VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT

on

OBJECT ORIENTED JAVA PROGRAMMING

Submitted by

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in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING

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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**" carried out by **SUBRAMANYA J (1BM23CS343),** who is bonafide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2024-25. The Lab report has been approved as it satisfies the academic requirements in respect of **Object-Oriented Java Programming Lab - (23CS3PCOOJ)** work prescribed for the said degree.

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LABORATORY PROGRAM - 1

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

OBSERVATION

26/9/24 Lab - 1

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

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

class Quadratic {
    float a;
    float b;
    float c;

    Quadratic() {
        Scanner J = new Scanner (System.in);
        System.out.println("Enter your variables one by one:");
        a = J.nextFloat();
        b = J.nextFloat();
        c = J.nextFloat();
    }

    void solve() {
        float disc = b*b - 4*a*c;

        if (disc < 0) {
            System.out.println("No real solutions!\n");
            return;
        }
        disc = (float) Math.sqrt(disc);
```

```
float s1 = (-b + disc) / (2 * a);
float s2 = (-b - disc) / 2 * a);

System.out.println(s1 + " and " + s2
    + " are the required roots\n");
}}
```

```
class Main {
    public static void main
            (String argv[]){
        Quadratic myEquation = new
                Quadratic();
        myEquation.solve();
        return;
    }
}
```

Output :

i) Enter your variables one by one:
1 1 1
No real solutions!

ii) Enter your variables one by one:
1 5 -6
1.0 and -6.0 are the required roots

PROGRAM

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

class Quadratic {
   float a;
   float b;
   float c;

   Quadratic() {
      Scanner J = new Scanner(System.in);
      System.out.println("Enter your variables one by one : ");
      a = J.nextFloat();
      b = J.nextFloat();
      c = J.nextFloat();
   }

   void solve() {
      float disc = b * b - 4 * a * c;

      if (disc < 0) {
         System.out.println("No real solutions!\n");
         return;
      }

      disc = (float) Math.sqrt(disc);

      float s1 = (-b + disc) / (2 * a);
      float s2 = (-b - disc) / (2 * a);

      System.out.println(s1 + " and " + s2 + " are the required roots.");

   }

}

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

      Quadratic myEquation = new Quadratic();
      myEquation.solve();

      return;

   }
}
```

OUTPUT

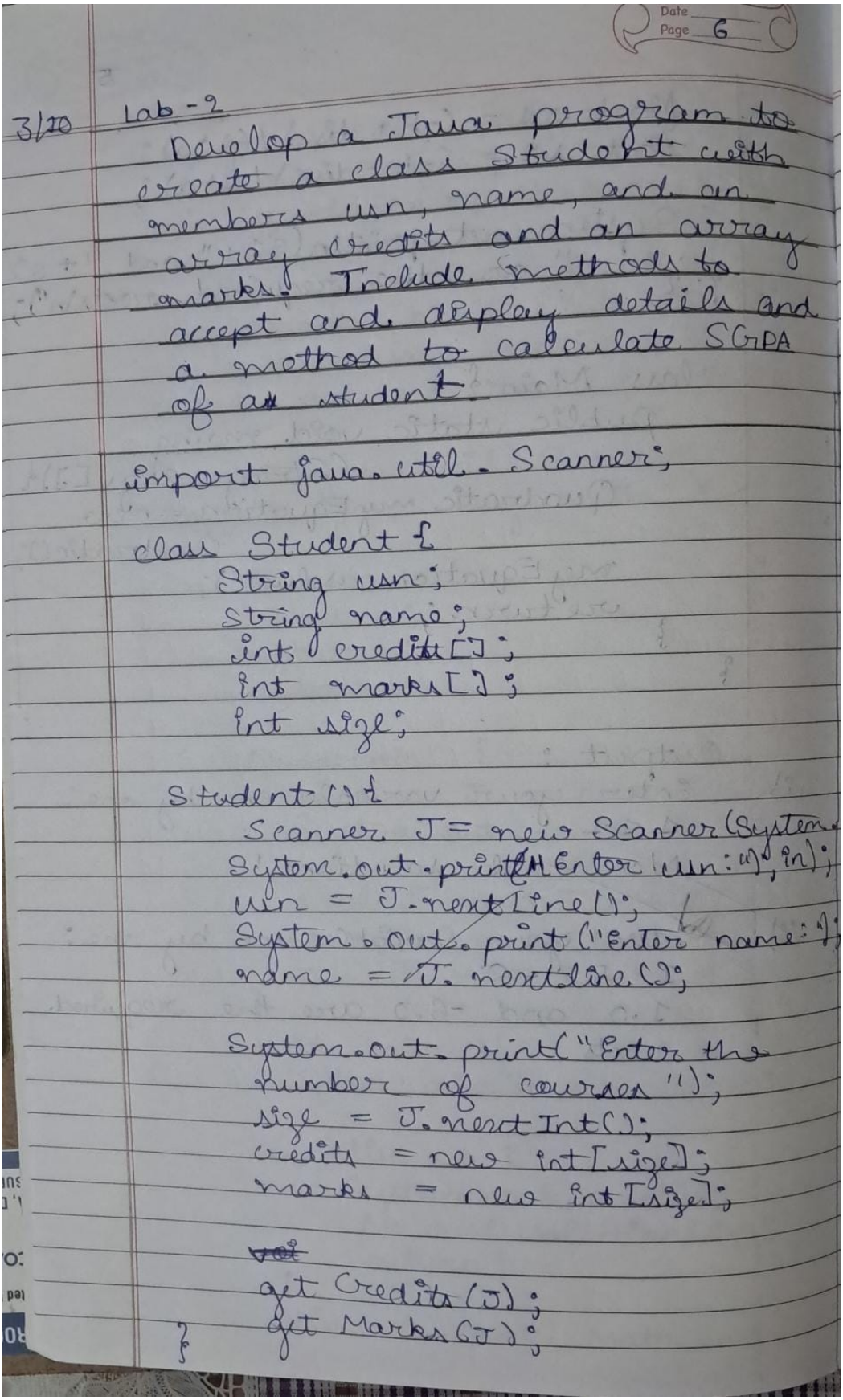
```
PS D:\1BM23CS343\java-lab\1> java Main
Enter your variables one by one :
1 1 1
No real solutions!

PS D:\1BM23CS343\java-lab\1> java Main
Enter your variables one by one :
1 5 -6
1.0 and -6.0 are the required roots.
PS D:\1BM23CS343\java-lab\1>
```

LABORATORY PROGRAM – 2

Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

OBSERVATION



Date
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3/10 Lab - 2

Develop a Java program to create a class Student with members usn, name, and 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 {
    String usn;
    String name;
    int credits[];
    int marks[];
    int size;

    Student() {
        Scanner J = new Scanner(System.
        System.out.println("Enter usn:"); in);
        usn = J.nextLine();
        System.out.print("Enter name:");
        name = J.nextLine();

        System.out.print("Enter the
        number of courses");
        size = J.nextInt();
        credits = new int[size];
        marks = new int[size];

        getCredits(J);
        getMarks(J);
    }
```

```
void getCredits (Scanner J){
    System.out.println("Enter each
        course one by one : ");
    for(int i=0; i<size; i++){
credits[i] = J.nextInt();
    }
}
void getMarks (Scanner J){
    System.out.println("Enter the marks
of course one by one :");
    for (int i=0; i<size; i++){
        marks[i] = J.nextInt();
    }
}
void display(){
    System.out.println("USN "
+ usn + "\n Name : " + name +
"\n Credits : \n");
    for (int i : credits){
        System.out.print(i + "  ");
    }
    System.out.println("\n Marks:\n");
    for (int i : marks){
        System.out.print(i + "  ");
} } // display

float returnSGPA(){
    float sgpa, count;
    sgpa = count = 0;
    for (int i=0; i<size; i++){
        sgpa += credits[i] * marks[i];
        count += credits[i];
    }
    return sgpa/(count*10);
} } // class
```

```
class Main {
    public static void main (String
        Student one = new Student(); args[])
        one.display();
        System.out.println(
                one.returnSGPA());
        return;
    }
}
```

Output:

```
Enter your USN: 1BM23CS343
Enter your Name: Subramanya J
Enter the number of courses: 8
Enter the credits of each course:
1 4 3 3 3 1 1 1
Enter the marks of each course:
100 95 95 96 97 88 90 87

USN: 1BM23CS343
Name: Subramanya J
Credits:
4 4 3 3 3 1 1 1
Marks obtained:
100 95 95 96 97 88 90 87

SGPA: 9.545
```

PROGRAM

```
import java.util.Scanner;

class Student{

    String usn;
    String name;
    int credits[];
    int marks[];
    int size;

    Student(){

        Scanner J = new Scanner(System.in);
        System.out.print("Enter your usn : ");
        usn = J.nextLine();
        System.out.print("Enter your name : ");
        name = J.nextLine();

        System.out.print("Enter the number of courses : ");
        size = J.nextInt();
        credits = new int[size];
        marks = new int[size];

        getCredits(J);
        getMarks(J);

    }

    void getCredits(Scanner J){
        System.out.println("Enter the credits of each course one by one : ");
        for (int i = 0; i < size; i++){
            credits[i] = J.nextInt();
        }
    }

    void getMarks(Scanner J){
        System.out.println("Enter the marks of each course one by one : ");
        for (int i = 0; i < size; i++){
            marks[i] = J.nextInt();
        }
    }

    void display(){
        System.out.println("USN : " + usn + "\nName : " + name + "\nCredits : \n");
```

```
        for(int i : credits){
            System.out.print(i + " ");
        }
        System.out.print("\nMarks obtained : \n");
        for(int i : marks){
            System.out.print(i + "\n");
        }
    }

    float returnSGPA(){
        float sgpa, count;
        sgpa = count = 0;
        for(int i = 0; i < size; i++){
            sgpa += credits[i]*marks[i];
            count += credits[i];
        }
        return sgpa/(count*10);
    }


}

class Main{
    public static void main(String argv[]){
        Student one = new Student();
        one.display();
        System.out.println(one.returnSGPA());

        return;
    }
}
```

OUTPUT

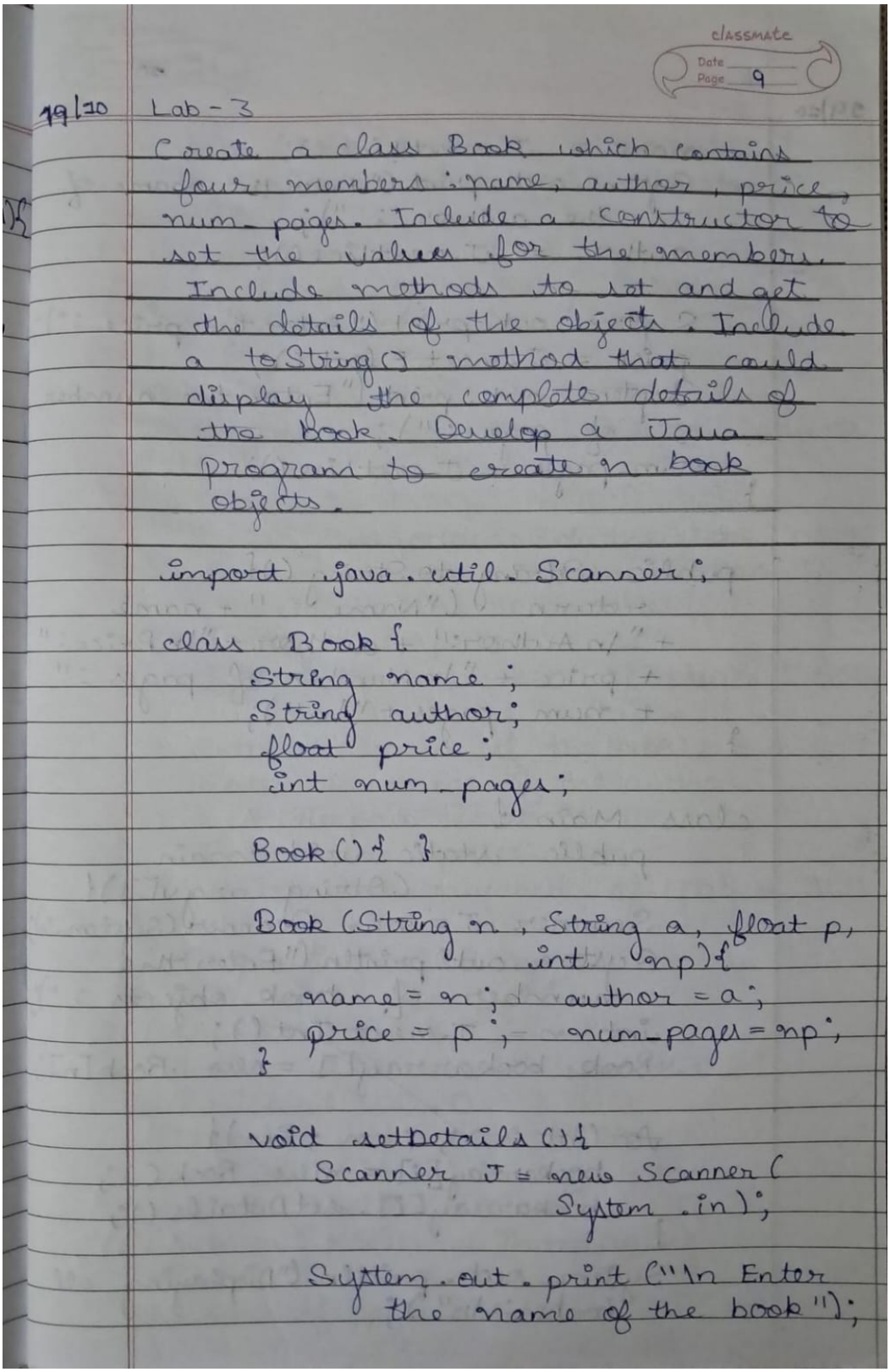
```
PS D:\1BM23CS343\java-lab\2> java Main
Enter your usn : 1BM23CS343
Enter your name : Subamanya J
Enter the number of courses : 8
Enter the credits of each course one by one :
4 4 3 3 3 1 1 1
Enter the marks of each course one by one :
100 95 95 96 97 88 90 87
USN : 1BM23CS343
Name : Subamanya J
Credits :

4 4 3 3 3 1 1 1
Marks obtained :
100
95
95
96
97
88
90
87
9.545
PS D:\1BM23CS343\java-lab\2>
```

LABORATORY PROGRAM – 3

Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString( ) method that could display the complete details of the book. Develop a Java program to create n book objects.

OBSERVATION



19/10 Lab - 3

Create a class Book which contains four members : name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString() method that could display the complete details of the Book. Develop a Java program to create n book objects.

```
import java.util.Scanner;

class Book {
    String name;
    String author;
    float price;
    int num_pages;

    Book() { }

    Book (String n, String a, float p,
                int np){
        name = n;  author = a;
        price = p;  num_pages = np;
    }

    void setDetails (){
        Scanner J = new Scanner (
                System.in);

        System.out.print("\n Enter
            the name of the book");
```

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```
name = J.nextLine();
System.out.print("Enter the name of
    the author : ");
author = J.nextLine();

System.out.print("Enter the price :"
price = J.nextFloat();
System.out.print("Enter the numbe
    of pages : ");
num_pages = J.nextLine();
}

public String toString(){
    return ("Name : " + name
    + "\nAuthor:" + author + "\nPrice:
    + price + "\nNumber of pages :"
    + num_pages + "\n");
}

class Main {
    public static void main
            (String argv[]){
    Scanner J = new Scanner(System.
    System.out.println("Enter the
    number of book objects :"
    int n = J.nextInt();
    Book bookarray[] = new Book[n]

    for(int i=0; i<n; i++){
        bookarray[i] = new Book();
        bookarray[i].setDetails();
    }
    System.out.println("Displaying all
    books : \n");
```

```
for (Book instance : bookarray){
    System.out.println(instance);
}
return;
} // End of main
} // End of class Main
```

Output:

Enter the number of book objects
2

Enter the name of the book: DBMS
Enter the name of the author:
Elmashri - Navathe
Enter the price: 900
Enter the number of pages: 600

Enter the name of the book: DS in C
Enter the name of the author:
Reema Thareja
Enter the price: 400
Enter the number of pages: 800

Displaying all books:

Name: DBMS
Author: Elmashri - Navathe
Price: 900.0
Number of pages: 600

Name: DS in C
Author: Reema Thareja
Price: 400.0
Number of pages: 800

PROGRAM

```
import java.util.Scanner;

class Book{

    String name;
    String author;
    float price;
    int num_pages;

    Book(){

    }

    Book(String n, String a, float p, int np){
        name = n;
        author = a;
        price = p;
        num_pages = np;
    }

    void setDetails(){
        Scanner J = new Scanner(System.in);

        System.out.print("\nEnter the name of the book : ");
        name = J.nextLine();
        System.out.print("Enter the name of the author : ");
        author = J.nextLine();

        System.out.print("Enter the price : ");
        price = J.nextFloat();
        System.out.print("Enter the number of pages : ");
        num_pages = J.nextInt();
    }

    public String toString(){
        return ("Name : " + name + "\nAuthor : " + author + "\nPrice : " + price + "\nNumber of pages : "
+ num_pages + "\n");
    }

}

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

```
        Scanner J = new Scanner(System.in);
        System.out.print("Enter the number of book objects");
        int n = J.nextInt();
      Book bookarray[] = new Book[n];

        for(int i = 0; i < n; i++){
                bookarray[i] = new Book();
                bookarray[i].setDetails();
        }

        System.out.println("Displaying all books : ");

        for(Book instance : bookarray){
                System.out.println(instance);
        }


        return;


   }


}
```

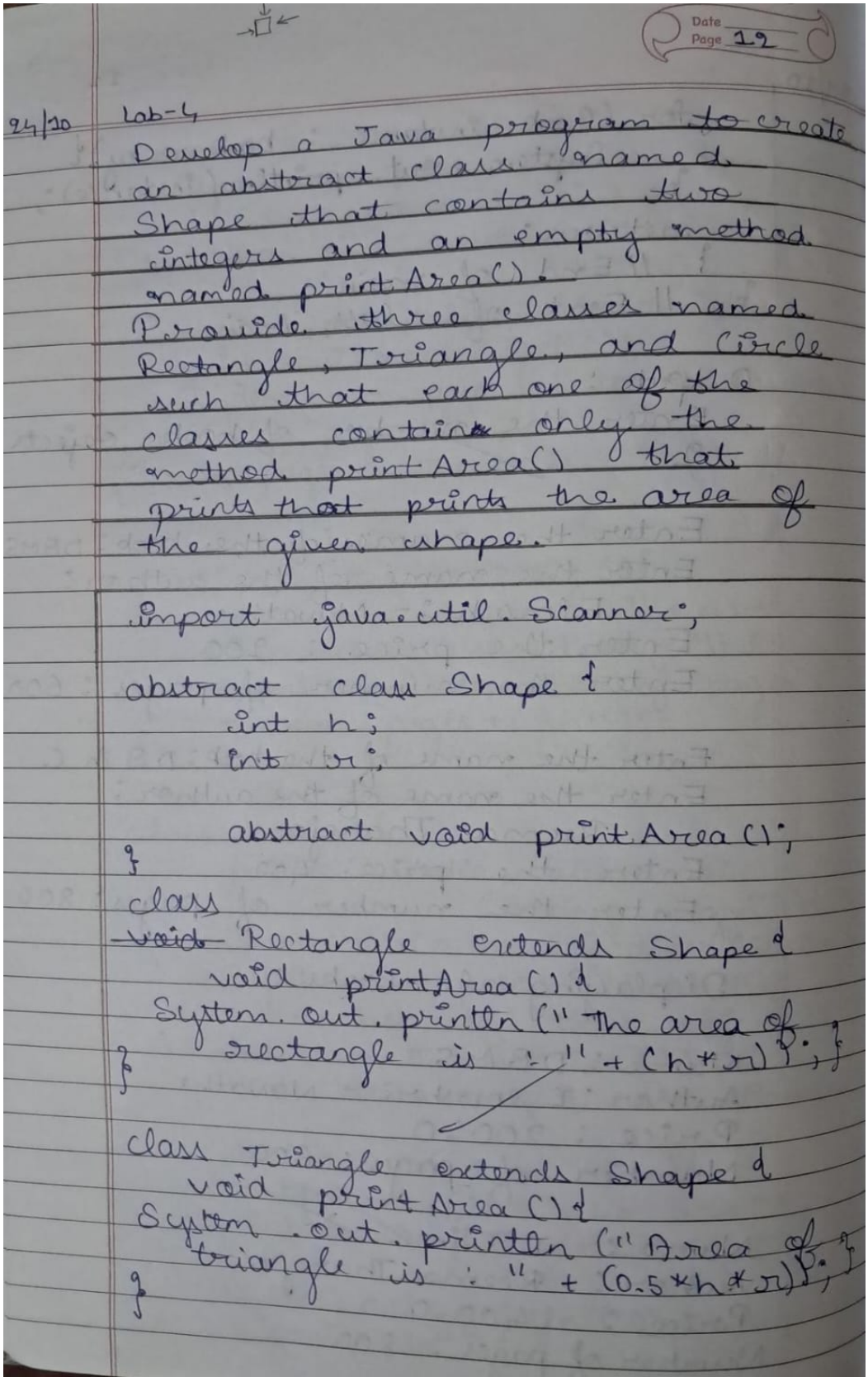
OUTPUT

```
PS D:\1BM23CS343\java-lab\3> java Main
Enter the number of book objects
2

Enter the name of the book : DBMS
Enter the name of the author : Elmashri-Navathe
Enter the price : 200
Enter the number of pages : 600

Enter the name of the book : DS in C
Enter the name of the author : Reema Thareja
Enter the price : 400
Enter the number of pages : 800
Displaying all books :
Name : DBMS
Author : Elmashri-Navathe
Price : 200.0
Number of pages : 600

Name : DS in C
Author : Reema Thareja
Price : 400.0
Number of pages : 800
```

LABORATORY PROGRAM – 4

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

OBSERVATION



24/10 Lab-4

Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes contains only the method printArea() that prints that prints the area of the given shape.

```
import java.util.Scanner;

abstract class Shape {
    int h;
    int r;

    abstract void printArea();
}
class
void Rectangle extends Shape {
    void printArea() {
System.out.println("The area of
    rectangle is :" + (h*r)};}
}

class Triangle extends Shape {
    void printArea() {
System.out.println("Area of
    triangle is :" + (0.5*h*r)};}
}
```

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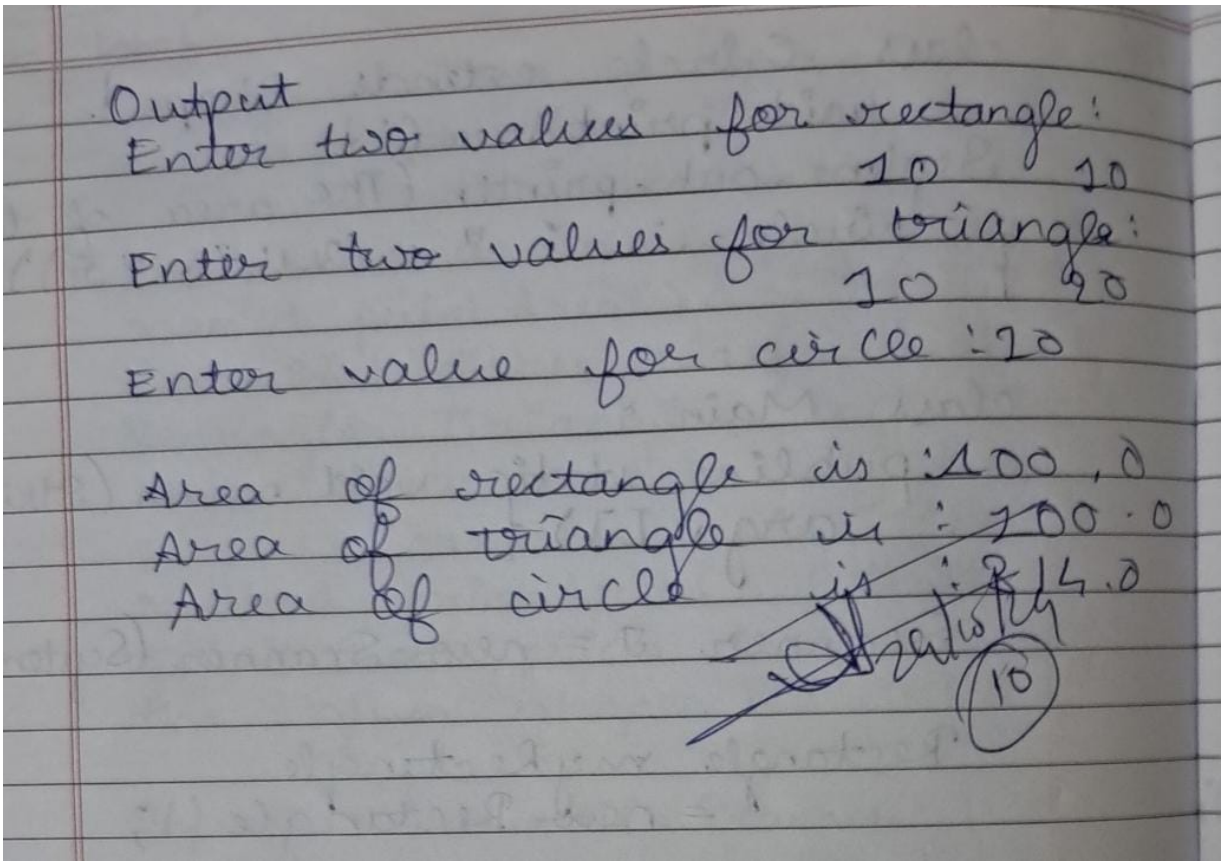
```
class Circle extends Shape {
    void printArea() {
System.out.println("The area of the
    circle is : " + (3.14 * r * r));
}
}

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

    Scanner J = new Scanner(System.in);

    Rectangle myRectangle
        = new Rectangle();

    System.out.println("Enter two
        values for rectangle :");
    myRectangle.h = J.nextInt();
    myRectangle.r = J.nextInt();

    Triangle myTriangle = new Triangle();
    System.out.println("Enter two
        values for triangle :");
    myTriangle.h = J.nextInt();
    myTriangle.r = J.nextInt();

    Circle myCircle = new Circle();
    System.out.println("Enter
        the value for circle :");
    myCircle.h = J.nextInt();

    myRectangle.printArea();
    myTriangle.printArea();
    myCircle.printArea();
}}
```



PROGRAM

```
import java.util.Scanner;

abstract class Shape{
	int h;
	int r;

	abstract void printArea();
}

class Rectangle extends Shape{

	void printArea(){
		System.out.println("The area of rectangle is : " + (h*r));
	}

}

class Triangle extends Shape{

	void printArea(){
		System.out.println("The area of the triangle is : " + (0.5*h*r));
	}
```

```
}

class Circle extends Shape{

	void printArea(){
		System.out.println("Thea area of the circle is : " + (3.14*r*r));
	}

}

class Main{

	public static void main(String argv[]){

		Scanner J = new Scanner(System.in);

		Rectangle myRectangle = new Rectangle();

		System.out.print("Enter the two integer values for rectangle: ");
		myRectangle.h = J.nextInt();
		myRectangle.r = J.nextInt();

		Triangle myTriangle = new Triangle();

		System.out.print("Enter the two integer values for triangle: ");
		myTriangle.h = J.nextInt();
		myTriangle.r = J.nextInt();

		Circle myCircle = new Circle();

		System.out.print("Enter the integer value for circle: ");
		myCircle.h = J.nextInt();

		myRectangle.printArea();
		myTriangle.printArea();
		myCircle.printArea();

		return;

	}

}
```

OUTPUT

```
PS D:\1BM23CS343\java-lab\4> java Main
Enter the two integer values for rectangle: 10 10
Enter the two integer values for triangle: 10 20
Enter the integer value for circle: 10
The area of rectangle is : 100
The area of the triangle is : 100.0
Thea area of the circle is : 314.0
PS D:\1BM23CS343\java-lab\4>
```

LABORATORY PROGRAM – 5

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Cur-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: a) Accept deposit from customer and update the balance. b) Display the balance. c) Compute and deposit interest d) Permit withdrawal and update the balance Check for the minimum balance, impose penalty if necessary and update the balance.

OBSERVATION

4 Lab - 5

Develop a Java program to create a class Bank that maintain two kinds of accounts for its customers, one called savings account and the other current account.
The savings account provides compound interest and withdrawal facility but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a level of minimum balance, and below this level service charge is imposed.

Create class Account that stores customer name, account number and type of account. From this, derive the above classes. Include methods to:

a) Accept deposit from customer and update the balance.
b) Display balance
c) Compute and deposit interest
d) Permit withdrawal and update balance

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

acceptDeposit displayBalance withdrawAmnt
if

7/11 Program:

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

abstract class Account {
    String customer_name;
    int account_number;
    String account_type;
    double balance;
    Object conduit;

    static Scanner J;
    static int acc_count;
    static {
        J = new Scanner(System.in);
        acc_count = 1;
    }
    void acceptDeposit() {
        System.out.println(
"Enter the amount you like to deposit");
        conduit = (double) J.nextDouble();
        this.balance += (double) conduit;
        System.out.println(
" Balance updated ! ");
    }

    void displayBalance(){
        System.out.println(
"Enter the Your current balance
is : " + this.balance);
    }

    void withDrawAmount() {
        System.out.println(
" Enter the amount you want to
withdraw:");
```

```
conduit = (double) J.nextDouble();
balance = (double) conduit;
System.out.println("Withdraw
successful");
displayBalance();
} // End of class Account

class SavingsAccount extends
Account{
    static int count;
    static int time;
    static double rate;

static {
    System.out.println("Enter times,
times over which to calculate,
and rate:");
    count = J.nextInt();
    time = J.nextInt();
    rate = J.nextDouble();
}
SavingsAccount(){
    customer_name = J.nextLine();
    account_number = acc_count;
    account_type = "Savings
                    Account";
}

void compoundInterestFactor(){
    balance += balance * (Math.pow(1 +
    (rate/count)), count*time));
    System.out.println("Interest
    added!");
} }
```

7/11

```
class CurrentAccount extends
Account {
    String cheque_book;
    static double minimum_
    penalty;
    static double minimum_
    balance;

    static {
        minimum_balance = 300.0;
        minimum_penalty = 200.0;
    }

    CurrentAccount(){
        cheque_book = " ";
        customer_name = J.nextLine();
        account_number =
                        acc_count;
        account_type = "Savings account";
    }

void checkMinimumBalance(){
    if (balance < minimum_balance){
        this.balance -= minimum_
                        penalty;
        System.out.println("A
penalty of " + minimum_penalty +
"was imposed to use to insufficient
balance");
    }
}

void acceptDeposit(){
    super.acceptDeposit();
```

```
cheque_book += ("Deposited." +
((double) conduit) + "\n");
}

void withdrawAmount()
    super.withdrawAmount();
    cheque_book += (" Withdrew +
(double) conduit + "\n");
    checkMinimumBalance();
}

void printChequeBook(){
    System.out.println(this.
    cheque_book);
}
}

class Main {
    public static void main(String
                              args[]){
SavingsAccount Sa = new Savings
                        Account();
CurrentAccount Ca = new Current
                        Account();
System.out.println("Savings :");
Sa.acceptDeposit();
Sa.displayBalance();
Sa.withdrawAmount();
Sa.computeInterestFactor();
Sa.displayBalance();

System.out.println("In Current:");
```

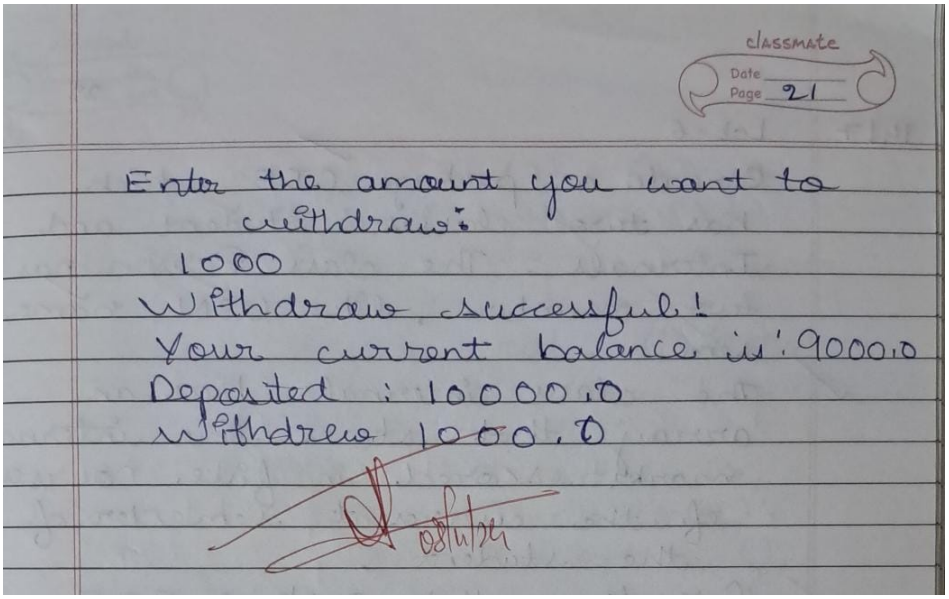
7/11

```
        ca.acceptDeposit();
        ca.displayBalance();
        ca.withdrawAmount();
        ca.printCheque.Book();
        ca.displayBalance();
    }
}
```

Output:

Enter times, time to calculate interest and rate:
1 1 1
Savings:
Enter the amount you would like to deposit:
10000
Balance updated!
Your current balance is: 10000.0
Enter the amount you want to withdraw:
1000
Withdraw successful
Your current balance is: 9000.0
Interest added!
Your current balance is:
27000.00

Current:
Enter the amount you would like to deposit
10000
Balance updated!
Your current balance is: 10000.


classmate
Date
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Enter the amount you want to withdraw:
1000
Withdraw successful!
Your current balance is: 9000.0
Deposited : 10000.0
Withdrew 1000.0
08/11/24