

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.



LAB REPORT

on

Object Oriented Java Programming

(23CS3PCOOJ)

Submitted by

K L SRUJAN (24BECS419)

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)

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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



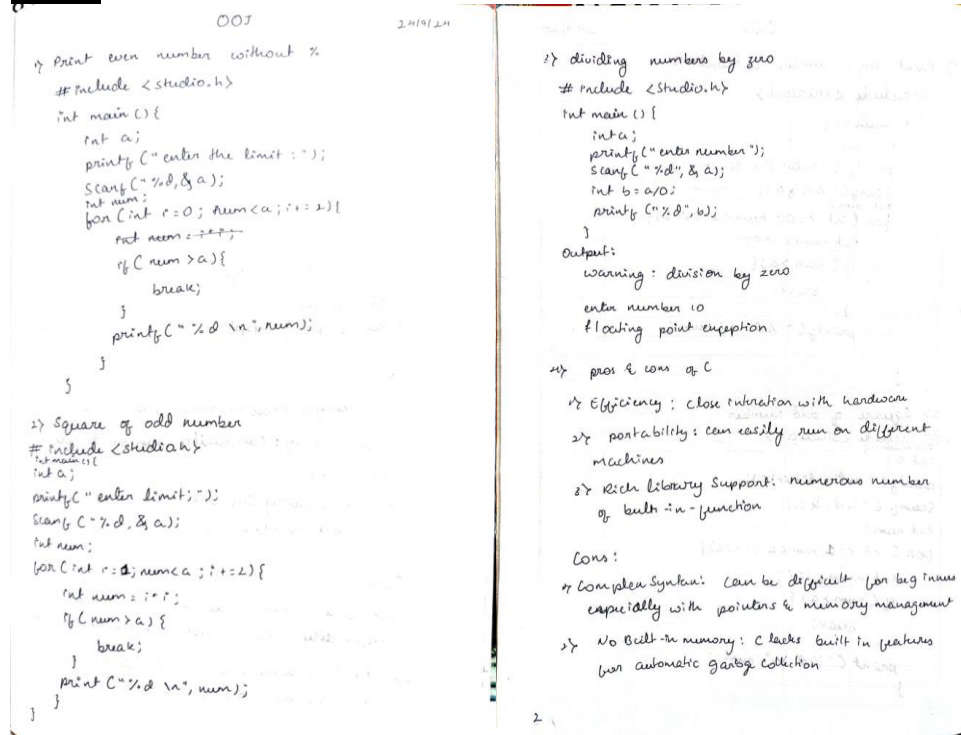
CERTIFICATE

This is to certify that the Lab work entitled “Object oriented Java programming (23CS3PCOOJ)” carried out by **K L SRUJAN (24BECS419)**, 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. 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.

Ms. Ambuja K 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/K-L-SRUJAN/OOJ>

LAB 1



Code:

Program 1

```
#include <stdio.h>
```

```
int main(){
```

```
    int a;
```

```
    printf("Enter the limit :");
```

```
    scanf("%d",&a);
```

```
    int num;
```

```
    for(int i=0;i<a;i+=2){
```

```
        if(i>a){
```

```
            break;
```

```
        }
```

```
        printf("%d\n",i);
```

```
    }
```

```
}
```

Output

Enter the limit :5

0

2

4

=== Code Execution Successful ===

Program 2

```
#include <stdio.h>
```

```
int main(){
```

```
    int a;
```

```
    printf("Enter the limit :");
```

```
    scanf("%d",&a);
```

```
    int num;
```

```
    for(int i=1;i<a;i+=2){
```

```
        num=i*i;
```

```
        if(num>a){
```

```
            break;
```

```
        }
```

```
        printf("%d\n",num);
```

```
    }
```

```
}
```

Output:

Output

Enter the limit :27

1

9

25

=== Code Execution Successful ===

Program 3

```
#include <stdio.h>
```

```
int main(){
```

```
    int a;
```

```
    printf("enter number :");
```

```
    scanf("%d",&a);
```

```
    int b=a/0;
```

```
    printf("%d",b);
```

```
}
```

Output

[Clear](#)

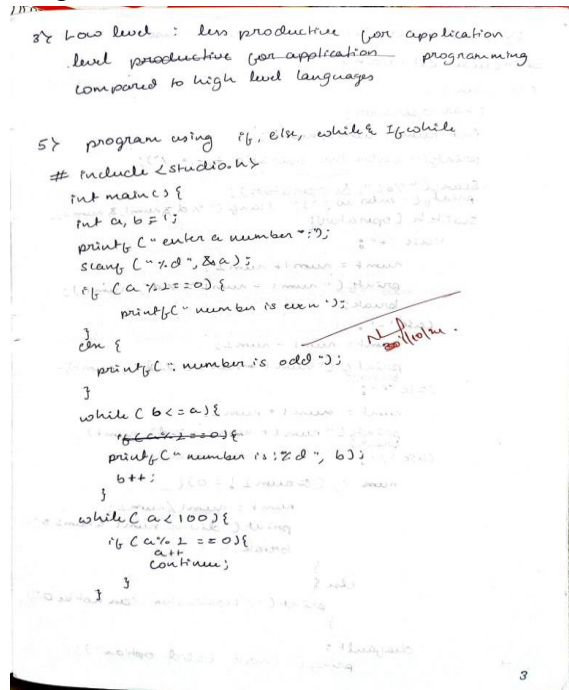
```
/tmp/2Vo0oiSQzt/main.c: In function 'main':
```

```
/tmp/2Vo0oiSQzt/main.c:7:12: warning: division by zero [-Wdiv-by-zero]
```

```
    7 |      int b=a/0;  
      |              ^
```

```
enter number :
```

Program 5



Code:

```
#include <stdio.h>
```

```
int main() {
    int a,b=1;

    printf("Enter your number :");
    scanf("%d",&a);
    if(a%2==0){
        printf("\nnumber is even ");
    }
    else{
        printf("\nNumber is odd ");
    }
    printf("\nnumber is : ");
    while (b<=a){

        printf("\n%d",b);
        b++;
    }
    while (a<10){
        printf("\n%d",a);
        if(a%2==0){
            printf("even\n");
        }
    }
}
```

```
    }  
    else{  
        printf("odd\n");  
    }  
    a++;  
}  
  
}
```

Output:

```
Enter your number :5
```

```
Number is odd
```

```
number is :
```

```
1
```

```
2
```

```
3
```

```
4
```

```
5
```

```
5odd
```

```
6even
```

```
7odd
```

```
8even
```

```
9odd
```

Program 6

```
6: Simple calculator using switch case
#include <stdio.h>
int main() {
    char operator;
    int num1, num2, numt;
    printf("Enter the operator +, -, /, *");
    scanf("%c", &operator);
    printf("Enter no : "); scanf("%d", &num1, &num2);
    switch (operator) {
        case '+':
            numt = num1 + num2;
            printf("num1 + num2 = %d", numt);
            break;
        case '-':
            numt = num1 - num2;
            printf("num1 - num2 = %d", numt);
            break;
        case '*':
            numt = num1 * num2;
            printf("num1 * num2 = %d", numt);
            break;
        case '/':
            if (num2 != 0) {
                numt = num1 / num2;
                printf("div of num1 & num2 is %d", numt);
                break;
            }
            else {
                printf("denominator can not be 0");
            }
        default:
            printf("choose valid option");
    }
}
```

Code:

```
#include <stdio.h>
```

```
int main() {
    char operators;
    int num1, num2, numt;
```

```
    printf("Enter the operator (+, -, /, *): ");
    scanf(" %c", &operators); // Use %c to read a character, and add a space before %c to consume
    newline
```

```
    printf("Enter number 1: ");
    scanf("%d", &num1); // Correct address-of operator
```

```
    printf("Enter number 2: ");
    scanf("%d", &num2); // Correct address-of operator
```

```
    switch (operators) {
        case '+':
            numt = num1 + num2;
            printf("\nResult: num1 + num2 :%d ", numt);
            break;
        case '-':
```



```

        numt = num1 - num2;
        printf("\nResult: num1 - num2 : %d", numt);
        break;
    case '*':
        numt = num1 * num2;
        printf("\nResult: num1 * num2 : %d", numt);
        break;
    case '/':
        if (num2 != 0) {
            numt = num1 / num2;
            printf("\nResult: num1 / num2 :%d ", numt);
        } else {
            printf("\nError: Division by zero is not allowed.");
        }
        break;
    default:
        printf("\nInvalid operator selection.");
}

return 0;
}

```

Output:

```

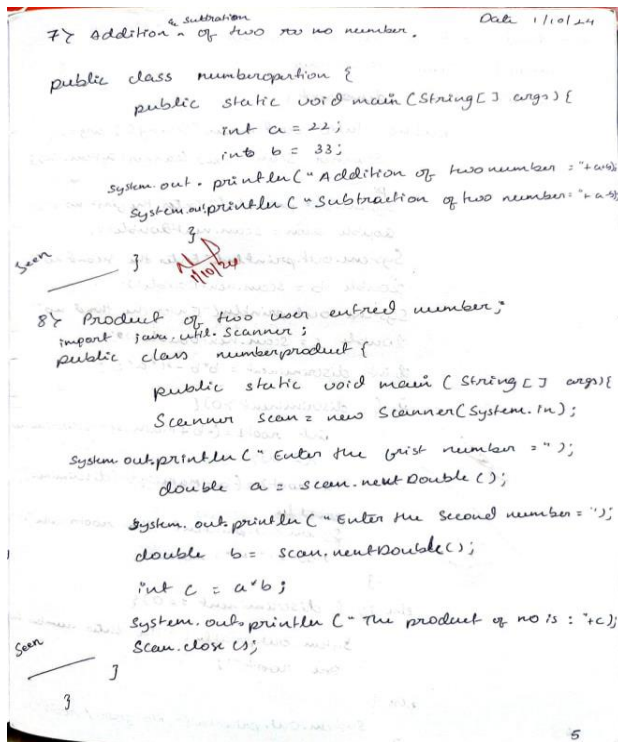
Enter the operator (+, -, /, *): +
Enter number 1: 50
Enter number 2: 40

Result: num1 + num2 :90

=== Code Execution Successful ===

```

Program 7



Code:

```
class Main {
    public static void main(String[] args) {
        int a=22;
        int b=23;

        System.out.println("Addition of two numbers : "+(a+b));
        System.out.println("Subtraction of two numbers : "+(a-b));
    }
}
```

Output:

```
PS D:\JAVA\jva> javac Program7.java
PS D:\JAVA\jva> java Program7
Addition of two numbers : 45
Subtraction of two numbers : -1
```

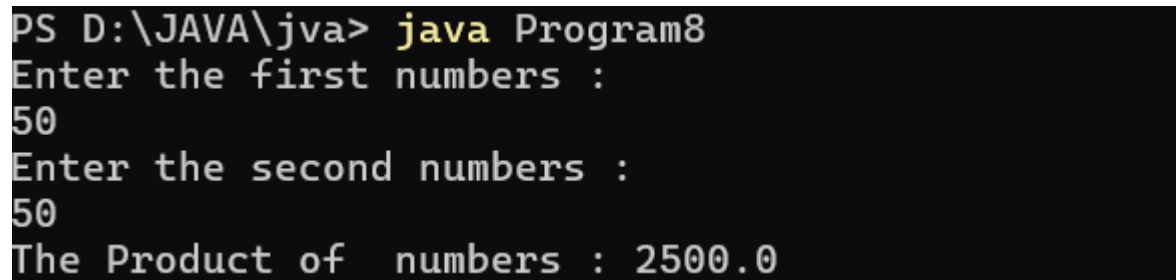
Program 8

Code:

```
import java.util.Scanner;
class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the first numbers : ");
        double a=sc.nextInt();
        System.out.println("Enter the second numbers : ");
        double b=sc.nextInt();

        double c=a*b;
        System.out.println("The Product of numbers : "+c);
    }
}
```

Output :



```
PS D:\JAVA\jva> java Program8
Enter the first numbers :
50
Enter the second numbers :
50
The Product of numbers : 2500.0
```

Program 9:

```

3> find root of entered number:
import java.util.Scanner;

public class demoRoot {

    public static void main (String[] args) {
        Scanner scan = new Scanner(System.in);

        System.out.println("Enter the first no:");
        double a = scan.nextDouble();
        System.out.println("Enter the second no:");
        double b = scan.nextDouble();
        System.out.println("Enter the third no:");
        double c = scan.nextDouble();
        double discriminant = b*b - 4*a*c;

        if (discriminant > 0) {
            int root1 = (-b + Math.sqrt(discriminant)) / (2*a);
            int root2 = (-b - Math.sqrt(discriminant)) / (2*a);
            System.out.println("The roots are: " + root1 + " and " + root2);
        }
        else if (discriminant == 0) {
            System.out.println("The equation has one root");
        }
        else {
            System.out.println("No roots / roots");
        }
    }
}

```

scan.close();

Output 1: The addition of two number is: 55
The subtraction of two number is: -11;

Output 2:

Enter the first number: 2
Enter the second number: 3
product of the two no is: 6

Output 3:

case 1: no roots:
Enter the first no: 1
Enter the sec no: 1
Enter the third no: 1

no zeros / roots

case 2:

Enter the first no: 1
Enter the sec no: -3
Enter the third no: 2
The roots are 2, 1

Case 3:

Enter the first no: 1

Enter the second no: 2

Enter the third no: 1

The equation has one root

Code :

```
import java.util.Scanner;

public class Program9 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the first number: ");
        double a = scanner.nextDouble();

        System.out.print("Enter the second number: ");
        double b = scanner.nextDouble();

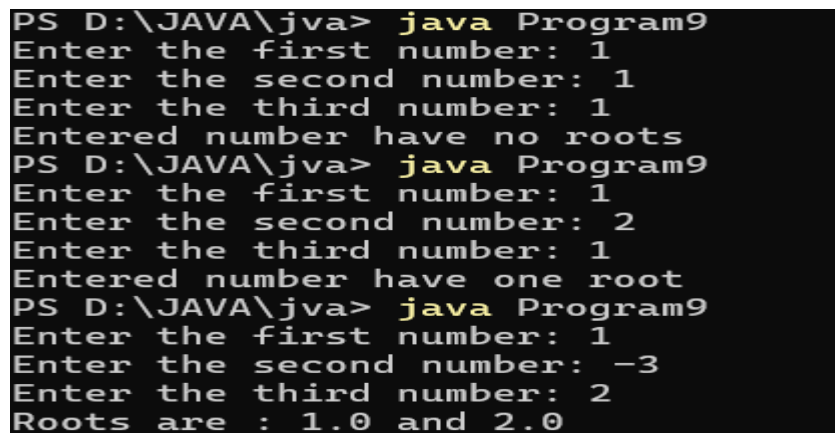
        System.out.print("Enter the third number: ");
        double c = scanner.nextDouble();

        double dis=b*b-4*a*c;

        if (dis> 0) {
            double root1= ((-b)+Math.sqrt(dis))/2*a;
            double root2= ((-b)-Math.sqrt(dis))/2*a;
            System.out.println("Roots are : " + root2 + " and " + root1);
        } else if(dis==0){
            System.out.println("Entered number have one root");
        }
        else{
            System.out.println("Entered number have no roots");
        }

        scanner.close();
    }
}
```

Output:

A screenshot of a Windows command prompt window showing the execution of a Java program named Program9. The prompt is 'PS D:\JAVA\jva>'. The user enters 'java Program9'. The program prompts for three numbers: 'Enter the first number: 1', 'Enter the second number: 1', and 'Enter the third number: 1'. The output is 'Entered number have no roots'. The user then runs the program again with inputs 1, 2, and 1, resulting in 'Entered number have one root'. Finally, the user runs the program with inputs 1, -3, and 2, resulting in 'Roots are : 1.0 and 2.0'.

```
PS D:\JAVA\jva> java Program9
Enter the first number: 1
Enter the second number: 1
Enter the third number: 1
Entered number have no roots
PS D:\JAVA\jva> java Program9
Enter the first number: 1
Enter the second number: 2
Enter the third number: 1
Entered number have one root
PS D:\JAVA\jva> java Program9
Enter the first number: 1
Enter the second number: -3
Enter the third number: 2
Roots are : 1.0 and 2.0
```

LAB 2

Program 10:

```
import java.util.Scanner;

class Student {
    int usn;
    String name;
    int[] credits;
    int[] marks;
    int numSubjects;

    void acceptDetails() {
        Scanner sc = new Scanner(System.in);

        System.out.println("Enter USN:");
        usn = sc.nextInt();

        System.out.println("Enter Name:");
        name = sc.nextLine();

        System.out.println("Enter number of subjects:");
        numSubjects = sc.nextInt();

        credits = new int[numSubjects];
        marks = new int[numSubjects];

        for (int i = 0; i < numSubjects; i++) {
            System.out.println("Enter credits of Subject " + (i+1));
            credits[i] = sc.nextInt();

            System.out.println("Enter the marks of Subject " + (i+1));
            marks[i] = sc.nextInt();
        }
    }

    double calcGPA() {
        double totalCredits = 0;
        double totalGradePoints = 0;

        for (int i = 0; i < numSubjects; i++) {
            double gradePoint = getGradePoint(marks[i]);
            totalGradePoints += gradePoint * credits[i];
            totalCredits += credits[i];
        }

        return (double) totalGradePoints / totalCredits;
    }
}
```

```
int getGradePoint(int marks) {
    if (marks >= 90) return 10;
    if (marks >= 80) return 9;
    if (marks >= 70) return 8;
    if (marks >= 60) return 7;
    if (marks >= 50) return 6;
    if (marks >= 40) return 5;
    return 0;
}

void display() {
    System.out.println("Student Details:");
    System.out.println("USN: " + usn);
    System.out.println("Name: " + name);
    System.out.println("Subject Details:");

    for (int i = 0; i < numSubjects; i++) {
        System.out.println("Subject " + (i+1) + " Credits: " + credits[i] + " Marks: " + marks[i]);
    }

    System.out.println("GPA: " + calcGPA());
}

public class Main {
    public static void main(String[] args) {
        Student student = new Student();
        student.acceptDetails();
        student.display();
    }
}
```

Code:

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

```
class Student {
    String usn;
    String name;
    int[] credits;
    int[] marks;
    int numSubjects;
```

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

```

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

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

System.out.print("Enter number of subjects: ");
numSubjects = sc.nextInt();

credits = new int[numSubjects];
marks = new int[numSubjects];

for (int i = 0; i < numSubjects; i++) {
    System.out.print("Enter credits for subject " + (i + 1) + ": ");
    credits[i] = sc.nextInt();

    System.out.print("Enter marks for subject " + (i + 1) + ": ");
    marks[i] = sc.nextInt();
}
}

double calculateSGPA() {
    int totalCredits = 0;
    int totalGradePoints = 0;

    for (int i = 0; i < numSubjects; i++) {
        int gradePoint = getGradePoint(marks[i]);
        totalGradePoints += gradePoint * credits[i];
        totalCredits += credits[i];
    }

    return (double) totalGradePoints / totalCredits;
}

int getGradePoint(int marks) {
    if (marks >= 90) return 10;
    if (marks >= 80) return 9;
    if (marks >= 70) return 8;
    if (marks >= 60) return 7;
    if (marks >= 50) return 6;
}

```

```

        if (marks >= 40) return 5;
        return 0;
    }

    void displayDetails() {
        System.out.println("\nStudent Details:");
        System.out.println("USN: " + usn);
        System.out.println("Name: " + name);
        System.out.println("Subject Details:");
        for (int i = 0; i < numSubjects; i++) {
            System.out.println("Subject " + (i + 1) + " - Credits: " + credits[i] + ", Marks: " + marks[i]);
        }
        System.out.printf("SGPA: %.2f\n", calculateSGPA());
    }
}

public class Program10 {
    public static void main(String[] args) {
        Student student = new Student();
        student.acceptDetails();
        student.displayDetails();
    }
}

```

Output:

```

PS D:\JAVA\jva> java Program10
Enter USN: 419
Enter Name: Srujan
Enter number of subjects: 3
Enter credits for subject 1: 4
Enter marks for subject 1: 90
Enter credits for subject 2: 3
Enter marks for subject 2: 80
Enter credits for subject 3: 3
Enter marks for subject 3: 70

Student Details:
USN: 419
Name: Srujan
Subject Details:
Subject 1 - Credits: 4, Marks: 90
Subject 2 - Credits: 3, Marks: 80
Subject 3 - Credits: 3, Marks: 70
SGPA: 9.10

```


LAB 3

Program 11:

11) Create a class Book which contains four members name, author, price, num pages. Include a constructor to set the value for the members. Include method to set and get the details of the objects. Include a toString() method that could display the complete details of the book.

```
import java.util.Scanner;

public class Book {
    private String name;
    private String author;
    private int price;
    private int numPages;

    // constructor
    public Book (String name, String author, int price, int numPages) {
        this.name = name;
        this.author = author;
        this.price = price;
        this.numPages = numPages;
    }

    public String getName () {
        return name;
    }
}
```

```
public void setName (String name) {
    this.name = name;
}

public String getAuthor () {
    return author;
}

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

public int getPrice () {
    return price;
}

public void setPrice (int price) {
    this.price = price;
}

public int getNumPages () {
    return numPages;
}

public void setNumPages (int numPages) {
    this.numPages = numPages;
}

public String toString () {
    return "Name : " + name + "\n Author : " + author +
        "\n Price : " + price + "\n Num pages : " + numPages;
}
```

```
public class BookStore {
    Scanner sc = new Scanner (System.in);

    System.out.println ("Enter the no of book : ");
    int n = sc.nextInt();

    Book[] books = new Book[n];

    for (int i = 0; i < n; i++) {
        System.out.println ("Enter the name of Book");
        String name = sc.nextLine();

        System.out.println ("Enter the name of Author");
        String author = sc.nextLine();

        System.out.println ("Enter the Price : ");
        int price = sc.nextInt();

        System.out.println ("Enter the no of Pages : ");
        int numPages = sc.nextInt();

        books[i] = new Book (name, author, price, numPages);
    }

    for (int i = 0; i < n; i++) {
        System.out.println (books[i].toString());
    }
}
```

Output:

Enter the number of Books : 1

Enter the detail of Book 1:

Enter the name of Book : Java

Enter the name of Author : abc

Enter the Price of Book : 200

Enter the number of pages : 500

----- Printing the details -----

Name of Book : Java

Name of Author : abc

Price of Book : 200

Number of pages : 500

Code:

```
import java.util.Scanner;

class Book {
    private String name;
    private String author;
    private double price;
    private int numPages;

    public Book(String name, String author, double price, int numPages) {
        this.name = name;
        this.author = author;
        this.price = price;
        this.numPages = numPages;
    }

    public void setName(String name) {
        this.name = name;
    }

    public String getName() {
        return name;
    }

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

    public String getAuthor() {
        return author;
    }

    public void setPrice(double price) {
        this.price = price;
    }

    public double getPrice() {
        return price;
    }

    public void setNumPages(int numPages) {
        this.numPages = numPages;
    }

    public int getNumPages() {
        return numPages;
    }
}
```

```

@Override
public String toString() {
    return "Book Details:\n" +
        "Name: " + name + "\n" +
        "Author: " + author + "\n" +
        "Price: " + price + "\n" +
        "Number of Pages: " + numPages;
}
}

public class Program11 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

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

        Book[] books = new Book[n];

        for (int i = 0; i < n; i++) {
            System.out.println("Enter details for book " + (i + 1) + ":");
            System.out.print("Name: ");
            String name = sc.nextLine();
            System.out.print("Author: ");
            String author = sc.nextLine();
            System.out.print("Price: ");
            double price = sc.nextDouble();
            System.out.print("Number of Pages: ");
            int numPages = sc.nextInt();
            sc.nextLine();
            books[i] = new Book(name, author, price, numPages);
        }

        System.out.println("\nBook Details:");
        for (int i=0;i<n;i++) {
            System.out.println(books[i].toString());
            System.out.println();
        }
    }
}

```

Output:

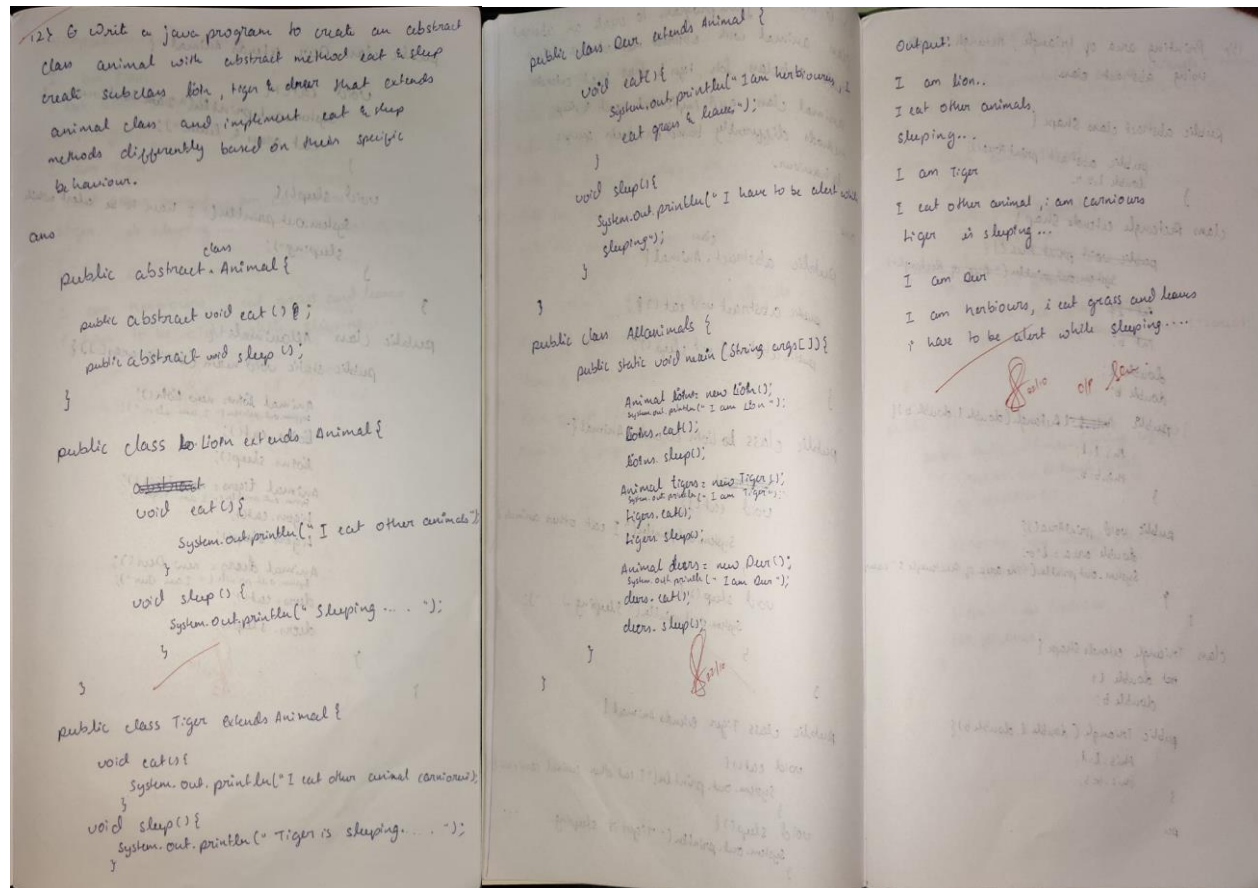
```
PS D:\JAVA\jva> java Program11
Enter the number of books: 2
Enter details for book 1:
Name: Marvel
Author: stan lee
Price: 500
Number of Pages: 300
Enter details for book 2:
Name: Java
Author: abc
Price: 100
Number of Pages: 300

Book Details:
Book Details:
Name: Marvel
Author: stan lee
Price: 500.0
Number of Pages: 300

Book Details:
Name: Java
Author: abc
Price: 100.0
Number of Pages: 300
```

LAB 4:

Program 12:



Code :

```
abstract class Animal {  
    abstract void eat();  
    abstract void sleep();  
}
```

```
class Lion extends Animal {  
    void eat() {  
        System.out.println("I eat other animal meat.");  
    }  
  
    void sleep() {  
        System.out.println("Sleeping.");  
    }  
}
```

```
class Tiger extends Animal {  
    @Override
```

```

void eat() {
    System.out.println("I eat other herbiours .");
}

@Override
void sleep() {
    System.out.println("Tiger is sleeping.");
}
}

class Deer extends Animal {
    void eat() {
        System.out.println("I am herbivours and i eat grass.");
    }

    void sleep() {
        System.out.println("I have to be alert while sleeping.");
    }
}

public class Program12 {
    public static void main(String[] args) {
        Animal lion = new Lion();
        Animal tiger = new Tiger();
        Animal deer = new Deer();
        System.out.println("I am Lion");
        lion.eat();
        lion.sleep();
        System.out.println("I am tiger");
        tiger.eat();
        tiger.sleep();
        System.out.println("I am dear");
        deer.eat();
        deer.sleep();
    }
}

```

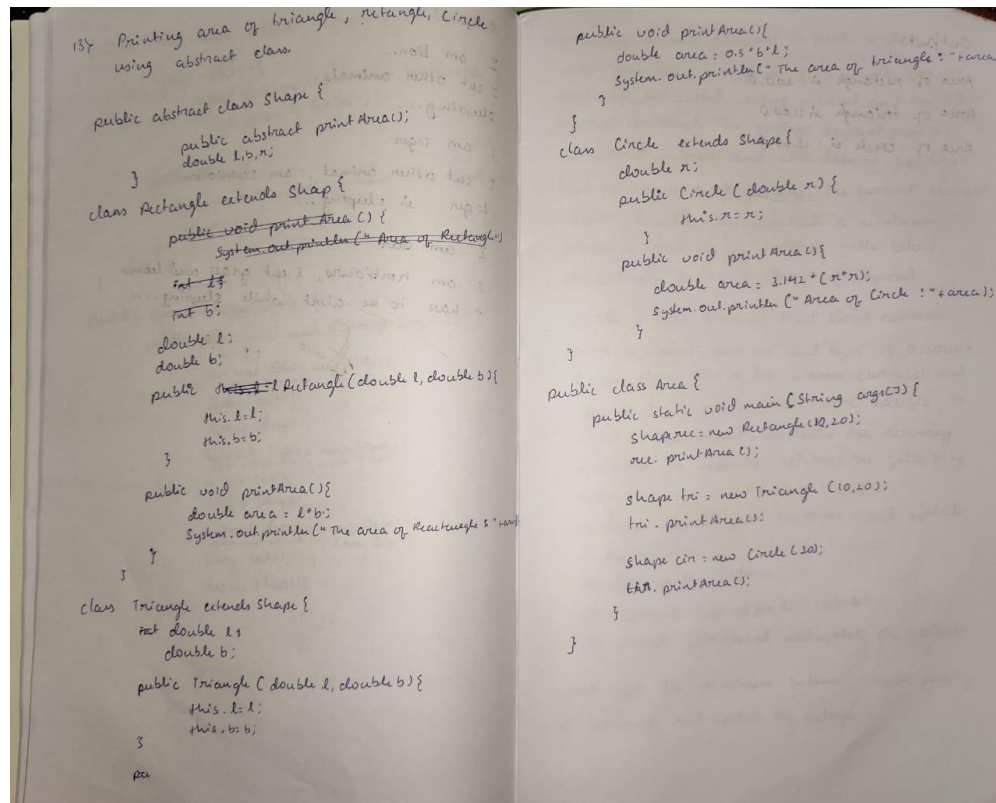
Output:

```

PS D:\JAVA\jva> java Program12
I am Lion
i eat other animal meat.
Sleeping.
I am tiger
I eat other herbiours .
Tiger is sleeping.
I am dear
I am herbivours and i eat grass.
I have to be alert while sleeping.

```

Program13:



Code :

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

```

abstract class Shape {
    int l, b, r;

    abstract void printArea();
}

```

```

class Rectangle extends Shape {
    Rectangle(int length, int breadth) {
        this.l = length;
        this.b = breadth;
    }
    void printArea() {
        System.out.println("Rectangle Area: " + (l * b));
    }
}

```

```

class Triangle extends Shape {
    Triangle(int base, int height) {
        this.b = base;
        this.l = height;
    }
    void printArea() {
        System.out.println("Triangle Area: " + (0.5 * b * l));
    }
}

class Circle extends Shape {
    Circle(int radius) {
        this.r = radius;
    }

    void printArea() {
        System.out.println("Circle Area: " + (Math.PI * r * r));
    }
}

public class Program13 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        Shape rectangle = new Rectangle(20,12);

        Shape triangle = new Triangle(20, 10);
        Shape circle = new Circle(5);

        rectangle.printArea();
        triangle.printArea();
        circle.printArea();
    }
}

```

Output:

```

PS D:\JAVA\jva> java Program13
Rectangle Area: 240
Triangle Area: 100.0
Circle Area: 78.53981633974483

```


LAB 5

Program 14:

Develop a Java program to create a class Bank that maintains two kinds of accounts for its customers, one called saving account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The 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-act and Sav-act to make them more specific to their requirement. Includes 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.

Program:

import java.util.Scanner;

class Account {

String Name;

int accno;

double balance;

public void deposit (double amount) {
 ~~balance++amount~~

public Account (String Name, int accno, double balance) {

this.Name = Name;

this.accno = accno;

this.balance = balance;

public void deposit (double amount) {

balance += amount;

System.out.println ("Deposit successful

current balance = " + balance);

public void display () {

System.out.println ("Current Balance = " + balance);

}

class Sav-act extends Account {

public Sav-act (String Name, int accno, double balance) {

super (Name, accno, balance);

public void calculate (double amount) {

double interest = 0.05; // 5%

double interest = interest * balance;

balance += interest;

System.out.println ("Interest applied

current balance = " + balance);

public void withdraw (double amount) {

if (amount <= balance) {

balance -= amount;

System.out.println ("Withdrawal

successful of rs " + amount + " ; current balance = "

+ balance);

}

else {

System.out.println ("Insufficient balance");

}

}

public class Cur-act extends Account {
 public void withdraw (String Name, int accno, double balance) {
 super (Name, accno, balance);
 int minimumBalance = 1000; int penalty = 50;
 public void withdraw (double amount) {
 if (amount > balance) {
 System.out.println ("Penalty applied

current balance = " + balance);
 }
 else {
 balance -= amount;
 System.out.println ("Withdrawal successful;

while (r==0) {
 System.out.println ("Menu for Saving account");
 2. for Current account {
 x = sc.nextInt();
 if (x==1) {
 System.out.println ("1-> balance go to withdraw

3. deposit : n.7 interest %;
 if (x==2) {
 sc.display();
 }
 else if (x==3) {
 System.out.println ("Enter amount : ");
 int y = sc.nextInt();
 sc.deposit (y);

public class Cur-act extends Account {
 public void withdraw (String Name, int accno, double balance) {
 super (Name, accno, balance);
 int minimumBalance = 1000; int penalty = 50;
 public void withdraw (double amount) {
 if (amount > balance) {
 System.out.println ("Penalty applied

current balance = " + balance);
 }
 else {
 balance -= amount;
 System.out.println ("Withdrawal successful;

while (r==0) {
 System.out.println ("Menu for Saving account");
 2. for Current account {
 x = sc.nextInt();
 if (x==1) {
 System.out.println ("1-> balance go to withdraw

3. deposit : n.7 interest %;
 if (x==2) {
 sc.display();
 }
 else if (x==3) {
 System.out.println ("Enter amount : ");
 int y = sc.nextInt();
 sc.deposit (y);

Code :

```
import java.util.Scanner;

class Account{

    String Name;
    int accno;
    double balance;

    public Account(String Name,int accno,double balance){
        this.Name=Name;
        this.accno=accno;
        this.balance=balance;
    }

    public void deposit(double amount){
        balance+=amount;
        System.out.println("Deposit successfull current balance = "+balance);
    }

    public void display(){

        System.out.println("Current balance = "+balance);
    }

}

class Savacct extends Account{

    public Savacct(String Name,int accno,double balance){
        super(Name,accno,balance);
    }

    public void calinter(){
        double interraterate=0.05;
        double interest =interraterate*balance;
        balance+=interest;
        System.out.println("Interest applied Current balance = "+balance);
    }

    public void withdraw(double amount){
        if(amount<=balance){
            balance-=amount;
        }
    }
}
```

```

        System.out.println("Withdraw successfull ; Current Balance =
"+balance);
    }
    else{
        System.out.println("Insufficient balance");
    }
}

class Curacct extends Account{

    public Curacct(String Name,int accno,double balance){
        super(Name,accno,balance);
    }

    int minbalance=1000;
    int pan=50;

    public void withdraw(double amount){
        if(amount<balance){
            balance-=amount;
            System.out.println("Withdraw successfull ; Current Balance =
"+balance);
        }
        else{
            balance-=amount;
            balance-=pan;
            System.out.println("Low balance warring Panalty of 50 applied ;
Current Balance = "+balance);
        }
    }
}

class Bank{

    public static void main(String args[]){
        Scanner sc=new Scanner(System.in);

        Savacct sav=new Savacct("Srujan",203,1000);
        Curacct cur=new Curacct("Srujan",203,1000);

        int i=0;
        int x;
        int y;
        double z;

        while(i==0){
            System.out.println("Enter 1-> Saving acc ; 2 -> Current acc");
            x=sc.nextInt();

```

```

        if(x==1){
            System.out.println("Enter 1-> Balance ; 2-> Deposit ; 3 ->
Withdraw ; 4-> Interest ; other to exit");
            y=sc.nextInt();
            if(y==1){
                sav.display();
            }
            else if(y==2){
                System.out.println("Enter the amount : ");
                z=sc.nextInt();
                sav.deposite(z);
            }
            else if(y==3){
                System.out.println("Enter the amount : ");
                z=sc.nextInt();
                sav.withdraw(z);
            }
            else if(y==4){
                sav.calinter();
            }
            else{
                System.out.println("exiting");
                break;
            }
        }
    }

```

```

    else if(x==2){
        System.out.println("Enter 1-> Balance ; 2-> Deposit ; 3 ->
Withdraw; other to exit");
        y=sc.nextInt();
        if(y==1){
            cur.display();
        }
        else if(y==2){
            System.out.println("Enter the amount : ");
            z=sc.nextInt();
            cur.deposite(z);
        }
        else if(y==3){
            System.out.println("Enter the amount : ");
            z=sc.nextInt();
            cur.withdraw(z);
        }
        else{
            System.out.println("exiting");
            break;
        }
    }

```

```

        }
    }
    else{
        break;
    }
}
}
}

```

Output:

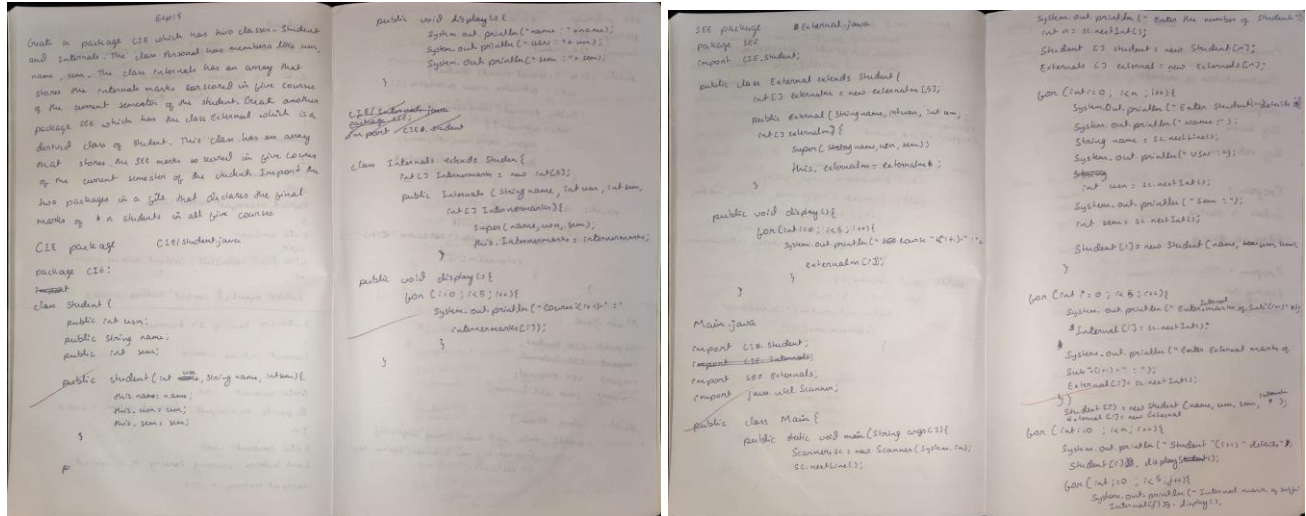
```

PS D:\JAVA\jva> java Program14
Enter 1-> Saving acc ; 2 -> Current acc
1
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw ; 4-> Interest ; other to exit
2
Enter the amount :
2000
Deposite successfull current balance = 3000.0
Enter 1-> Saving acc ; 2 -> Current acc
1
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw ; 4-> Interest ; other to exit
1
Current balance = 3000.0
Enter 1-> Saving acc ; 2 -> Current acc
1
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw ; 4-> Interest ; other to exit
4
Interest applied Current balance = 3150.0
Enter 1-> Saving acc ; 2 -> Current acc
1
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw ; 4-> Interest ; other to exit
3
Enter the amount :
200
Withdraw successfull ; Current Balance = 2950.0
Enter 1-> Saving acc ; 2 -> Current acc
2
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw; other to exit
3
Enter the amount :
200
Withdraw successfull ; Current Balance = 800.0
Enter 1-> Saving acc ; 2 -> Current acc

```

LAB 6

Program 15:



Student.java

package CIE;

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

```
    public Student(String usn, String name, int sem) {
        this.usn = usn;
        this.name = name;
        this.sem = sem;
    }
}
```

```
    public void displayStudentInfo() {
        System.out.println("USN: " + usn);
        System.out.println("Name: " + name);
        System.out.println("Semester: " + sem);
    }
}
```

```
public class Internals extends Student {
    public int[] internalMarks = new int[5];
```

```
    public Internals(String usn, String name, int sem, int[] internalMarks) {
        super(usn, name, sem);
        this.internalMarks = internalMarks;
    }
}
```

```

public void displayInternalMarks() {
    System.out.println("Internal Marks: ");
    for (int i = 0; i < internalMarks.length; i++) {
        System.out.println("Course " + (i + 1) + ": " + internalMarks[i]);
    }
}
}

```

External.java

```
package SEE;
```

```
import CIE.Student;
```

```

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

    public External(String usn, String name, int sem, int[] seeMarks) {
        super(usn, name, sem);
        this.seeMarks = seeMarks;
    }

    public void displaySeeMarks() {
        System.out.println("SEE Marks: ");
        for (int i = 0; i < seeMarks.length; i++) {
            System.out.println("Course " + (i + 1) + ": " + seeMarks[i]);
        }
    }
}

```

Main.java

```
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.println("Enter the number of students: ");
        int n = sc.nextInt();

        Internals[] internalStudents = new Internals[n];
        External[] externalStudents = new External[n];

        for (int i = 0; i < n; i++) {
            sc.nextLine();
            System.out.println("\nEnter details for Student " + (i + 1) + ":");

```

```

        System.out.print("USN: ");
        String usn = sc.nextLine();
        System.out.print("Name: ");
        String name = sc.nextLine();
        System.out.print("Semester: ");
        int sem = sc.nextInt();

        int[] internalMarks = new int[5];
        int[] seeMarks = new int[5];
        System.out.println("Enter marks for 5 courses (Internal followed by SEE):");
        for (int j = 0; j < 5; j++) {
            System.out.print("Course " + (j + 1) + " Internal Marks: ");
            internalMarks[j] = sc.nextInt();
            System.out.print("Course " + (j + 1) + " SEE Marks: ");
            seeMarks[j] = sc.nextInt();
        }

        internalStudents[i] = new Internals(usn, name, sem, internalMarks);
        externalStudents[i] = new External(usn, name, sem, seeMarks);
    }

    for (int i = 0; i < n; i++) {
        System.out.println("\nFinal Marks for Student " + (i + 1) + ":");
        internalStudents[i].displayStudentInfo();

        System.out.println("Course-wise Marks (Internal + SEE): ");
        for (int j = 0; j < 5; j++) {
            int finalMarks = internalStudents[i].internalMarks[j] + externalStudents[i].seeMarks[j];
            System.out.println("Course " + (j + 1) + ": " + finalMarks);
        }
    }

    sc.close();
}
}

```


Output:

```
PS D:\JAVA\jva> javac CIE/Student.java CIE/Internals.java SEE/External.java Program15.java
PS D:\JAVA\jva> java Program15.java
Enter the number of students:
2

Enter details for Student 1:
USN: 419
Name: srujan
Semester: 3
Enter marks for 5 courses (Internal followed by SEE):
Course 1 Internal Marks: 40
Course 1 SEE Marks: 40
Course 2 Internal Marks: 40
Course 2 SEE Marks: 30
Course 3 Internal Marks: 42
Course 3 SEE Marks: 33
Course 4 Internal Marks: 44
Course 4 SEE Marks: 31
Course 5 Internal Marks: 40
Course 5 SEE Marks: 34

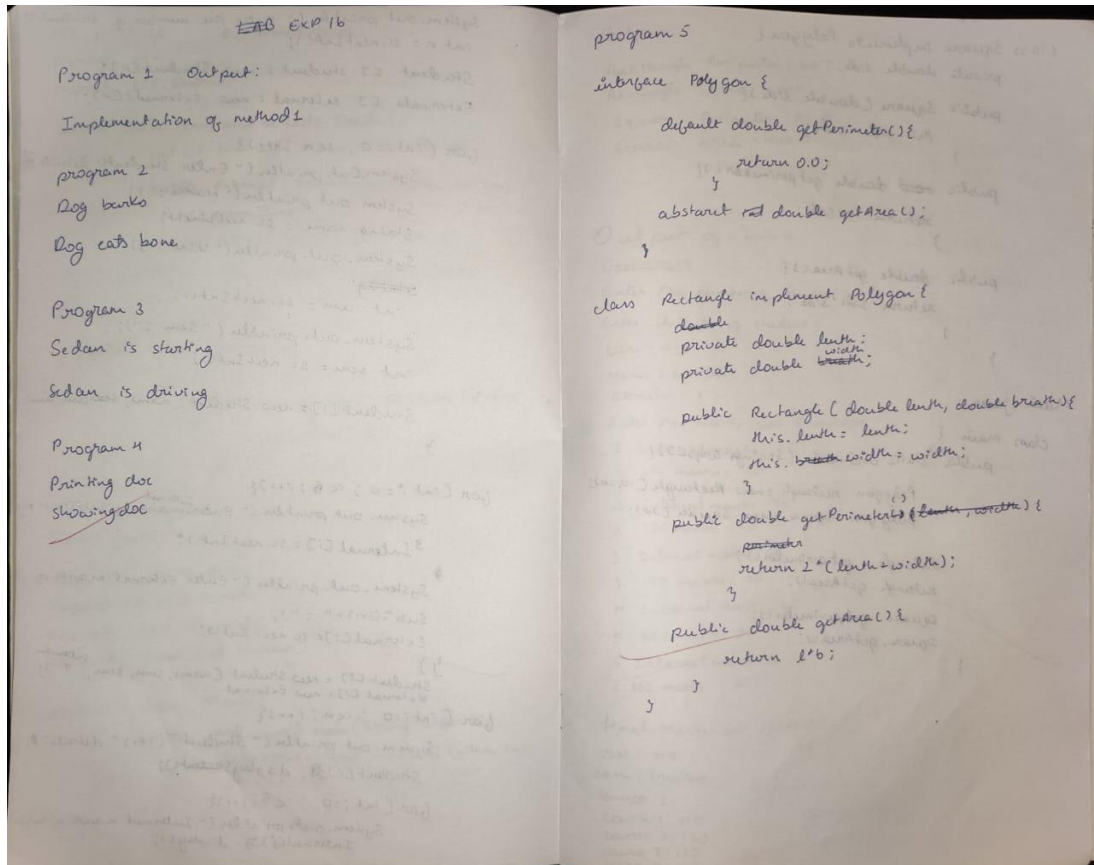
Enter details for Student 2:
USN: 400
Name: abc
Semester: 3
Enter marks for 5 courses (Internal followed by SEE):
Course 1 Internal Marks: 40
Course 1 SEE Marks: 50
Course 2 Internal Marks: 33
Course 2 SEE Marks: 23
Course 3 Internal Marks: 42
Course 3 SEE Marks: 32
Course 4 Internal Marks: 23
Course 4 SEE Marks: 42
Course 5 Internal Marks: 23
Course 5 SEE Marks: 33

Final Marks for Student 1:
USN: 419
Name: srujan
Semester: 3
Course-wise Marks (Internal + SEE):
Course 1: 80
Course 2: 70

Final Marks for Student 2:
USN: 400
Name: abc
Semester: 3
Course-wise Marks (Internal + SEE):
Course 1: 90
Course 2: 56
Course 3: 74
Course 4: 65
Course 5: 56
```

LAB 7

Program 16:



Code :

```

public interface Polygon {

    default double getPerimeter() {
        return 0.0;
    }

    abstract double getArea();
}

class Rectangle implements Polygon {
    private double length;
    private double width;

    public Rectangle(double length, double width) {
        this.length = length;
        this.width = width;
    }
}

```

```

    public double getArea() {
        return length * width;
    }

    public double getPerimeter() {
        return 2*(length+width); }
}

class Square implements Polygon {
    private double length;

    public Square(double length) {
        this.length = length;
    }

    public double getArea() {
        return length * length;
    }
    public double getPerimeter() {
        return 4*length; }
}

public class Program16 {
    public static void main(String[] args) {
        Polygon rectangle = new Rectangle(10,20);
        System.out.println("Rectangle Perimeter: " + rectangle.getPerimeter());
        System.out.println("Rectangle Area: " + rectangle.getArea());

        Polygon square = new Square(20);
        System.out.println("Rectangle Perimeter: " + square.getPerimeter());
        System.out.println("Rectangle Area: " + square.getArea());
    }
}

```

Output:

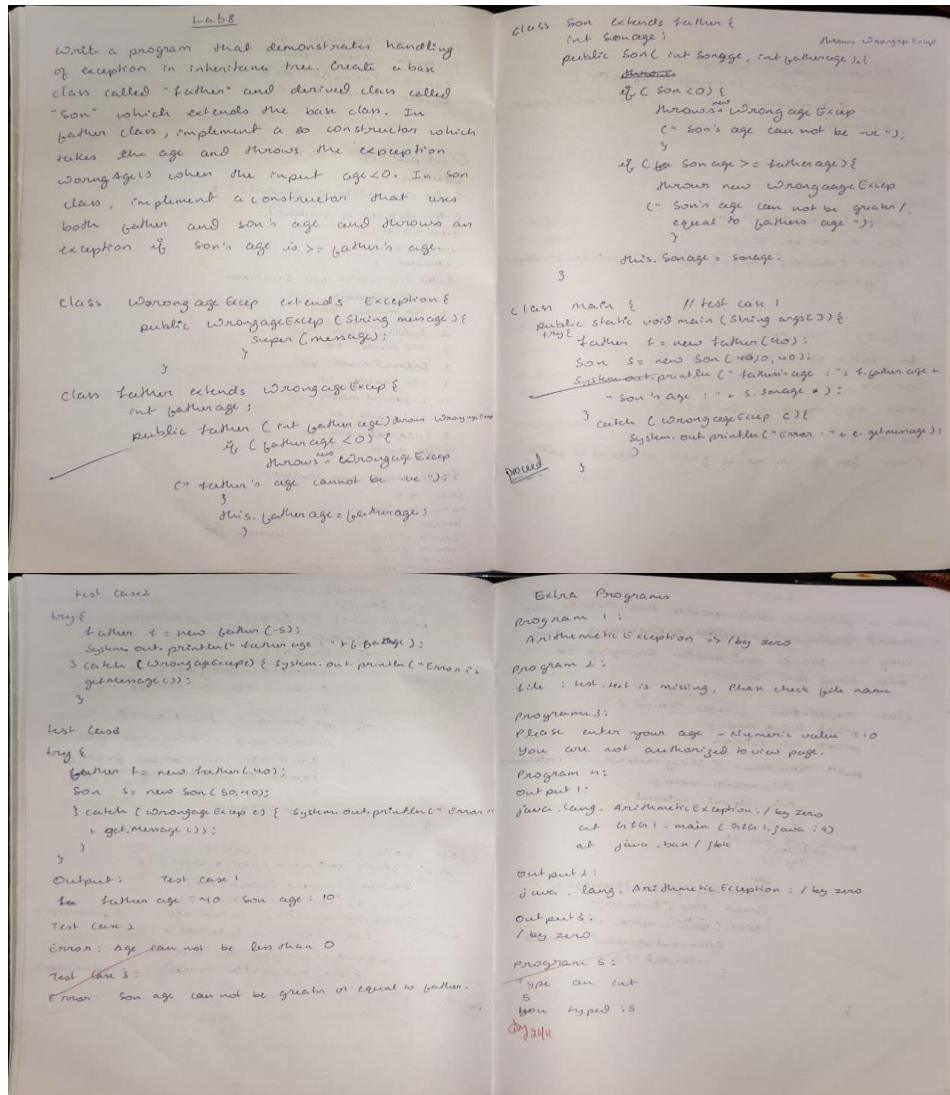
```

PS D:\JAVA\jva> java Program16.java
Rectangle Perimeter: 60.0
Rectangle Area: 200.0
Rectangle Perimeter: 80.0
Rectangle Area: 400.0

```

LAB 8

Program17:



Code:

```
class WrongAgeExcep extends Exception{
```

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

```
class Father {
```

```
    public int fage;
    public Father (int fage) throws WrongAgeExcep{
        if(fage<0){
            throw new WrongAgeExcep("Age can not be less than 0");
        }
    }
}
```

```

    }
    this.fage=fage;
}

}

class Son extends Father{

    public int sage;
    public Son(int sage, int fage) throws WrongAgeExcep{
        super(fage);
        if(sage<0){
            throw new WrongAgeExcep("Age can not be less than 0");
        }
        if(sage>=fage){
            throw new WrongAgeExcep("Sons age can not be greater or equal to father age");
        }
        this.sage=sage;
    }
}

class Program17{
    public static void main(String args[]){
        try{

            Father f=new Father(40);
            Son s=new Son(10,40);
            System.out.println("Father age : "+f.fage+" Son age : "+s.sage);
        }catch (WrongAgeExcep e){System.out.println("Error : "+e.getMessage());}

        try{

            Father f=new Father(-5);

            System.out.println("Father age : "+f.fage);
        }catch (WrongAgeExcep e){System.out.println("Error : "+e.getMessage());}

        try{

            Father f=new Father(40);
            Son s=new Son(50,40);
            System.out.println("Father age : "+f.fage+" Son age : "+s.sage);
        }catch (WrongAgeExcep e){System.out.println("Error : "+e.getMessage());}
    }
}

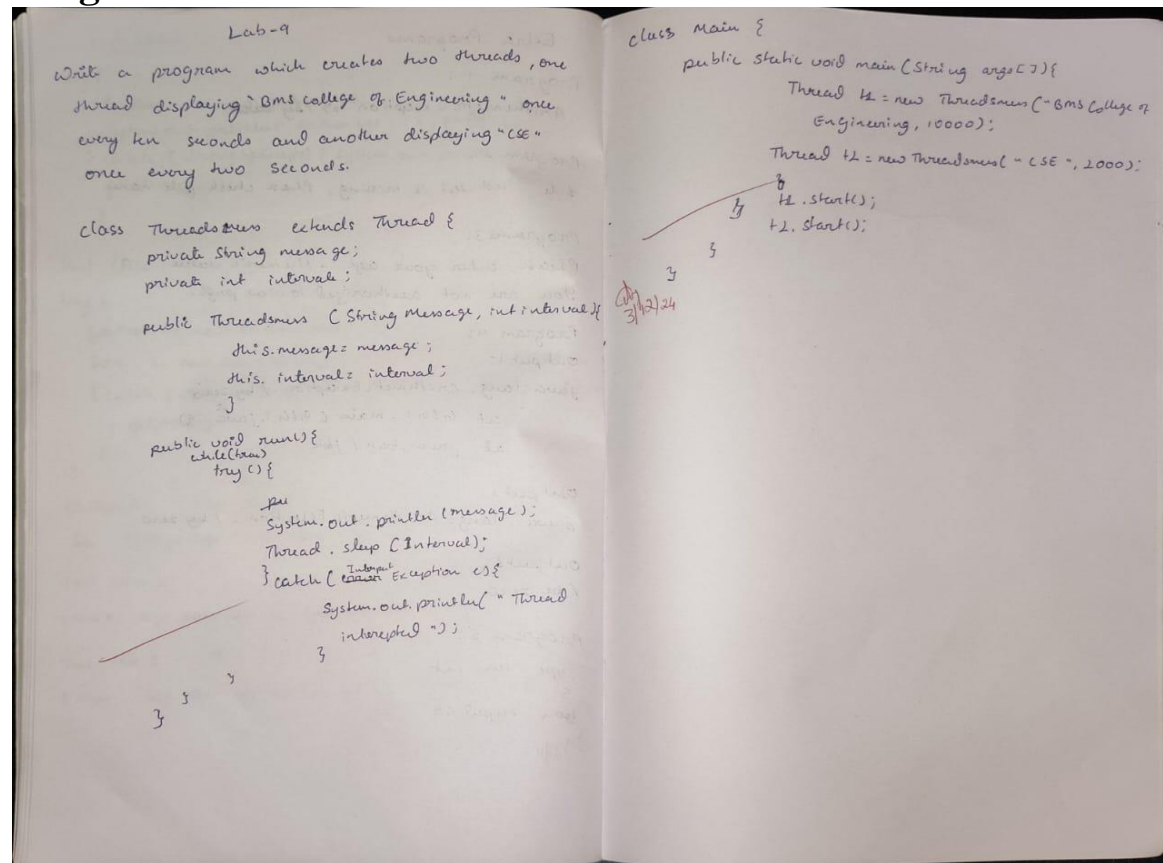
```

Output:

```
PS D:\JAVA\jva> java Program17.java
Father age : 40 Son age : 10
PS D:\JAVA\jva> java Program17.java
Error : Age can not be less than 0
PS D:\JAVA\jva> java Program17.java
Error : Sons age can not be greater or equal to father age
```

LAB 9

Program18:



Code:

```

class Threadmess extends Thread {
    private String message;
    private int interval;

    public Threadmess(String message , int interval){

        this.message=message;
        this.interval=interval;
    }
    public void run(){
        while(true){
            try{
                System.out.println(message);
                Thread.sleep(interval);
            } catch(InterruptedException e){

                System.out.println("Thread interuted");
            }
        }
    }
}

```

```

    }
}

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

        Thread t1=new Threadmess("BMS college ",10000);
        Thread t2=new Threadmess("CSE",2000);
        t1.start();
        t2.start();
    }
}

```

Output:

```

PS D:\JAVA\jva> javac Threadexcep.java
PS D:\JAVA\jva> java Threadexcep
CSE
BMS college
CSE
CSE
CSE
CSE
BMS college
CSE
CSE
CSE
CSE
CSE
BMS college
CSE
CSE
CSE
CSE
CSE
BMS college
CSE
CSE
CSE
CSE

```