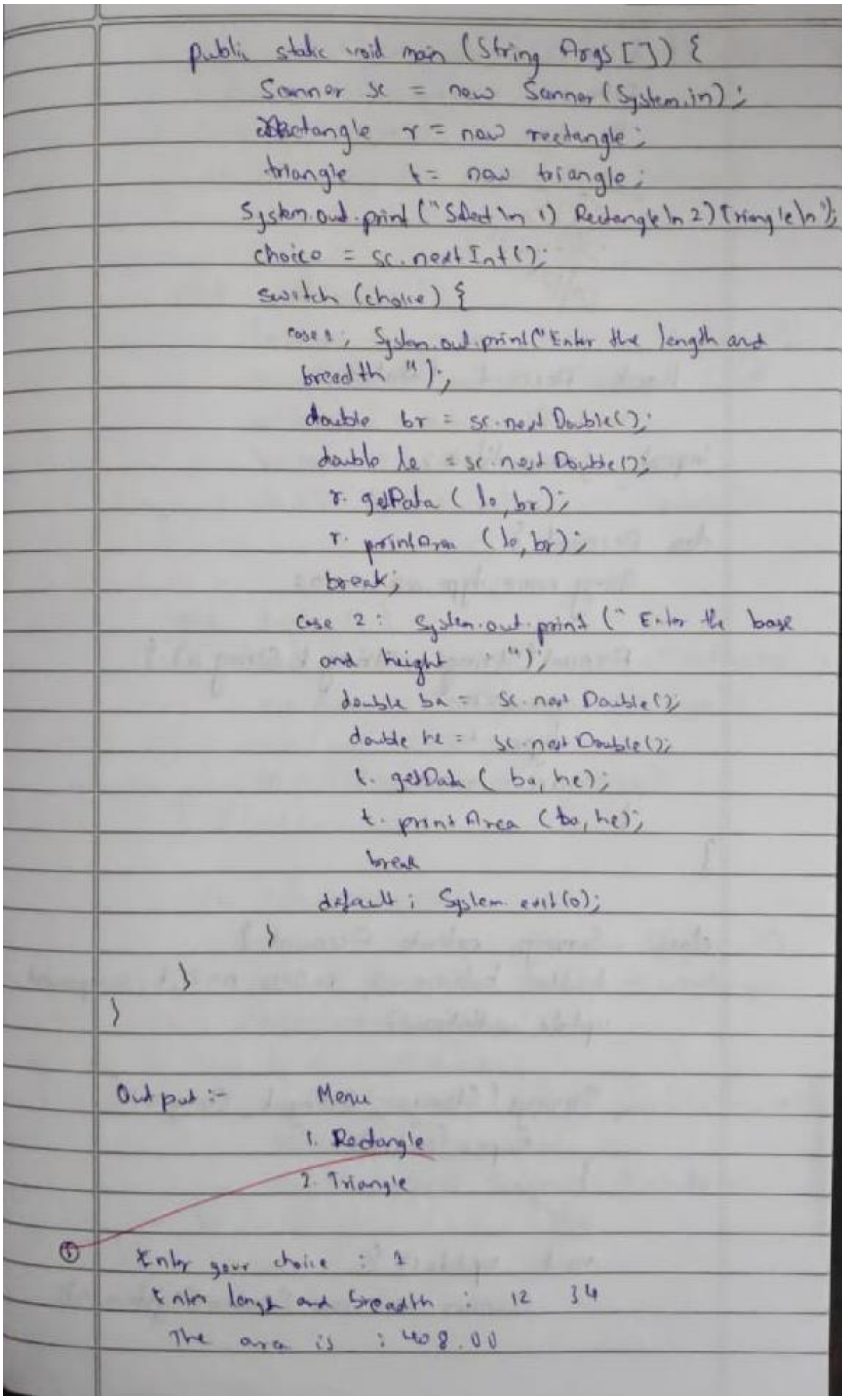
5) Abstract class

→ Code :-

```
import java.util.Scanner;

abstract class shape {
        double a,b;
        abstract void printArea();
}

class rectangle extends shape {
        void getData (double x, double y) {
                a=x ;
                b=y ;
        }
        void printArea () {
                double x = a+b;
                System.out.print (" Area = "+x);
        }
}

class triangle extends shape {
            void getData ( double x, double y) {
                    a=x;
                    b=y;
            }
            void printArea() {
                    double x= a+b *.5;
                    System.out.print (" the area is "+x);
            }
}

 class hi {
```



```
public static void main (String Args []) {
        Sanner sc = new Sanner (System.in);
        Rectangle r = new rectangle;
        triangle t= new triangle;
      System.out.print ("Select \n 1) Rectangle \n 2) Triangle \n");
        choice = sc.nextInt();
        switch (choice) {
          case 1; System.out.print("Enter the length and
           breadth ");
           double br = sc.next Double();
            double le = sc.next Double();
             r. getData ( lo, br);
             r. printArea (lo, br);
            break;
          case 2: System.out.print (" Enter the base
            and height : ");
              double ba = sc.next Double();
              double he = sc.next Double();
              t. getData ( ba, he);
              t. print Area (ba, he);
              break
          default ; System.exit(0);
        }
    }
}
```

```
Output :-        Menu
                 1. Rectangle
                 2. Triangle

①  Enter your choice : 1
    Enter length and breadth : 12 34
     The area is : 408.00
```

LAB PROGRAM 5: BANK PROGRAM

CODE

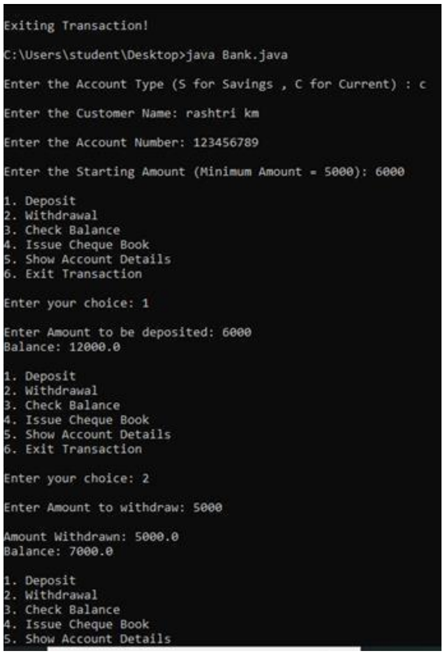
```
import java.util.Scanner;
class Account
{
    String customer_name;
    long acc_no;
    float bal;
    Scanner s = new Scanner(System.in);
    public void input()
    {
        System.out.print("\nEnter the Customer Name: ");
        customer_name = s.nextLine();
        System.out.print("\nEnter the Account Number: ");
        acc_no = s.nextLong();
        System.out.print("\nEnter the Starting Amount (Minimum Amount = 5000): ");
        bal = s.nextFloat();
        if(bal<5000f)
        {
            System.out.println("\nAccount Balance cannot be less than 5000.0 \n");
            System.exit(0);
        }
    }
    public void display()
    {
        System.out.println("\nCustomer Name: "+customer_name);
        System.out.println("Account Number: "+acc_no);
        System.out.println("Amount: "+bal);
    }
}

class Savings extends Account
{
    Scanner s = new Scanner(System.in);
    float deposit,withdraw,interest;
    public void deposit()
    {
        System.out.print("\nEnter the amount to be deposited: ");
        deposit = s.nextFloat();
        bal+=deposit;
        System.out.println("\nBalance: "+bal);
    }
    public void withdraw()
    {
        System.out.print("\nEnter the amount to be withdrawn: ");
        withdraw = s.nextFloat();
        if(bal<5000)
        {
            System.out.println("\nInsufficient Balance");
        }
        else
        {
            bal-=withdraw;
            System.out.println("\nAmount Withdrawn: "+withdraw+"\nBalance:
"+bal);
        }

    }


    public void check_Bal()
    {
        if(bal<5000)
        {
            System.out.println("\nInsufficient Balance!!\nBalance: "+bal);
        }
        else
        {
            System.out.println("\nBalance: "+bal);
        }
    }
    public void interest()
    {
        interest=(bal*6)/100;
        bal+=interest;
        System.out.println("\nInterest Credited: "+interest+"\nBalance :"+bal) ;
    }
```

```
}



class Current extends Account
{
    float deposit, withdraw, penalty;

    public void deposit()
    {
        System.out.print("\nEnter Amount to be deposited: ");
        deposit = s.nextFloat();
        bal += deposit;
        System.out.println("Balance: " + bal);
    }

    public void check_Bal()
    {
        if (bal < 5000)
        {
            penalty = (0.1f * bal);
            System.out.println("\nInitial Account Balance: "+bal);
            bal = bal-penalty;
            System.out.println("\nLow balance!\nPenalty Amount: " + penalty +
"\nAccount balance: " + bal);
        }
        else
        {
            System.out.println("\n Balance: " + bal);
        }
    }

    public boolean check_Bal_part_2()
    {
        if (bal < 5000)
        {
            penalty = (0.1f * bal);
            System.out.println("\nInitial Account Balance: "+bal);
            bal = bal-penalty;
            System.out.println("\nLow Balance!\nPenalty Amount: " + penalty +
"\nAccount balance: " + bal);
            return false;
        }
        return true;
    }

    public void withdraw()
    {
        System.out.print("\nEnter Amount to withdraw: ");
        withdraw = s.nextFloat();
        if(check_Bal_part_2())
        {
            bal-=withdraw;
            System.out.println("\nAmount Withdrawn: "+withdraw+"\nBalance: 
"+bal);
        }
    }

    public void chequebook()
    {
        System.out.println("\nCheque Book has been Issued!");
    }
}


public class Bank
{
    public static void main(String[] args)
    {
        Scanner s = new Scanner(System.in);
        String ch;
        int n;
        Current c = new Current();
        Savings sa = new Savings();
        System.out.print("\nEnter the Account Type (S for Savings , C for Current) : 
");
        ch = s.next();

        switch(ch.toLowerCase())
```

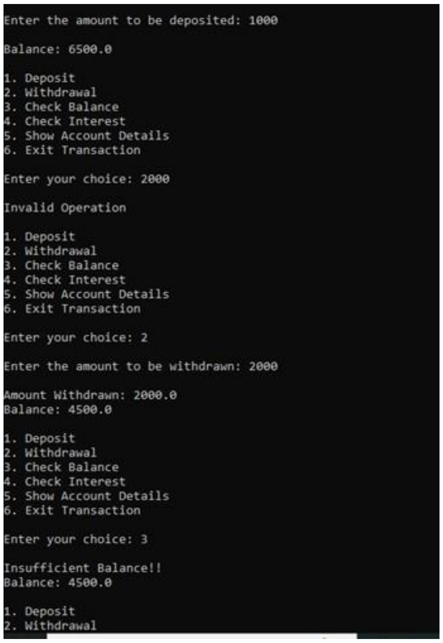
```
       {
          case "s" :  sa.input();
                    do
                    {
                       System.out.print("\n1. Deposit \n2. Withdrawal \n3. Check
Balance \n4. Check Interest"
                              +"\n5. Show Account Details \n6. Exit Transaction\n\nEnter
your choice: ");
                       n = s.nextInt();
                       switch(n)
                       {
                          case 1 : sa.deposit();
                                 break;
                          case 2 : sa.withdraw();
                                 break;
                          case 3 : sa.check_Bal();
                                 break;
                          case 4 : sa.interest();
                                 break;
                          case 5 : sa.display();
                                 break;
                          case 6 : System.out.println("\nExiting Transaction!");
                                 System.exit(0);
                                 break;
                          default : System.out.println("\nInvalid Operation");
                       }
```

```
                 }while(true);
        case "c" : c.input();
                do {
                    System.out.print("\n1. Deposit \n2. Withdrawal \n3. Check Balance \n4. Issue Cheque Book"
                            + "\n5. Show Account Details \n6. Exit Transaction\n\nEnter your choice: ");
                    n = s.nextInt();
                    switch (n) {
                        case 1:
                            c.deposit();
                            break;
                        case 2:
                            c.withdraw();
                            break;
                        case 3:
                            c.check_Bal();
                            break;
                        case 4:
                            c.chequebook();
                            break;
                        case 5:
                            c.display();
                            break;
                        case 6:
                            System.out.println("\nExiting Transaction!");
                    System.exit(0);
                            break;
                          default:
                            System.out.println("\nInvalid Operation");
                        }
                    }while(true);
                default : System.out.println("\nInvalid Choice");
                     break;
                }
            }
        }
```

Output:

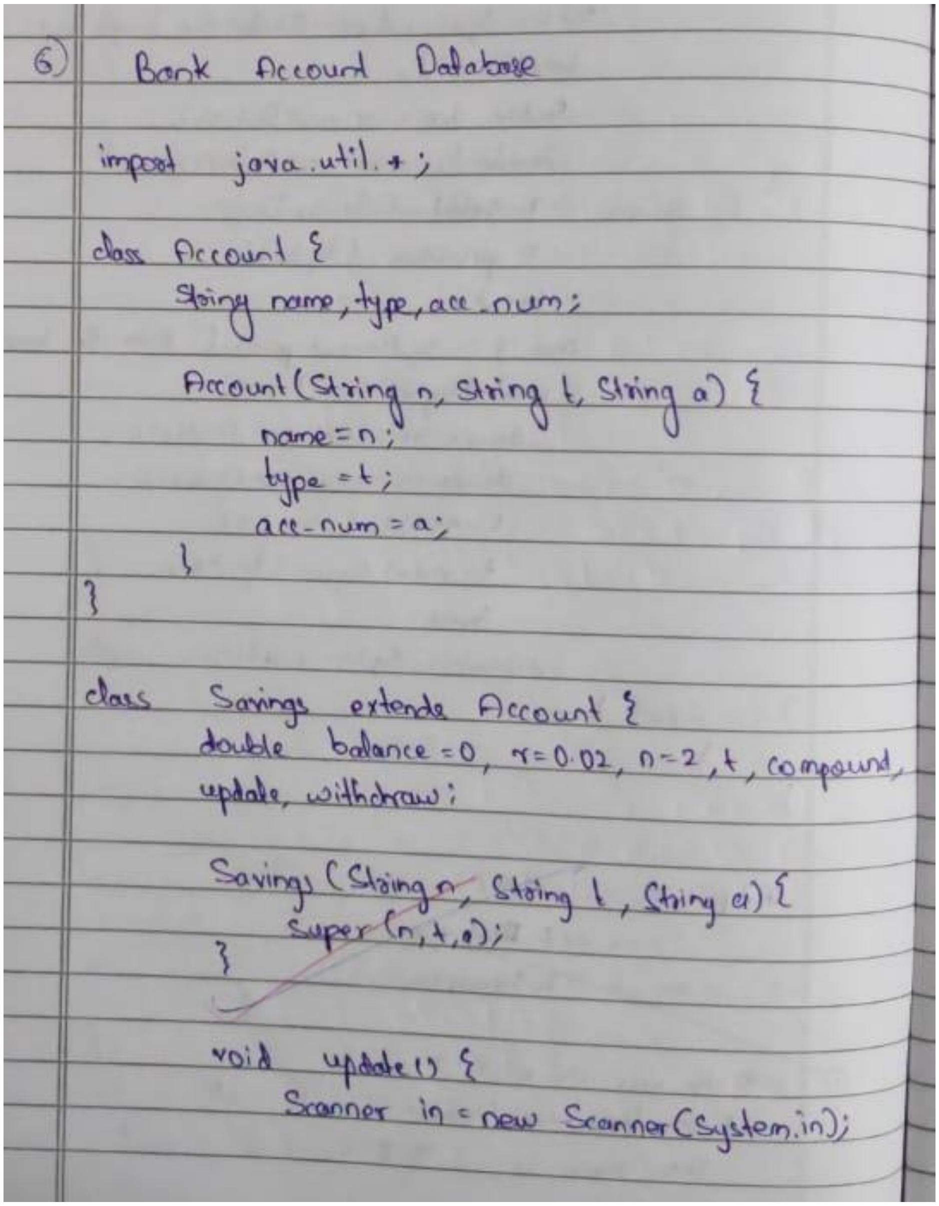


```
Exiting Transaction!

C:\Users\student\Desktop>java Bank.java

Enter the Account Type (S for Savings , C for Current) : c

Enter the Customer Name: rashtri km

Enter the Account Number: 123456789

Enter the Starting Amount (Minimum Amount = 5000): 6000

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
6. Exit Transaction

Enter your choice: 1

Enter Amount to be deposited: 6000
Balance: 12000.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
6. Exit Transaction

Enter your choice: 2

Enter Amount to withdraw: 5000

Amount Withdrawn: 5000.0
Balance: 7000.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
```



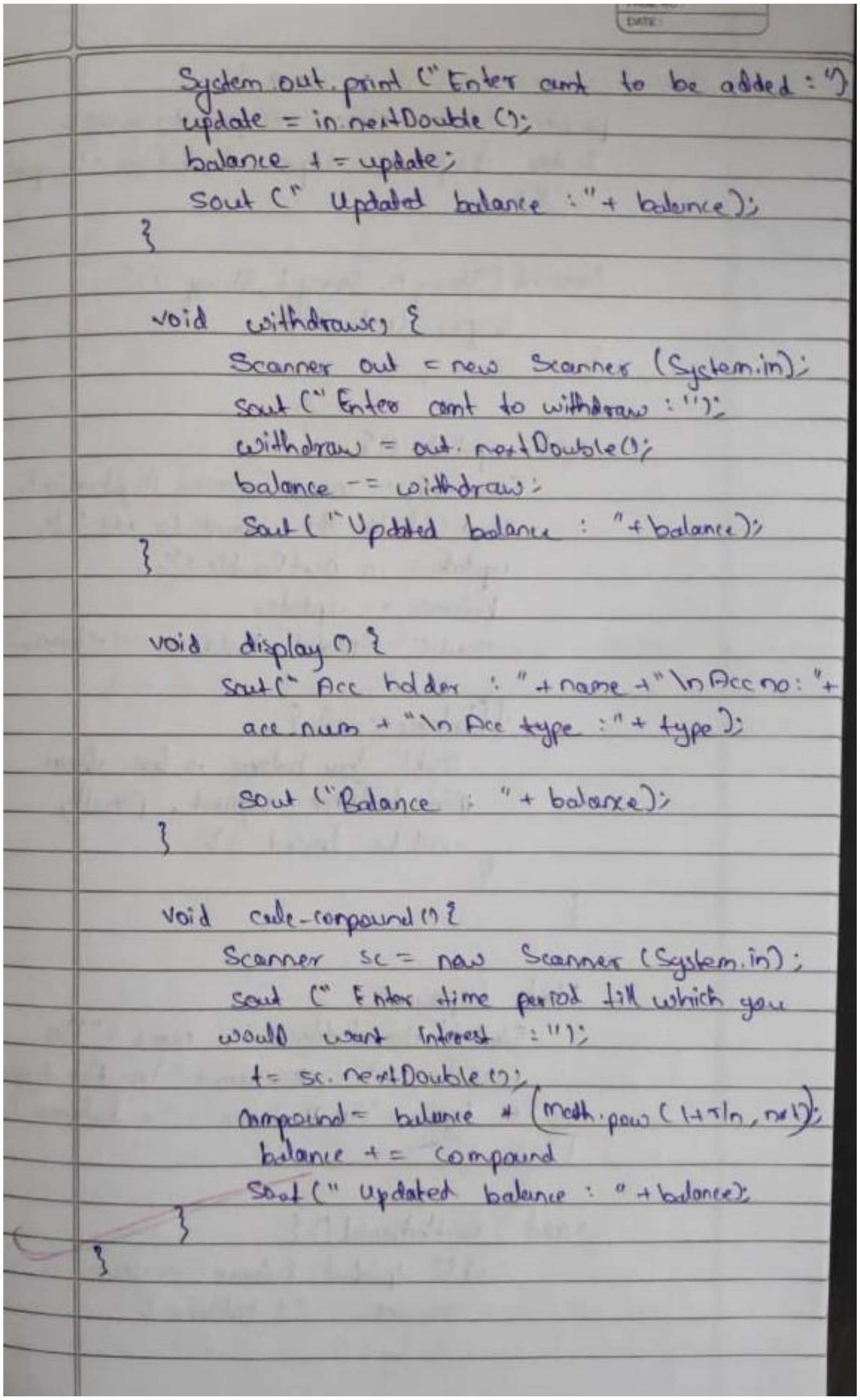
```
Enter the amount to be deposited: 1000

Balance: 6500.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 2000

Invalid Operation

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 2

Enter the amount to be withdrawn: 2000

Amount Withdrawn: 2000.0
Balance: 4500.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 3

Insufficient Balance!!
Balance: 4500.0

1. Deposit
2. Withdrawal
```

Observation Book:

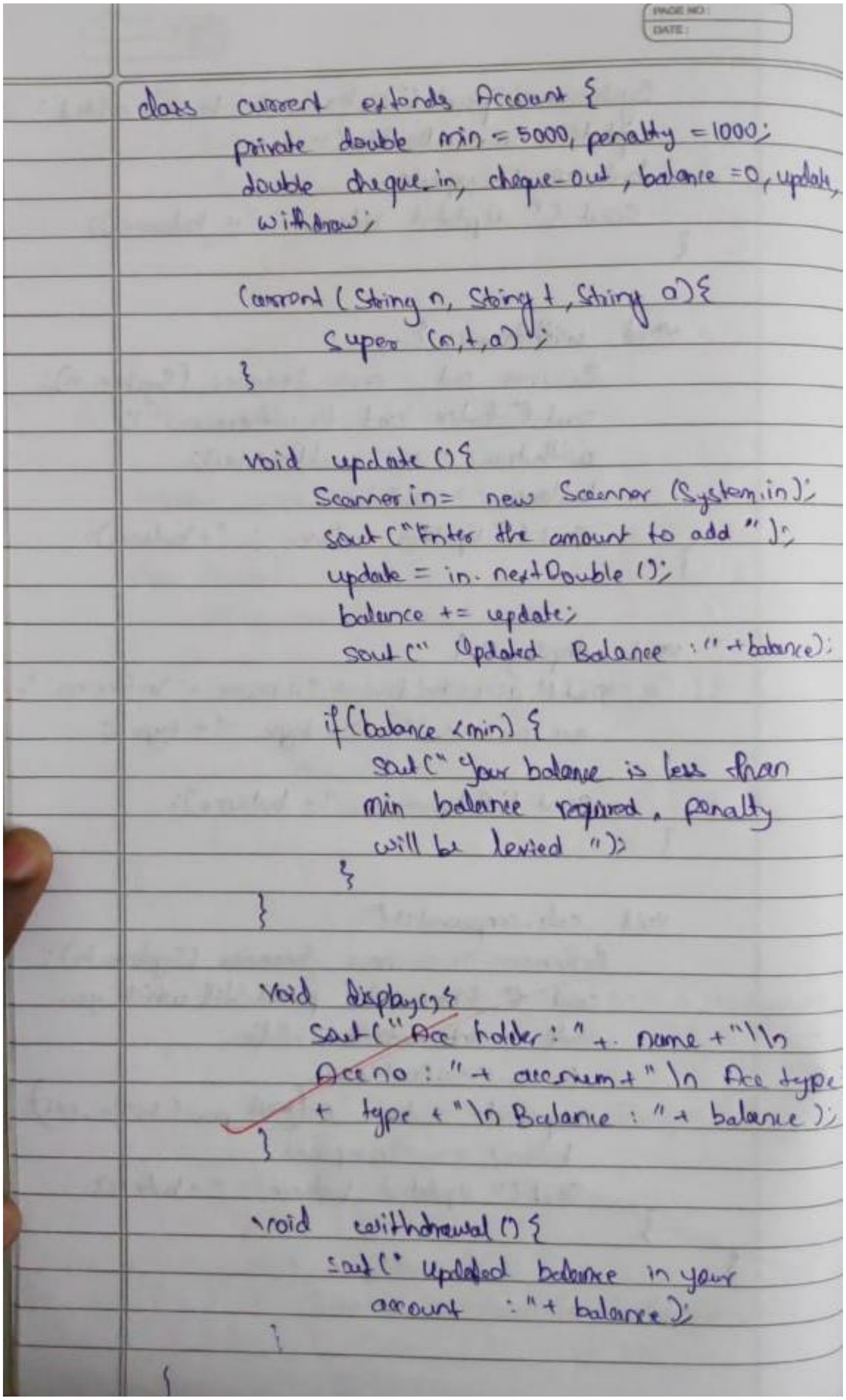


6) Bank Account Database

```
import java.util.*;

class Account {
      String name, type, acc_num;

      Account(String n, String t, String a) {
            name=n;
            type =t;
            acc_num = a;
      }
}

class Savings extends Account {
      double balance =0, r=0.02, n=2, t, compound,
      update, withdraw;

      Savings (String n, String t, String a){
            super (n,t,a);
      }

      void update() {
            Scanner in = new Scanner(System.in);
```

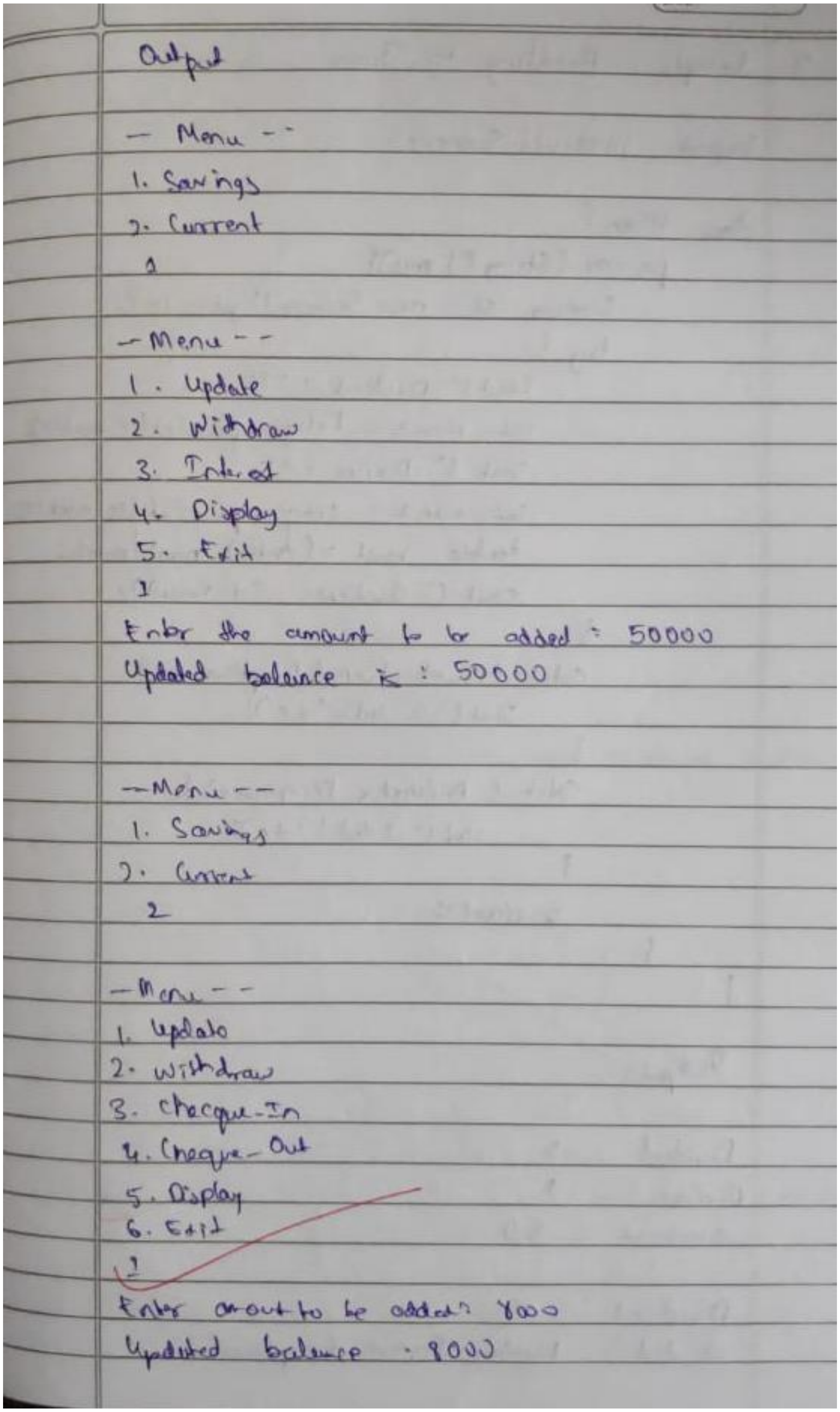


```
    System.out.print ("Enter amt to be added :")
    update = in.nextDouble ();
    balance + = update;
    sout (" Updated balance :" + balance);
  }

  void withdraw() {
      Scanner out = new Scanner (System.in);
      sout (" Enter amt to withdraw :");
      withdraw = out.nextDouble();
      balance -= withdraw;
      Sout (" Updated balance : "+balance);
  }

  void display () {
      sout (" Acc holder : "+name +"\nAcc no: "+
       acc_num + "\n Acc type :" + type);

      sout ("Balance : " + balance);
   }

   void calc-compound () {
      Scanner sc = new Scanner (System.in);
      sout (" Enter time period till which you
      would want Interest :");
       t= sc.nextDouble ();
      compound= balance * (Math.pow (1+r/n, n*t));
       balance += compound
       Sout (" updated balance : " +balance);
    }
}
```



PAGE NO :
DATE :

```
class  current  extends  Account {
        private double min = 5000, penalty = 1000;
        double cheque_in, cheque-out , balance = 0, update,
         withdraw;

        Current ( String n, String t , String a){
                Super  (n,t,a);
        }

        void update (){
              Scanner in=  new  Scanner (System.in);
              sout ("Enter the amount to add " );
              update = in. nextDouble ();
              balance += update;
              sout ("  Updated  Balance  :" +balance);

              if(balance <min) {
                  sout (" Your balance is less than
                  min balance required . penalty
                  will be levied "));
              }
        }

        void display(){
            Sout (" Acc holder : " + name +"\n
            Acc no : " + accnum + " \n Acc type
            + type + "\n Balance : " + balance );
        }

        void withdrawal (){
              sout (" Updated balance in your
                  account  : " + balance );
        }
    }
```



Output

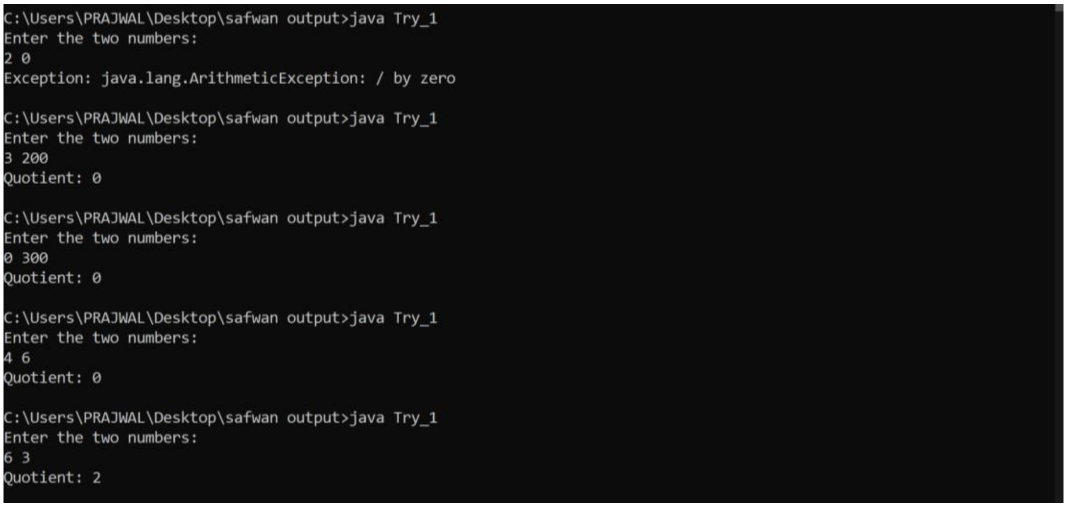
```
-- Menu --
1. Savings
2. Current
 1

-- Menu --
1. Update
2. Withdraw
3. Interest
4. Display
5. Exit
 1
Enter the amount to be added : 50000
Updated balance is : 50000


-- Menu --
1. Savings
2. Current
 2

-- Menu --
1. Update
2. Withdraw
3. Cheque-In
4. Cheque-Out
5. Display
6. Exit
 1
Enter amout to be added: 8000
Updated balance : 8000
```

LAB PROGRAM 6: NUMBER OPERATIONS - EXCEPTION HANDLING

CODE

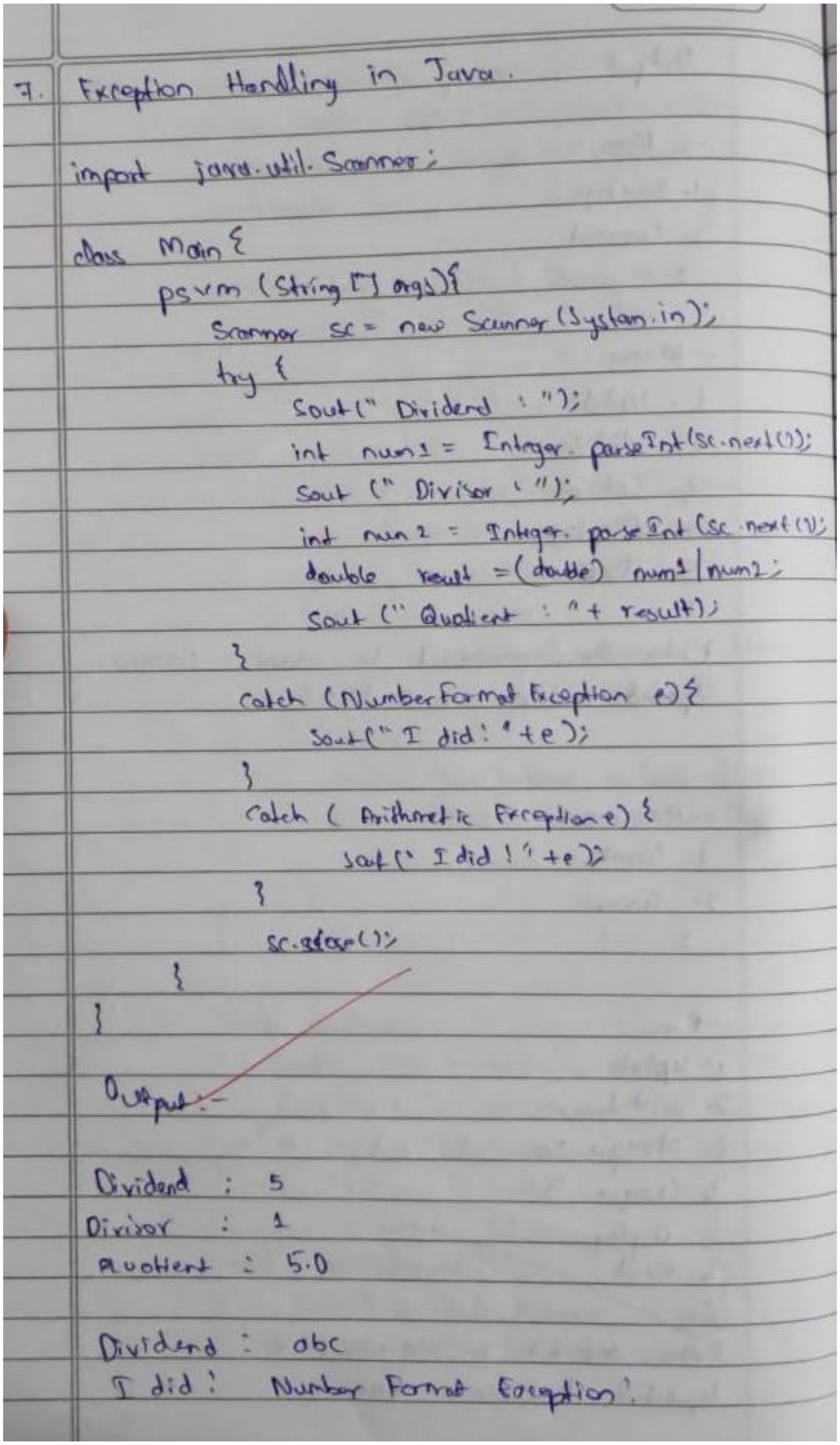
```
import java.util.InputMismatchException;
import java.util.Scanner;

interface Z
{
    public int calc(int a,int b);
}

class Y implements Z
{
    public int calc(int a, int b)
    {
        int c = a/b;
        return c;
    }
}

public class Try_1
{
    public static void main(String[] args)
    {
        Scanner s = new Scanner(System.in);
        Y o = new Y();
        int num1,num2;
        try
        {
            System.out.println("Enter the two numbers: ");
            num1 = s.nextInt();
            num2 = s.nextInt();
            int c = o.calc(num1,num2);
            System.out.println("Quotient: "+c);
        }
        catch(ArithmeticException | InputMismatchException e1)
        {
            System.out.println("Exception: "+e1);
        }
    }
}
```

Output:



```
C:\Users\PRAJWAL\Desktop\safwan output>java Try_1
Enter the two numbers:
2 0
Exception: java.lang.ArithmeticException: / by zero

C:\Users\PRAJWAL\Desktop\safwan output>java Try_1
Enter the two numbers:
3 200
Quotient: 0

C:\Users\PRAJWAL\Desktop\safwan output>java Try_1
Enter the two numbers:
0 300
Quotient: 0

C:\Users\PRAJWAL\Desktop\safwan output>java Try_1
Enter the two numbers:
4 6
Quotient: 0

C:\Users\PRAJWAL\Desktop\safwan output>java Try_1
Enter the two numbers:
6 3
Quotient: 2
```

Observation Book:



7. Exception Handling in Java.

```
import java.util.Scanner;

class Main {
    psvm (String [] args){
        Scanner sc = new Scanner (System.in);
        try {
            Sout (" Dividend : ");
            int num1 = Integer. parseInt(sc.next());
            Sout (" Divisor : ");
            int num 2 = Integer. parseInt (sc.next ());
            double result = (double) num1 / num2;
            Sout (" Quotient : " + result);
        }
        catch (NumberFormat Exception e){
            Sout(" I did: " + e);
        }
        catch ( Arithmetic Exception e) {
            sout (" I did ! " + e);
        }
        sc.close();
    }
}
```

Output:-

```
Dividend : 5
Divisor  : 1
Quotient : 5.0

Dividend : abc
 I did :  Number Format Exception'.
```

LAB PROGRAM 7: AGE EVALUATION - EXCEPTION HANDLING

CODE

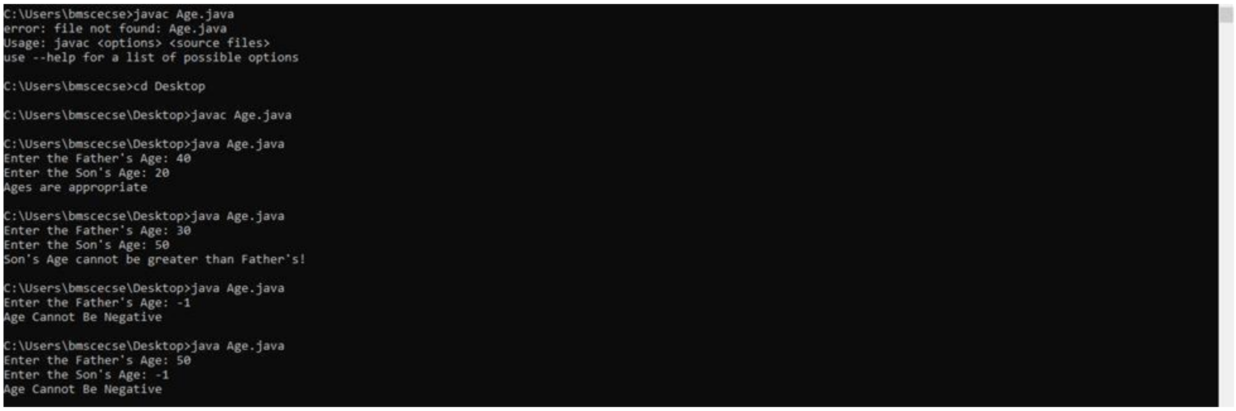
```
import java.util.Scanner;

public class Age
{
        public static void main(String[] args) throws WrongAge,InvalidAge
        {
        new Son();
        }
}

class WrongAge extends Exception
{
        public String getMessage()
        {
        return "Age Cannot Be Negative";
        }
}

class InvalidAge extends Exception
```

```
{
    public String getMessage()
    {
    return "Son's Age cannot be greater than Father's!";
    }
}
class Father
{
    Scanner s = new Scanner(System.in);
    int f;
    Father() throws WrongAge
    {
    System.out.print("Enter the Father's Age: ");
    f = s.nextInt();
    try
    {
    if(f<0)
    throw new WrongAge();
    }
    catch(WrongAge e1)
    {
      System.out.println(e1.getMessage());
```

```
        System.exit(0);
        }
        }
}

class Son extends Father
{
        int son;
        Son() throws WrongAge,InvalidAge
        {
        super();
        System.out.print("Enter the Son's Age: ");
        son = s.nextInt();
        try
        {
        if(son<0)
        throw new WrongAge();
        }
        catch(WrongAge e2)
        {
          System.out.println(e2.getMessage());
            System.exit(0);
```

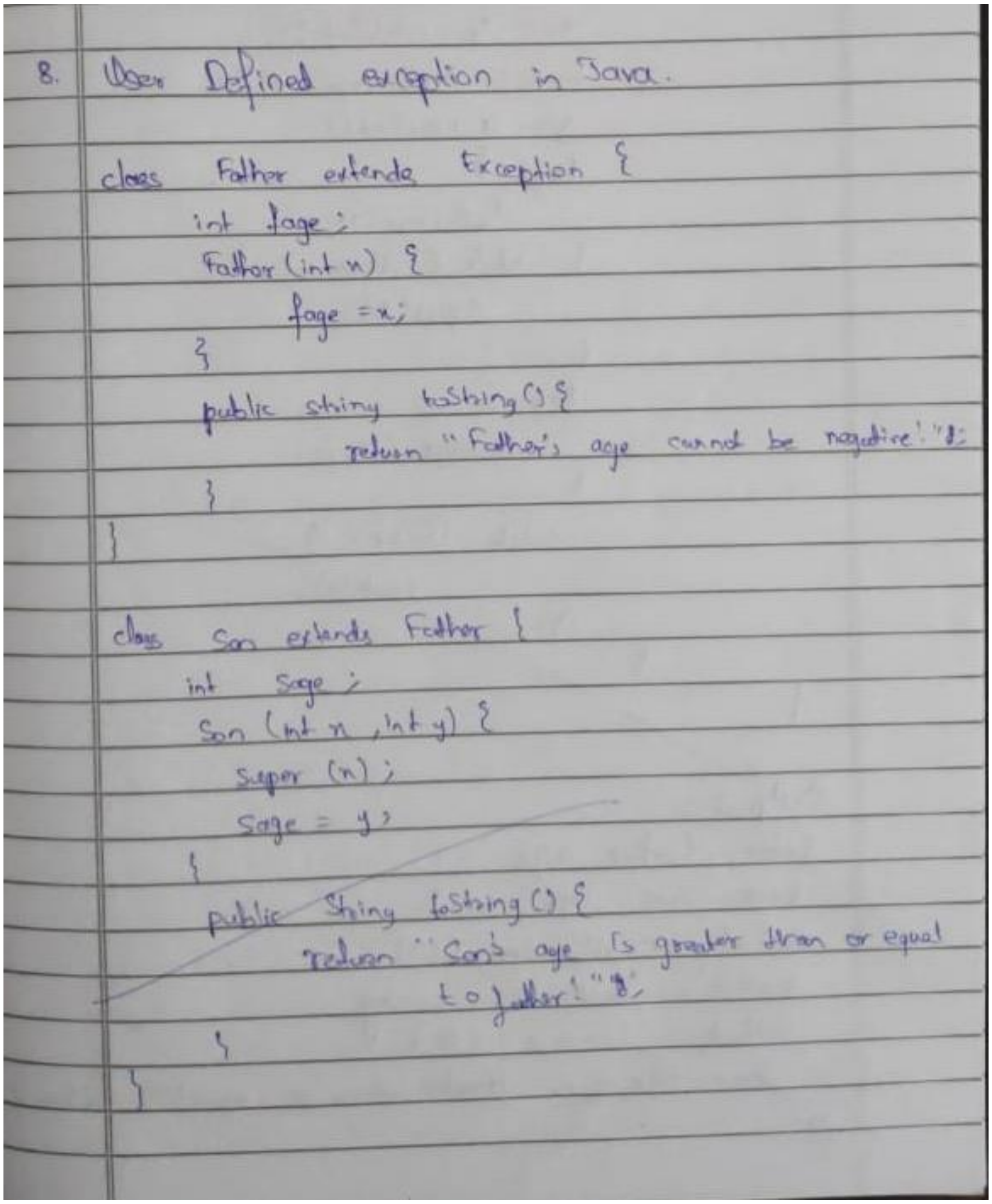
```
    }
    try
    {
    if(son>f)
    throw new InvalidAge();
    }
    catch(InvalidAge e3)
    {
      System.out.println(e3.getMessage());
        System.exit(0);
    }
    System.out.println("Ages are appropriate");
    }
}
```

<u>Output:</u>



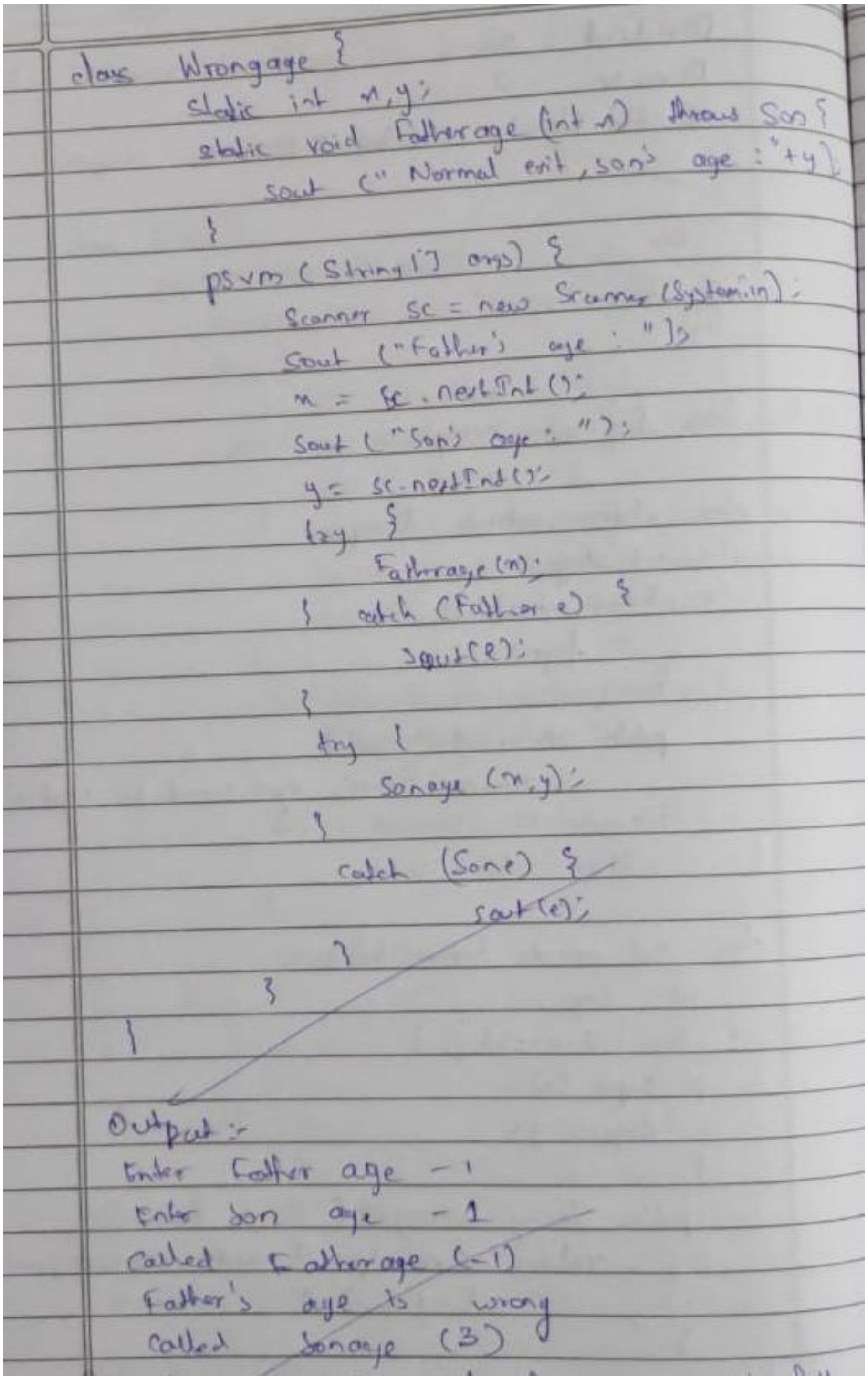
```
C:\Users\bmscecse>javac Age.java
error: file not found: Age.java
Usage: javac <options> <source files>
use --help for a list of possible options

C:\Users\bmscecse>cd Desktop

C:\Users\bmscecse\Desktop>javac Age.java

C:\Users\bmscecse\Desktop>java Age.java
Enter the Father's Age: 40
Enter the Son's Age: 20
Ages are appropriate

C:\Users\bmscecse\Desktop>java Age.java
Enter the Father's Age: 30
Enter the Son's Age: 50
Son's Age cannot be greater than Father's!

C:\Users\bmscecse\Desktop>java Age.java
Enter the Father's Age: -1
Age Cannot Be Negative

C:\Users\bmscecse\Desktop>java Age.java
Enter the Father's Age: 50
Enter the Son's Age: -1
Age Cannot Be Negative
```

Observation Book:



8. User Defined exception in Java.

```
class Father extends Exception {
    int fage;
    Father (int x) {
        fage = x;
    }
    public string toString() {
        return "Father's age cannot be negative!";
    }
}

class Son extends Father {
    int sage;
    Son (int x , int y) {
      super (x);
      sage = y;
    }
    public String toString() {
        return "Son's age is greater than or equal
                to father!";
    }
}
```



```
class Wrongage {
     static int n,y;
     static void Fatherage (int n) throws Son {
          sout (" Normal exit, son's age :"+y);
     }
     psvm (String[] args) {
          Scanner sc = new Scanner (System.in);
          Sout ("Father's age : ");
          n = sc.nextInt ();
          Sout ("Son's age : ");
          y= sc.nextInt ();
          try {
               Fatherage (n);
          } catch (Father e) {
               sout(e);
          }
          try {
               Sonage (n,y);
          }
            catch (Sone) {
                    sout (e);
            }
       }
}
```

Output :-

```
Enter Father age -1
Enter Son age - 1
Called Fatherage (-1)
Father's age is wrong
Called Sonage (3)
```

LAB PROGRAM 8: MULTI-THREADING

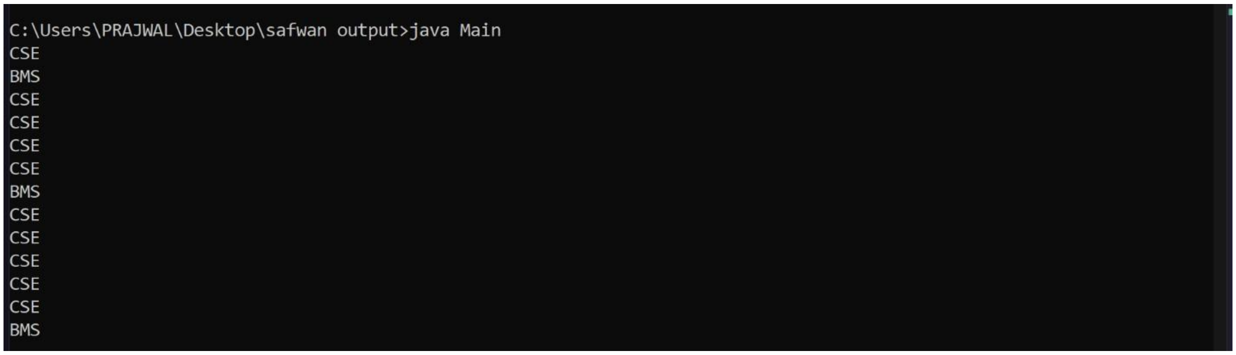
CODE

```
class MyThread extends Thread
{
        long time;
        private volatile boolean running = true;
        MyThread(){
        System.out.println("Default");
}
MyThread(String name, long time)
{
        super(name);
        this.time = time;
}
public void pause()
{
        running = false;
}
public void run()
{
        try
        {
                while(running)
                {
```

```
            System.out.println(this.getName());
            Thread.sleep(time*1000);
        }
    }
     catch(InterruptedException ie)
    {
        System.out.println("Exception caught in method");
    }

}
}

class Main
{
    public static void main(String [] args)
    {
        MyThread mt1 = new MyThread("BMS", 10);
        MyThread mt2 = new MyThread("CSE", 2);
        mt1.start();
        mt2.start();
        Try
        {
            Thread.sleep(20*1000);
            mt1.pause();
            mt2.pause();
        }
```

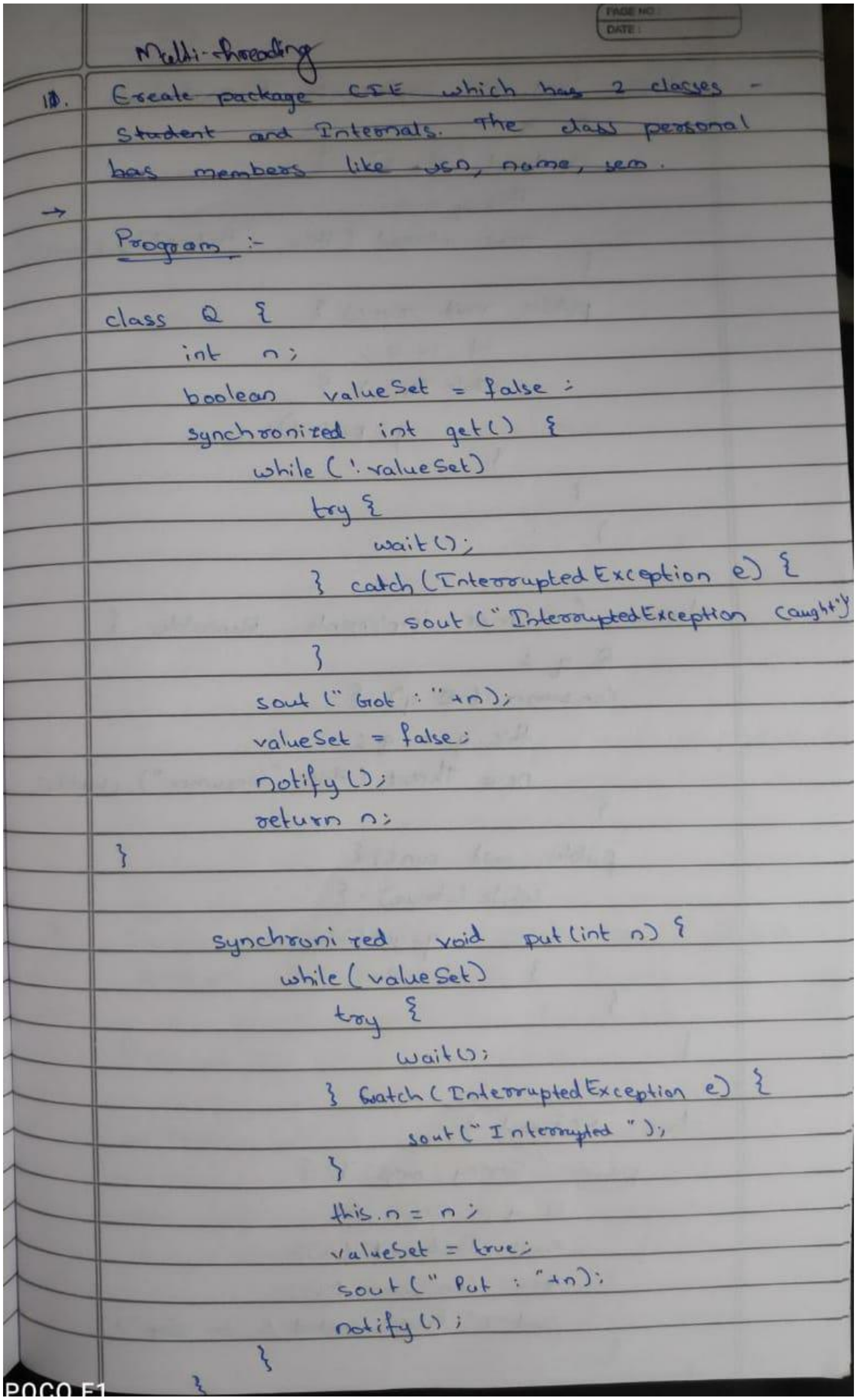
```
                catch(InterruptedException ie)
                {
                        System.out.println("Exception caught in main");
                }
        }
}
```

Output:



```
C:\Users\PRAJWAL\Desktop\safwan output>java Main
CSE
BMS
CSE
CSE
CSE
CSE
BMS
CSE
CSE
CSE
CSE
CSE
BMS
```

Observation Book:



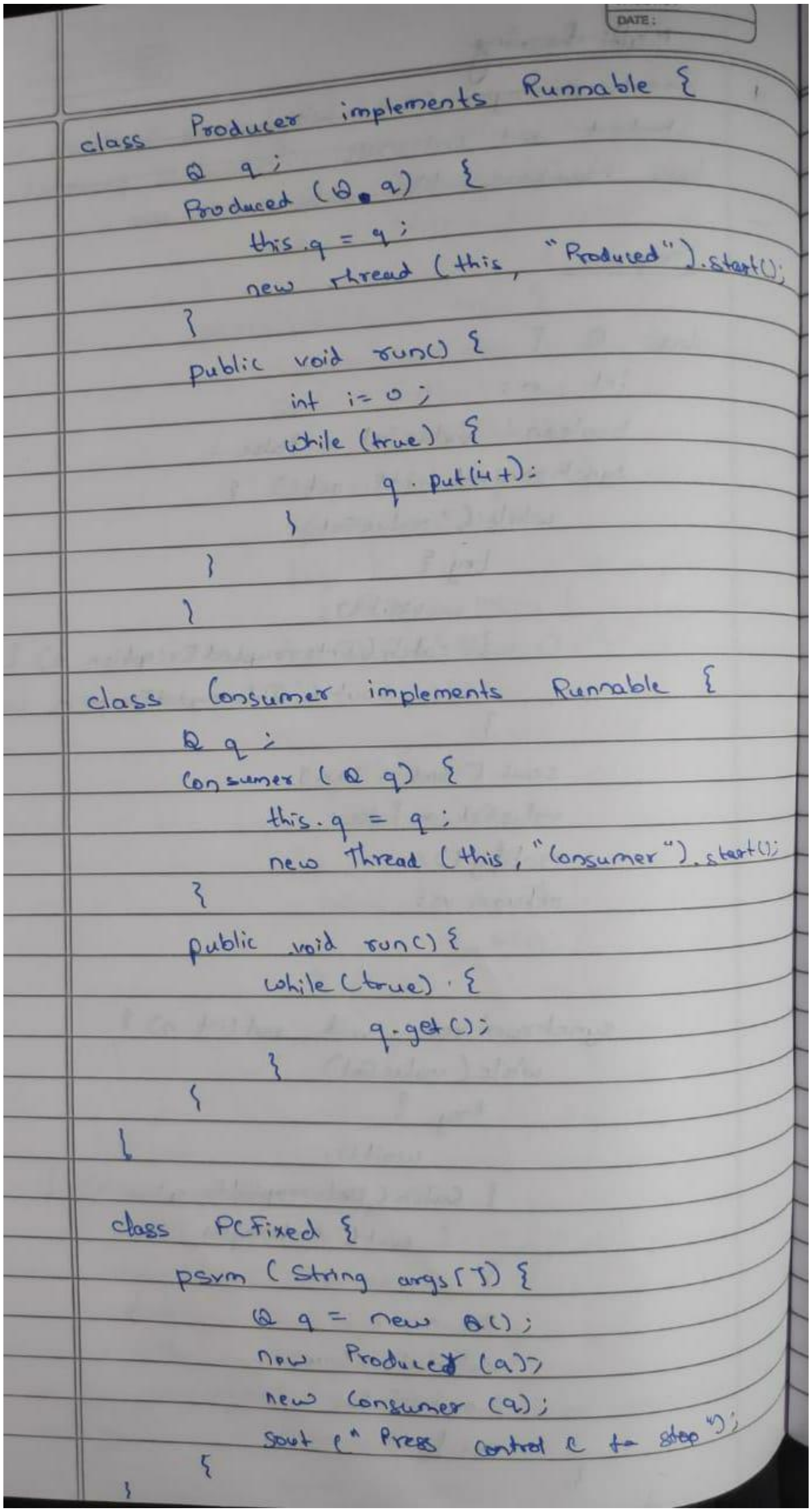
PAGE NO :
DATE :

Multi-threading

10. ~~Create package CIE which has 2 classes - Student and Internals. The class personal has members like usn, name, sem.~~

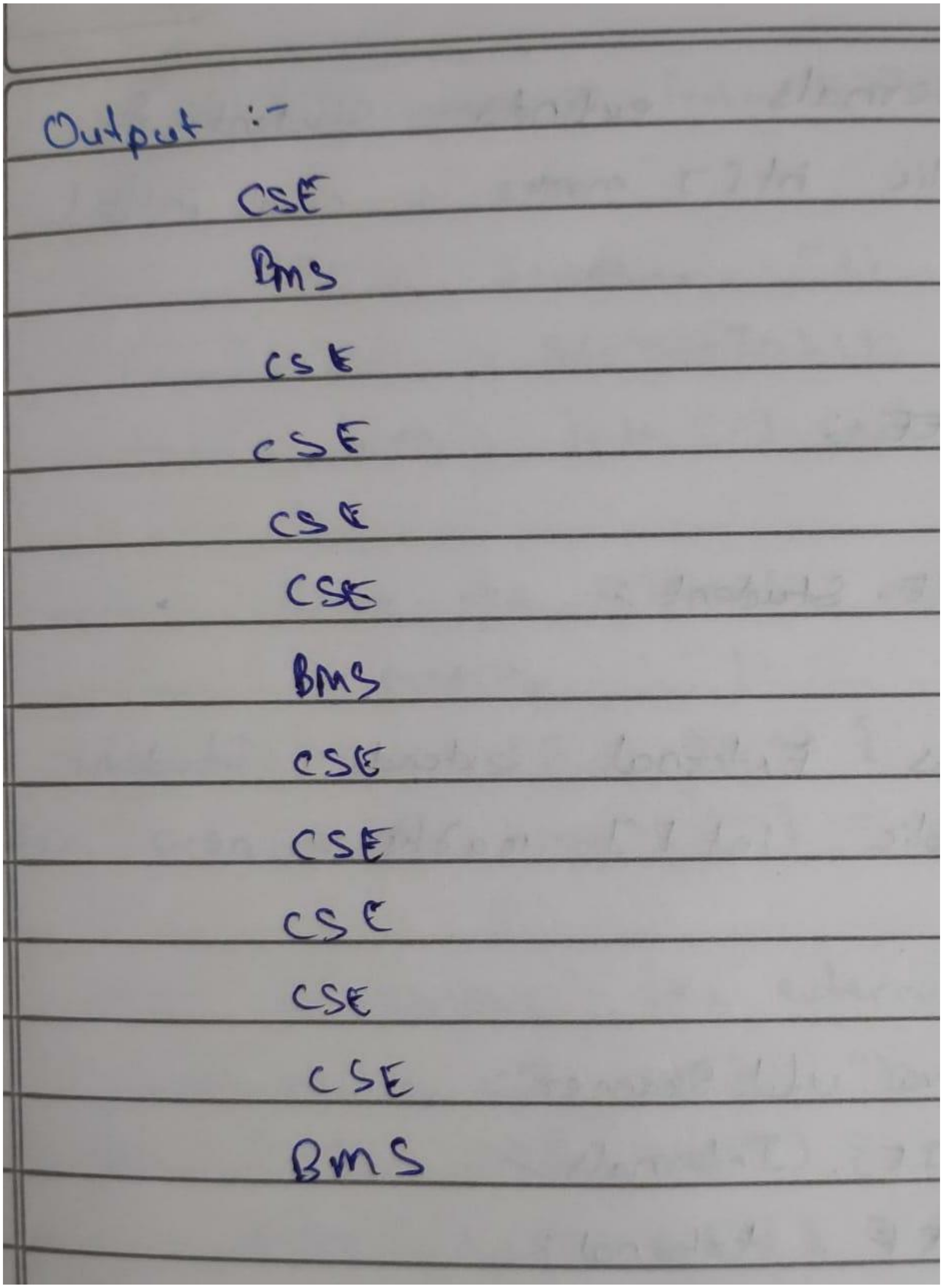
→ Program :-

```
class Q {
      int n;
      boolean valueSet = false;
      synchronized int get() {
            while (!valueSet)
                  try {
                        wait();
                  } catch (InterruptedException e) {
                        sout ("InterruptedException caught")
                  }
            sout (" Got : "+n);
            valueSet = false;
            notify();
            return n;
}

      synchronized void put(int n) {
            while(valueSet)
                  try {
                        wait();
                  } catch (InterruptedException e) {
                        sout(" Interrupted ");
                  }
                  this.n = n;
                  valueSet = true;
                  sout (" Put : "+n);
                  notify();
            }
      }
```



DATE :

```
class Producer implements Runnable {
        Q q;
        Produced (Q q) {
                this.q = q;
                new thread (this, "Produced").start();
        }
        public void run() {
                int i=0;
                while (true) {
                        q.put(i+):
                }
        }
        }

class Consumer implements Runnable {
        Q q;
        Consumer (Q q) {
                this.q = q;
                new Thread (this, "Consumer").start();
        }
        public void run() {
                while (true) {
                        q.get();
                }
        {
}

class PCFixed {
        psvm (String args[]) {
                Q q = new Q();
                now Producer (q);
                new Consumer (q);
                sout (" Press control c to stop ");
        {
}
```



Output :-

```
        CSE
        Bms
        CSE
        CSE
        CSE
        CSE
        Bms
        CSE
        CSE
        CSE
        CSE
        CSE
        BmS
```