B.M.S COLLEGE OF ENGINEERING BENGALURU

Autonomous Institute, Affiliated to VTU

LAB REPORT

23CS3PCOOJ

Submitted in partial fulfilment of the requirements for Lab

Bachelor of Engineering

in

Computer Science and Engineering

Submitted by:

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Quadratic Equation

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```
import java.util.Scanner;
class Quadratic
{
int a,b,c;
double r1, r2, d;
void getd()
{
Scanner s = new Scanner (System.in);
System.out.println("Enter the coefficients of a,b,c");
a = s.nextInt();
b = s.nextInt();
c = s.nextInt();
}
void compute()
{
while (a==0)
{
System.out.println("Not a quadratic equation");
System.out.println("Enter a non zero value for a:");
Scanner s = new Scanner(System.in);
a = s.nextInt();
}
d = b*b - 4*a*c;
if (d==0)
{
r1 = (-b)/(2*a);
System.out.println("Roots are real and equal");
System.out.println("Root1 = Root2 = " + r1);
}
else if (d>0)
{
```

```
r1 = ((-b) + (Math.sqrt(d)))/(double)(2*a);
r2 = ((-b) - (Math.sqrt(d)))/(double)(2*a);
System.out.println("Roots are real and distinct");
System.out.println("Root 1 = "+r1+" Root 2 = "+r2);
}
else if (d<0)
{
System.out.println("Roots are imaginary");
r1 = (-b)/(2*a);
r2 = Math.sqrt(-d)/(2*a);
System.out.println("Root 1 = "+r1+" + i "+r2);
System.out.println("Root 1 = "+r1+" - i "+r2);
}
}
}
```

```
class QuadraticMain
{
public static void main(String args[])
{
Quadratic q = new Quadratic();
q.getd();
q.compute();
}
}
```

Output

```
Enter the coefficients of a,b,c
1 2 1
Roots are real and equal
Root 1 = Root 2 = -1.0
```

```
Enter the coefficients of a,b,c
2 6 2
Roots are real and distinct
Root 1 = -0.3819..... Root 2 = -2.6180.....
```

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```
Enter the coefficients of a,b,c
1 1 1
Roots are imaginary
Root 1 = 0.0 + i 0.8660.....
Root 2 = 0.0 - i 0.8660.....
```

```
Enter the coefficients of a,b,c
0 1 2
Not a quadratic equation
Enter a non zero value for a:
```

SGPA Lab-2

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```
import java.util.Scanner;
class Subject{
int subjectMarks, credits, grade;};
class Student {
    String name;
    String usn;
    double usn;
    double SGPA.
    Scanner s;
    Subject subjects[];
Student()
{
int i;
subjects=new subject[9];
for(i=0; i<8; i++)
subjects[i]=new subject();
s=new Scanner(System.in);
}
public void getStudentDetails(){
System.out.println("Enter student name:");
name=s.nextline();
System.out.println("Enter students USN:");
usn=s.nextLine();}

public void getMarks(){
int i;
for(i=0; i<8; i++){
System.out.println("Enter marks of subject"+(i+1)":");
subjects[i].subjectMarks=s.nextInt();
if(subjects[i].subjectMarks>=50&& subjects[i].subject
                                    Marks<=100){
subjects[i].grade=calculateGrade(subjects[i].subjectMarks);}
else{
```

```
System.out.println("Invalid Marks. Marks should be
                    between 40 and 100");}.
System.out.println("enter Credits:");
Subjects[i].Credits = s.nextInt();
}
}
public int calculateGrade(int marks){
if (marks >= 90)
return 10;
else if (marks >= 70 && marks <= 80)
return 9;
else if (marks >= 60 && marks <= 70)
return 8;
else if (marks >= 50 && marks <= 60)
return 7;
else
return 6;
}.
public void computeSGPA(){
    int totalScore = 0;
    int totalCred = 0;
    for (int i=0; i<8; i++){
        totalScore += Subjects[i].grade * Subjects[i
        totalCred += Subjects[i].credits;
    }
    SGPA = (double)totalScore / (double) totalCred;
}
}
Class Stud{
public static void main(String args[]){
Student S = new Student();
S.getStudentDetails();
S.getMarks();
S.computeSGPA();
```

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```
System.out.println("student name" +s1.name);
System.out.println("student USN" +s1.USN);
System.out.println("student sgpa"+s1.SGPA);
}
```

Output:

```
Enter student name:
Vinuthna
Enter student usn:
1bm22cs193
Enter marks of subject1
45
Enter credits.
4
Enter marks of subject2
56
Enter credits
3
Enter marks of subject3
56
Enter credits
3
].credits;Enter marks of subject4
100
Enter credits
3
Enter marks of subject5
100
Enter credits
1
Enter marks of subject6
99
Enter credits
4
```

```
Enter marks of subject7
77
Enter credits
3
Enter marks of subject8
100
Enter credits
1
Student name: Vinuthna
Student usn: 1bm22cs193
Student sgpa :8.318181818
```

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Details of n Books

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 pgm to create n book objects

```
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;
    }
}
```

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```
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;
}
public String toString(){
    return "Book Details: \n Name: " + name + "\n Author: "
    + author + "\n Price: INR " + price + "\n Number of
    Pages: " + numPages;
}
}
public class Main {
    public static void main(String[] args){
    Scanner scanner = new Scanner(System.in);
    System.out.print("Enter the number of books: ");
    int n = scanner.nextInt();
    Book[] books = new Book[n];
    for (int i=0; i<n; i++){
      System.out.println("\n Enter details for book "+(i+1)+": ");
      Scanner.nextLine();
      System.out.println("Enter name: ");
      String name = scanner.nextLine();
      System.out.println("Enter author: ");
      String author = scanner.nextLine();
      System.out.println("Enter price: ");
      double price = scanner.nextLine();
      System.out.println("Enter number of pages: ");
      int numPages = scanner.nextLine();
```

```
        books[i] = new Book(name, author, price, numpages);
    }
    System.out.println("\n Details of all books:\n");
    for(int i=0; i<n; i++){
        System.out.println("\n Book " + (i+1) + ":\n" + books[i]);
    }
    scanner.close();
  }
}
```

Output

```
Enter the number of books: 2

Enter the details for Book 1:
Enter name: the ghosts
Enter author: pots
Enter price: 324.56
Enter number of pages: 678

Enter the details for Book 2:
Enter name: The living
Enter author: pots
Enter price: 356.99
Enter number of pages: 712

Details of all books:

Book 1:
Book Details:
Name : the ghosts
Author : pots
Price : INR 324.56
Number of Pages: 678

Book 2:
Book Details:
Name : the living
Author : pots
Price : 356.99
Number of Pages: 712
```

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LAB 4 (Areas) using abstract

```
import java.util.Scanner;
class InputScanner {
    Scanner s = new Scanner(System.in);
    int getInput(String prompt){
        System.out.println(prompt);
        return s.nextInt();
    }
}
class shape extends InputScanner{
    double dim1;
    double dim2;
    shape(double a, double b){
        dim1 = a;
        dim2 = b;
    }
}
class Rectangle extends shape {
    Rectangle() {
        super(0,0);
        dim1 = getInput("Enter length");
        dim2 = getInput("Enter breadth");
    }
    double area() {
        System.out.println("Inside Area for Rectangle");
        return dim1 * dim2;
    }
}
class Triangle extends shape{
    Triangle() {
        super(0,0);
        dim1 = getInput("Enter length");
        dim2 = getInput("Enter base");
    }
}
```

```
    double area(){
        System.out.println("Inside Area for Triangle");
        return dim1 * dim2/2;
    }
}
class Circle extends Shapes{
    Circle(){
        super(0,0);
        dim1 = getInput("Enter the radius");
        dim2 = dim1;
    }
    double area(){
        System.out.println("Inside Area for Circle");
        return Math.PI * dim1 * dim2;
    }
}
public class Areas{
    public static void main(String[] args){
        Rectangle rectangle = new Rectangle();
        System.out.println("Area of Rectangle: " +
                rectangle.area());

        Triangle triangle = new Triangle();
        System.out.println("Area of Triangle: " +
                triangle.area());

        Circle circle = new Circle();
        System.out.println("Area of Circle: " +
                circle.area());
    }
}
```

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```
Enter length
3
Enter breadth.
4
Inside Area for Rectangle:
Area of Rectangle: 12.0
Enter length
5
Enter base
6
Inside Area for Triangle
Area of Triangle: 15.0
Enter the radius
3
Inside Area for Circle
Area of Circle: 28.274333882308138
```

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Bank:-

```
import java.util.Scanner;
class Account {
    String customerName;
    int accountNumber;
    String accountType;
    double balance;

    Account(String name, int number, String type, double
            initialBalance) {
        customerName = name;
        accountNumber = number;
        accountType = type;
        balance = initialBalance;
    }
    void deposit(double amount) {
        balance += amount;
        System.out.println("Deposit of INR " + amount + "
    }
    void displayBalance() {
        System.out.println("Account Number: " + accountNumb
        System.out.println("Customer Name: " + customerName);
        System.out.println("Account Type: " + accountType);
        System.out.println("Balance: INR " + balance);
    }
    void withdraw(double amount) {
        if (balance >= amount) {
            balance -= amount;
            System.out.println("Withdrawal of INR " +
                    amount + " successful");
        } else {
            System.out.println("Insufficient funds");
        }
    }
}
```

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```
    void computeInterest() {
    }
    void checkMinimumBalance(double minBalance, double
                             serviceCharge) {
    }
}
class SavAcct extends Account {
    double interestRate = 0.05;
    SavAcct(String name, int number, String type, double
            initialBalance) {
        super(name, number, type, initialBalance);
    }
    void computeInterest() {
        double interest = balance * interestRate;
        balance += interest;
        System.out.println("Interest of INR " + interest +
                           " added to the account");
    }
}
class CurAcct extends Account {
    double minBalance = 1000;
    double serviceCharge = 50;
    CurAcct(String name, int number, String type, double
            initialBalance) {
        super(name, number, type, initialBalance);
    }
    void checkMinimumBalance(double minBalance, double
                             serviceCharge) {
        if (balance < minBalance) {
            System.out.println("Service charge of INR "
                + serviceCharge + " imposed");
            balance -= serviceCharge;
        }
    }
}
```

```
public class Bank {
    public static void main(String[] args){
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the number of users: ");
        int numUsers = scanner.nextInt();

        Account[] account = new Account[numUsers];

        for(int i =0; i <numUsers; i++) {
            System.out.println("\nUser " + (i+1));
            System.out.print("Enter customer name: ");
            scanner.nextLine();
            String name = scanner.nextLine();
            System.out.print("Enter account number: ");
            int accNumber = scanner.nextInt();
            System.out.print("Enter initial deposit amount: ");
            double initialDeposit = scanner.nextDouble();
            System.out.print("Enter account type(Savings/Current): ");
            scanner.nextLine()
            String accType = scanner.nextLine();

            if (accType.equalsIgnoreCase("Savings")){
                accounts[i] = new SavAcct(name, accNumber,
                                          initialDeposit);
            } else if(accType.equalsIgnoreCase("Current")){
                accounts[i] = new CurrAcct(name, accNumber,
                                           initialDeposit);
            } else{
                System.out.println("Invalid account type entered.");
                accounts[i] = new Account(name, accNumber, "Acc
            }
        }
    }
    Boolean exit = false;
```

```
while (!exit){
    System.out.println("\nChoose an option:");
    System.out.println("1. Deposit");
    System.out.println("2. Withdraw");
    System.out.println("3. Display Balance");
    System.out.println("4. Compute interest (Saving only)");
    System.out.println("5. Exit");
    System.out.println("Enter your choice: ");
    int choice = scanner.nextInt();
    switch (choice){
        case 1:
            System.out.println("Enter account number:");
            int accNum = scanner.nextInt();
            System.out.println("Enter deposit amount:INR");
            double depositAmount = scanner.nextDouble();
            for(Account acc : accounts){
                if(acc.accountNumber == accNum){
                    acc.deposit(depositAmount);
                }
            }
            break;
        case 2:
            System.out.println("Enter account number:");
            accNum = scanner.nextInt();
            System.out.println("Enter withdrawal amount:
                    INR");
            double withdrawAmount = scanner.nextDouble();
            for(Account acc : accounts){
                if(acc.accountNumber == accNum){
                    acc.withdraw(withdrawAmount);
                }
            }
            break;
```

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```
Case 3:
    System.out.print("Enter account number: ");
    accNum = scanner.nextInt();
    for (Account acc : accounts) {
        if (acc.accountNum == accNum) {
            acc.displayBalance();
        }
    }
    break;
    case 4:
    System.out.print("Enter account number: ");
    accNum = scanner.nextInt();
    for (Account acc : accounts) {
        if (acc.accountNumber == accNum &&
            acc instanceof SavAcct) {
            ((SavAcct)acc).computeInterest();
        }
    }
    break;
    case 5:
        exit = true;
        break;
    default:
        System.out.println("Invalid choice, Please
                            enter a valid option.");
    }
}
}
```

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Enter the number of users : 2

User 1
Enter customer name : rani
Enter account number : 1
Enter initial deposit amount : INR 100,000
Enter account type (Savings/Current) : Savings

User 2
Enter customer name : rohit
Enter account number : 2
Enter initial deposit amount : INR 150,000
Enter account type (savings/current) : Current

Choose an option
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (saving only)
5. Exit.

Enter your choice : 1
Enter account number : 1
Enter Deposit amount : INR 50000
Deposit of INR 50000.0 Successful.

Choose an option.
1. 2. 3 4. 5.
Enter your choice : 3
Enter account number : 1
Account number : 1
Customer name : rani
Account type : Savings
Balance : INR 150,000.0

Choose an option.
1. 2. 3. 4. 5.
Enter your choice: 2
Enter account number: 2
Enter withdrawal amount: INR 50000
Withdrawal of INR 50,000.0 successful.

Choose an option
1. 2. 3. 4. 5.
Enter your choice: 4
Enter account number (for sitting account): 1

Choose an option
1. 2. 3. 4. 5.
Enter your choice: 5

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Package

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```
Package CIE;
public class Student{
        String usn;
        String name;
        int sem;
    public Student(String usn, String name, int sem){
        this.usn = usn;
        this.name = name;
        this.sem = sem;
    }
}
Package CIE;
public class Internals extends Student{
    public int[] internalMarks;
    public Internals(String usn, String name, int sem,
            int[] internalMarks){
        super(usn, name, sem);
        this.internalMarks = internalMarks;
    }
}
Package SEE;
import CIE.Student;
public class External extends Student{
    public int[] seeMarks;
    public External(String usn, String name, int
            sem, int[] seeMarks){
        super(usn, name, sem);
        this.seeMarks = seeMarks;
    }
}
```

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```
import CIE.Internals;
import SEE.External;
import java.util.Scanner;
public class Final Marks{
    public static void main(String[] args){
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter no. of students ");
        int n = scanner.nextInt();
        Internals[] ciestudents = new Internals[n];
        External[] seestudents = new External[n];
for(int i=0; i<n; i++){
    System.out.println("Enter CIE details " + (i+1));
    System.out.println("USN: ");
    String usn = scanner.next();
    System.out.println("Name: ");
    String name = scanner.next();
    System.out.println("sem: ");
    String intsem = scanner.nextInt();
int[] cieMarks = new int[5];
System.out.println("Enter CIE marks for 5 cards");
for(int j=0; j<5; j++){
    cieMarks[j] = scanner.nextInt();
}
ciStudents[i] = new Internals(usn, name, sem, cieMarks)
}
for(int i=0; i<n; i++){
    System.out.println("Enter SEE details" + (i+1));
    System.out.println("USN:");
    String usn = scanner.next();
    System.out.println("Name: ");
    String name = scanner.next();
    System.out.println("sem: ");
    int sem = scanner.nextInt();
```

```
int[] seeMarks = new int[5];
System.out.println("Enter SEE marks for 5 courses");
for(int j=0; j<5; j++){
    seeMarks[j] = scanner.nextInt();
}
seeStudent[i] = new External(usn, name, sem, seeMarks);
}
System.out.println("\nFinal Marks of students:");
for(int i=0; i<n; i++){
    System.out.println("\nDetails of Student" + (i+1));
    System.out.println("USN: " + externalStudent[i].usn);
    System.out.println("Name: " + externalStudent[i].name);
    System.out.println("Sem: " + externalStudent[i].sem);
    System.out.println("CIE Marks:");
    for(int j=0; j<5; j++)
        System.out.println(externalStudent[i].internalMarks[j] + " ");
}
System.out.println("\nSEE Marks:");
for(int j=0; j<5; j++){
    System.out.println(seeStudent[i].seeMarks[j] + " ");
}
}
}
```

Op: Enter the number of students: 2
Enter details for CIE of student 1.
USN: 1bm21cs001
Name: Avinash
Semister: 4
Enter CIE marks for 5 courses:
34
39
37
40

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Enter details for CIE of Student 2
USN: 1bm14cs003
Name: Chandan
Semester: 7
Enter CIE marks for 5 courses: 20
14
26
18
30
Enter details for see of student 1
USN: 1bm14cs001
name: avinash
semester 4
Enter see marks for 5 courses: 40
37
43
23
43
Enter details for see of student 2
USN: 1bm14cs003
name: chandan
Semester: 7
enter see marks for 5 courses: 50
49
45
47
46
Final Marks of students:

Details of student 1	Details of Student 2
USN: 1bm14cs001	USN: 1bm14cs003
name: avinash	name: chandan
Semester: 4	Semester: 7
CIE marks:	CIE marks
20 14 26 18 30	20 14 26 18 30
SEE Marks	SEE marks
40 37 43 23 43	50 49 45 47 46

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Q/P Enter the no. of students: 1

Enter details for CIE of student 1

USN: 1

Name: G

Sem: 1

Enter CIE marks for 5 courses: 34

50

45

46

47

Enter see marks for 5 courses: 50

49

48

47

46

Final marks of student

Details of student 1

USN = 1

Name = G

Sem = 1

Total marks

84 99 93 93 93

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Exceptions

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```
import java.util.Scanner;
class WrongAge extends Exception{
    public WrongAge(String message) {
        super(message);
    }
}
class Father{
    protected int fatherAge;
    public Father(int age) throws WrongAge {
        fatherAge = age;
        if (fatherAge < 0){
            throw new WrongAge(message: "Father's age
                                cannot be negative!");
        }
    }
}
class Son extends Father{
    private int sonAge;
    public Son(int fatherAge, int sonAge) throws WrongAge
    { super(fatherAge);
      this.sonAge = sonAge;
      if (sonAge <= 0){
          throw new WrongAge(message: "Son's age
                                or zero
                              cannot be negative");
      }
      if (sonAge >= fatherAge){
          throw new WrongAge(message: "Son's age
                              cannot be greater than or equal
                              to father's age");
      }
    }
}
```

```
public class main{
    public static void main(String[] args){
        Scanner scanner = new Scanner(System.in);
        try{
            System.out.println("Enter father's age:");
            int fatherAge = scanner.nextInt();
            System.out.println("Enter son's age:");
            int sonAge = scanner.nextInt();
            Son son = new Son(fatherAge, sonAge);
            System.out.println("Father's age: "+fatherAge);
            System.out.println("Son's age: "+sonAge);
        } catch (WrongAge e){
            System.out.println("Exception Caught: "+e);
            System.out.println("Exception Caught: "+e.getMessage());
        } catch (Exception e){
            System.out.println("Error: "+e);
            System.out.println("Error: "+e.getMessage());
        } finally {
            scanner.close();
        }
    }
}
```

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Enter father's age: 34
Enter son's age: 45
Exception caught: WrongAge: Son's age cannot be greater than or equal to father's age
Exception caught: Son's age cannot be greater than or equal to father's age.

Enter father's age: -9
Enter son's age: 34
Exception Caught: WrongAge: Father's age cannot be negative
Exception caught: Father's age cannot be negative

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Enter Father's age: 45
Enter Son's age: -8
Exception caught: Wrongage: Son's age cannot be negative or zero
Exception caught: Son's age cannot be negative or zero

Enter Father's age: 56
Enter Son's age: 20
Father's age: 56
Son's age: 20

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Threading

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```
Class DisplayThread extend Thread{
    private String message;
    private int interval;
    Private boolean running = true;
    public DisplayThread(String message, int interval){
        this.message = message
        this.interval = interval;
    }
public void run(){
    while (running){
        System.out.println(message);
        try{
            Thread.sleep(interval);
        } catch(InterruptedExpected Exception e){
            e.printStackTrace();
        }
    }
}
    public void stopThread()
        running = false;
    }
}
public class ThreadEx{
    public static void main(String[] args){
        DisplayThread bmsThread =
            new DisplayThread(message: "BMS College
                of Engineering", interval:
                10,000);
        DisplayThread cseThread = new DisplayThread
            (message: "CSE", interval: 2000
        bmsThread.start();
        cseThread.start();
```

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```
System.out.println("Press Enter to stop the threads");
try{
    System.in.read();
} catch (Exception e){
    e.printStackTrace();
}
bmsThread.stopThread();
cseThread.stopThread();
}
```

Op

Press enter to stop
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
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Code 10 IPC

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Page

```
Class Q{
int n;
boolean valueSet = false;
Synchronized int get(){
while (!valueSet)
try{
wait();
} catch(InterruptedException e){}
System.out.println("InterruptedException caught");
}
System.out.println("Got: " +n);
valueSet = false;
notify();
return n;
}
Synchronized void put(int n){
while(valueSet)
try{
wait();
} catch(InterruptedException e){
System.out.println("InterruptedException caught");
}
this.n=n;
valueSet=true;
System.out.println("Put: " +n);
notify();
}
}.

Class Producer implements Runnable{
Q q;
Producer(Q q){
this.q=q;
new Thread(this, "Producer").start();
}
```

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```
public void run(){
int i=0;
while(i<15){
q.put(i++);
}
}
}
class PCFixed{
public static void main(String args[]){
Q q=new Q();
new Producer(q);
new Consumer(q);
System.out.println("Press Control-C to stop.");
}
}
```

Press Control-C to stop.

```
Put 0
Got 0
Put 1
Got 1
Put 2
Got 2
Put 3
Got 3
Put 4
Got 4
Put 5
Got 5
Put 6
Got 6
Put 7
Got 7
Put 8
Got 8
Put 9
Got 9
Put 10
Got 10
Put 11
Got 11
Put 12
Got 12
Put 13
Got 13
Put 14
Got 14
```

Deadlock.

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```
Class A{
Synchronized void foo(B b){
String name = Thread.currentThread().getName();
System.out.println(name + "entered A.foo");
try{
Thread.sleep(1000);
}catch(Exception e){
System.out.println("A Interrupted");
}
System.out.println(name + "trying to call B.last()");
b.last();
}
void last(){
System.out.println("Inside A.last");
}
}
Class B{
synchronized void bar(A a){
String name = Thread.currentThread().getName();
System.out.println(name + "entered B.bar");
try{
Thread.sleep(1000);
}catch(Exception e){
System.out.println("B Interrupted");
}
System.out.println(name + "trying to call A.last()");
a.last();
}
void last(){
System.out.println("Inside A.last");
}
}
Class Deadlock implements Runnable
```

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```
{
A a = new A();
B b = new B();
DeadLock(){
Thread.currentThread().setName("MainThread");
Thread t = new Thread(this, "RacingThread");
t.start();
a.foo(b);
System.out.println("Back in main thread");
}
public void run(){
b.bar(a);
System.out.println("Back in other thread");
}
public static void main(String args[]){
new DeadLock();
}
}
```

Op

MainThread entered A.foo
RacingThread entered B.bar
RacingThread trying to call A.last()
Inside A.last
Back in other thread
MainThread trying to call B.last()
Inside A.last
Back in main thread.

06.02.24

LAB: 9 HW1

```
import javax.swing.*;
import java.awt.*;
import javax.awt.event.*;
class SwingDemo{
SwingDemo(){
JFrame jfram=new JFrame("Divide App");
jfram.setSize(285, 150);
jfram.setLayout(new FlowLayout());
jfram.setDefaultCloseOperation(JFrame.EXIT_ON
JLabel jlab=new JLabel("Enter the dividend and
                        divisor:");
JTextField ajtf=new JTextField(8);
JTextField bjtf=new JTextField(8);
JButton button=new JButton("Calculate");
JLabel esslab=new JLabel();
JLabel alab=new JLabel();
JLabel blab=new JLabel();
JLabel anslab=new JLabel();
jfram.add(esslab);
jfram.add(jlab);
jfram.add(ajtf);
jfram.add(bjtf);
jfram.add(button);
jfram.add(alab);
jfram.add(blab);
jfram.add(anslab);
ActionListener l=new ActionListener(){
public void actionPerformed(ActionEvent ev){
System.out.println("Action event from a text
                    field");
}
};
ajtf.addActionListener(l);
bjtf.addActionListener(l);
```

```
button.addActionListener(new ActionListener(){
    public void actionPerformed(ActionEvent e){
    try{
        int a = Integer.parseInt(tf.getText());
        int b = Integer.parseInt(tf.getText());
        int ans = a/b;

        alab.setText("\nA = " + a);
        blab.setText("\nB = " + b);
        anslab.setText("\nAns = " + ans);
    }
    catch(NumberFormatException e){
        alab.setText("");
        blab.setText("");
        anslab.setText("");
        err.setText("Enter Only Integers!");
    }
    catch(ArithmeticException e){
        alab.setText("");
        blab.setText("");
        anslab.setText("");
        err.setText("B should be NON zero!");
    }
    }
});
    jfrm.setVisible(true);
}
public static void main(String args[]){
    SwingUtilities.invokeLater(new Runnable(){
        public void run(){
            new SwingDemo();
        }
    });
}
}
```

CLOSE);

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(Op) Enter divisor and dividend
22 8
calculate A=22 B=8 Ans = 2.

B should be NON zero
Enter divisor and dividend
5 0
calculate

Enter Only Integers!
Enter the divisor and dividend.
4.6m 6
calculate.

20.02.24

Lab 1

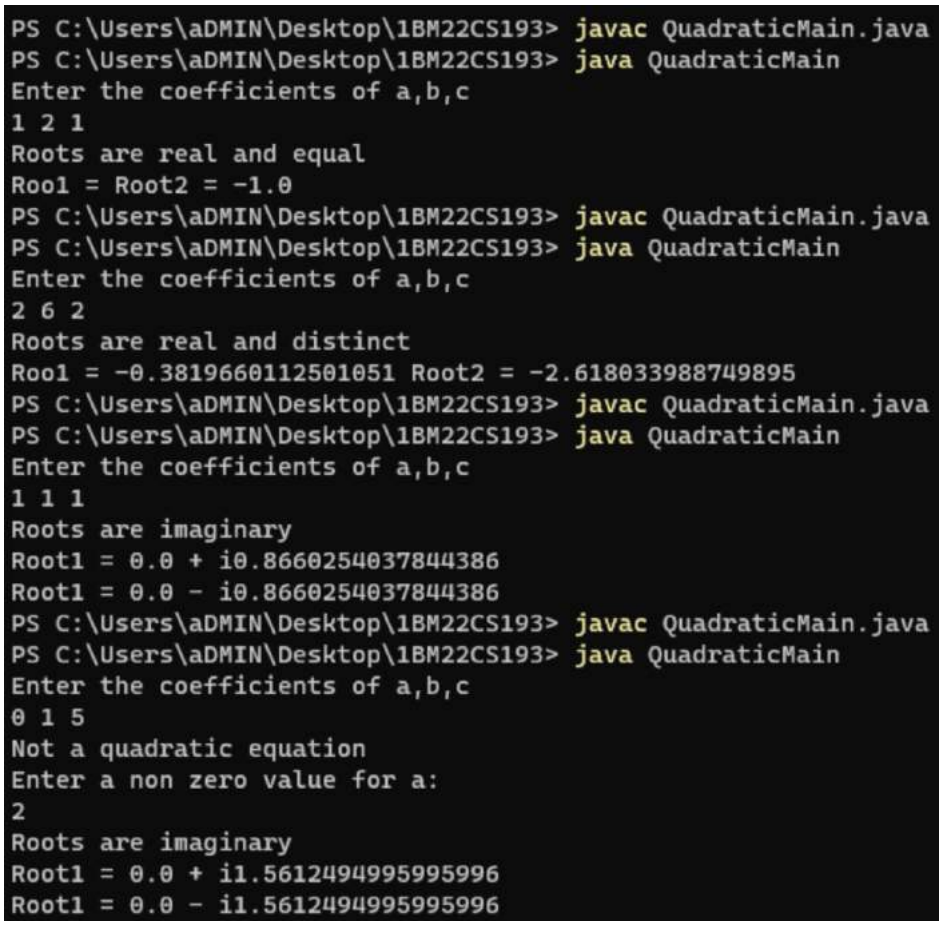
Develop a Java program that prints all real solutions to the quadratic equation ax 2 +bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b^2 – 4ac is negative, display a message stating that there are no real solutions.

```
import java.util.Scanner;
class Quadratic
{
int a, b, c;
double r1, r2, d;
void getd()
{
Scanner s = new Scanner(System.in);
System.out.println("Enter the coefficients of a,b,c");
a = s.nextInt();
b = s.nextInt();
c = s.nextInt();
}
void compute()
{
while(a==0)
{
System.out.println("Not a quadratic equation");
System.out.println("Enter a non zero value for a:");
Scanner s = new Scanner(System.in);
a = s.nextInt();
}
d = b*b-4*a*c;
if(d==0)
```

```
{
r1 = (-b)/(2*a);
System.out.println("Roots are real and equal");
System.out.println("Roo1 = Root2 = " + r1);
}
else if(d&gt;0)
{
r1 = ((-b)+(Math.sqrt(d)))/(double)(2*a);
r2 = ((-b)-(Math.sqrt(d)))/(double)(2*a);
System.out.println("Roots are real and distinct");
System.out.println("Roo1 = " + r1 + " Root2 = " + r2);
}
else if(d&lt;0)
{
System.out.println("Roots are imaginary");
r1 = (-b)/(2*a);
r2 = Math.sqrt(-d)/(2*a);
System.out.println("Root1 = " + r1 + " + i"+r2);
System.out.println("Root1 = " + r1 + " - i"+r2);
}
}
}
class QuadraticMain
{
public static void main(String args[])
{
Quadratic q = new Quadratic();
q.getd();
q.compute();
}
```

}

Output:



Lab 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.

```
import java.util.Scanner;
class subject{
int subjectMarks, credits, grade;}
class Student {
    String name;
```

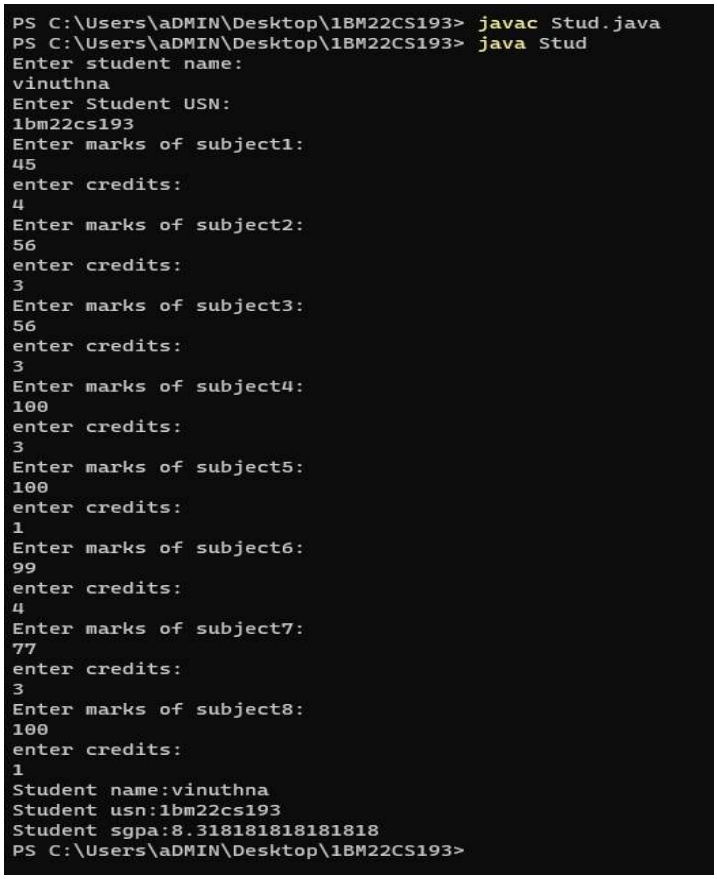
```
    String usn;
    double SGPA;
    Scanner s;
    subject subjects[];
Student()
{
int i;
subjects = new subject[9];
for(i=0;i<8;i++)
subjects[i] = new subject();
s = new Scanner(System.in);
}
public void getStudentDetails(){
System.out.println("Enter student name:");
name=s.nextLine();
System.out.println("Enter Student USN:");
usn=s.nextLine();}
public void getMarks(){
int i;
for(i=0;i<8;i++){
System.out.println("Enter marks of subject"+(i+1)+":");
subjects[i].subjectMarks= s.nextInt();
if(subjects[i].subjectMarks>=40&&subjects[i].subjectMarks<=100){
subjects[i].grade=calculateGrade(subjects[i].subjectMarks);}
else{
System.out.println("Invalid Marks. Marks should be between 40 and 100");}
System.out.println("enter credits:");
subjects[i].credits=s.nextInt();
}
}
```

```
public int calculateGrade(int marks){
if (marks>=90)
return 10;
else if(marks>=70&&marks<=80)
return 9;
else if(marks>=60&&marks<=70)
return 8;
else if(marks>=50&&marks<=60)
return 7;
else
return 6;
}
public void computeSGPA() {
        int totalscore = 0;
        int totalcred = 0;
        for (int i = 0; i < 8; i++) {
            totalscore += subjects[i].grade * subjects[i].credits;
            totalcred += subjects[i].credits;
        }
        SGPA = (double) totalscore / (double) totalcred;
    }
}
class Stud{
public static void main(String args[]){
Student s1=new Student();
s1.getStudentDetails();
s1.getMarks();
s1.computeSGPA();
 System.out.println("Student name:"+s1.name);
System.out.println("Student usn:"+s1.usn);
```

System.out.println("Student sgpa:"+s1.SGPA);}

}

Output:



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 {

    private String name;

    private String author;

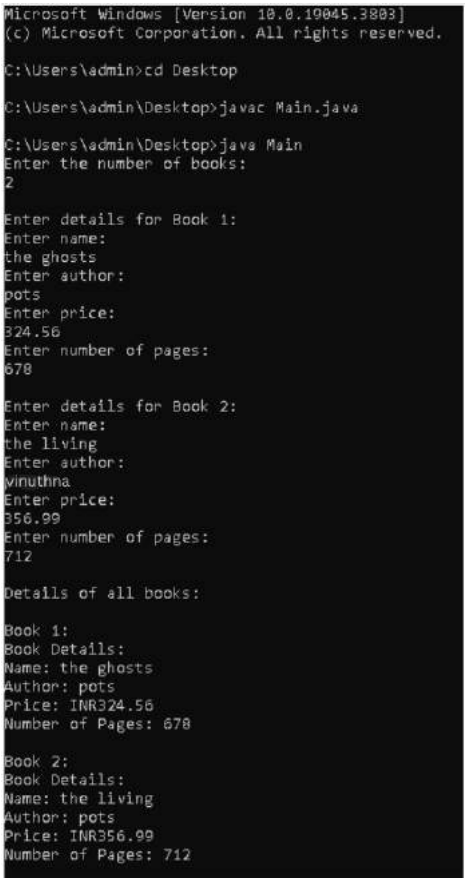
    private double price;

```
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;
```

```
    }
    public String toString() {
        return "Book Details: \nName: " + name + "\nAuthor: " + author + "\nPrice: INR" + price +
"\nNumber of Pages: " + numPages;
    }
}
public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter the number of books: ");
        int n = scanner.nextInt();
        Book[] books = new Book[n];
        for (int i = 0; i < n; i++) {
            System.out.println("\nEnter details for Book " + (i + 1) + ":");
            scanner.nextLine();
            System.out.println("Enter name: ");
            String name = scanner.nextLine();
            System.out.println("Enter author: ");
            String author = scanner.nextLine();
            System.out.println("Enter price: ");
            double price = scanner.nextDouble();
            System.out.println("Enter number of pages: ");
            int numPages = scanner.nextInt();
            books[i] = new Book(name, author, price, numPages);
        }
        System.out.println("\nDetails of all books:");
        for (int i = 0; i < n; i++) {
            System.out.println("\nBook " + (i + 1) + ":\n" + books[i]);
        }
        scanner.close();
    }
```

}

Output:



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 extends the classShape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape.

```
import java.util.Scanner;
class InputScanner {
   Scanner s = new Scanner(System.in);
   int getInput(String prompt) {
      System.out.println(prompt);
```

```
        return s.nextInt();
    }
}
class shape extends InputScanner {
    double dim1;
    double dim2;
    shape(double a, double b) {
        dim1 = a;
        dim2 = b;
    }
}
class Rectangle extends shape {
    Rectangle() {
        super(0, 0);
        dim1 = getInput("Enter length");
        dim2 = getInput("Enter breadth");
    }
    double area() {
        System.out.println("Inside Area for Rectangle.");
        return dim1 * dim2;
    }
}
class Triangle extends shape {
    Triangle() {
        super(0, 0);
        dim1 = getInput("Enter length");
        dim2 = getInput("Enter base");
    }
    double area() {
        System.out.println("Inside Area for Triangle.");
```

```
        return dim1 * dim2 / 2;
    }
}
class Circle extends shape {
    Circle() {
        super(0, 0);
        dim1 = getInput("Enter the radius");
        dim2 = dim1;
    }
    double area() {
        System.out.println("Inside Area for Circle.");
        return Math.PI * dim1 * dim2;
    }
}
public class Areas {
    public static void main(String[] args) {
        Rectangle rectangle = new Rectangle();
        System.out.println("Area of Rectangle: " + rectangle.area());

        Triangle triangle = new Triangle();
        System.out.println("Area of Triangle: " + triangle.area());
        Circle circle = new Circle();
        System.out.println("Area of Circle: " + circle.area());
    }
}
```

Output:

```
C:\Users\bmsce\Desktop> cd 1bm22cs193

C:\Users\bmsce\Desktop\1bm22cs193>javac AbstractAreas.java

C:\Users\bmsce\Desktop\1bm22cs193>java AbstractAreas
Enter length
3
Enter breadth
4
Inside Area for Rectangle.
Area of Rectangle: 12.0
Enter length
5
Enter base
6
Inside Area for Triangle.
Area of Triangle: 15.0
Enter the radius
3
Inside Area for Circle.
Area of Circle: 28.274333882308138
```

Lab 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.

```
import java.util.Scanner;
class Account {
    String customerName;
    int accountNumber;
    String accountType;
    double balance;
    Account(String name, int number, String type, double initialBalance) {
        customerName = name;
        accountNumber = number;
        accountType = type;
        balance = initialBalance;
    }
    void deposit(double amount) {
        balance += amount;
        System.out.println("Deposit of INR " + amount + " successful");
    }
    void displayBalance() {
        System.out.println("Account Number: " + accountNumber);
        System.out.println("Customer Name: " + customerName);
        System.out.println("Account Type: " + accountType);
        System.out.println("Balance: INR " + balance);
    }
    void withdraw(double amount) {
        if (balance >= amount) {
            balance -= amount;
            System.out.println("Withdrawal of INR " + amount + " successful");
        } else {
            System.out.println("Insufficient funds");
        }
    }
```

```
    void computeInterest() {
    }
    void checkMinimumBalance(double minBalance, double serviceCharge) {
    }
}
class SavAcct extends Account {
    double interestRate = 0.05;
    SavAcct(String name, int number, String type, double initialBalance) {
        super(name, number, type, initialBalance);
    }
    void computeInterest() {
        double interest = balance * interestRate;
        balance += interest;
        System.out.println("Interest of INR " + interest + " added to the account");
    }
}
class CurAcct extends Account {
    double minBalance = 1000;
    double serviceCharge = 50;
    CurAcct(String name, int number, String type, double initialBalance) {
        super(name, number, type, initialBalance);
    }
    void checkMinimumBalance(double minBalance, double serviceCharge) {
        if (balance < minBalance) {
            System.out.println("Service charge of INR " + serviceCharge + " imposed");
            balance -= serviceCharge;
        }
    }
}
public class Bank {
```

```
public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);
    System.out.print("Enter the number of users: ");
    int numUsers = scanner.nextInt();
    Account[] accounts = new Account[numUsers];
    for (int i = 0; i < numUsers; i++) {
        System.out.println("\nUser " + (i + 1));
        System.out.print("Enter customer name: ");
        scanner.nextLine();
        String name = scanner.nextLine();
        System.out.print("Enter account number: ");
        int accNumber = scanner.nextInt();
        System.out.print("Enter initial deposit amount: INR ");
        double initialDeposit = scanner.nextDouble();
        System.out.print("Enter account type (Savings/Current): ");
        scanner.nextLine();
        String accType = scanner.nextLine();
        if (accType.equalsIgnoreCase("Savings")) {
            accounts[i] = new SavAcct(name, accNumber, accType, initialDeposit);
        } else if (accType.equalsIgnoreCase("Current")) {
            accounts[i] = new CurAcct(name, accNumber, accType, initialDeposit);
        } else {
            System.out.println("Invalid account type entered. Defaulting to Account.");
            accounts[i] = new Account(name, accNumber, "Account", initialDeposit);
        }
    }
    boolean exit = false;
    while (!exit) {
        System.out.println("\nChoose an option:");
        System.out.println("1. Deposit");
```

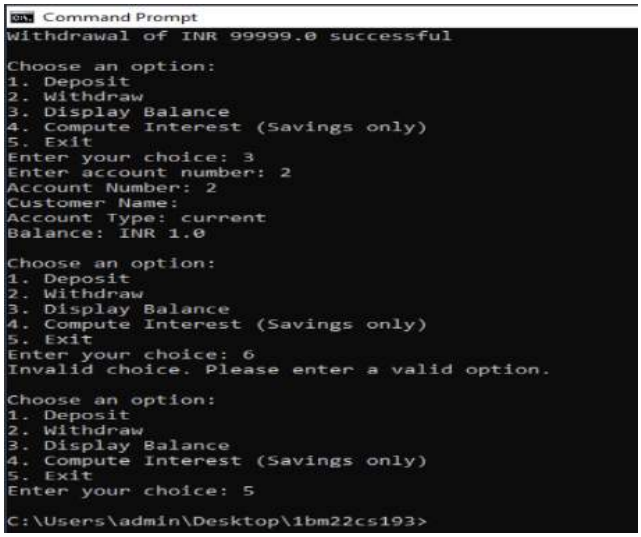
```
System.out.println("2. Withdraw");
System.out.println("3. Display Balance");
System.out.println("4. Compute Interest (Savings only)");
System.out.println("5. Exit");
System.out.print("Enter your choice: ");
int choice = scanner.nextInt();
switch (choice) {
    case 1:
        System.out.print("Enter account number: ");
        int accNum = scanner.nextInt();
        System.out.print("Enter deposit amount: INR ");
        double depositAmount = scanner.nextDouble();
        for (Account acc : accounts) {
            if (acc.accountNumber == accNum) {
                acc.deposit(depositAmount);
            }
        }
        break;
    case 2:
        System.out.print("Enter account number: ");
        accNum = scanner.nextInt();
        System.out.print("Enter withdrawal amount: INR ");
        double withdrawAmount = scanner.nextDouble();
        for (Account acc : accounts) {
            if (acc.accountNumber == accNum) {
                acc.withdraw(withdrawAmount);
            }
        }
        break;
    case 3:
```

```
                System.out.print("Enter account number: ");
                accNum = scanner.nextInt();
                for (Account acc : accounts) {
                    if (acc.accountNumber == accNum) {
                        acc.displayBalance();
                    }
                }
                break;
            case 4:
                System.out.print("Enter account number (for Savings account): ");
                accNum = scanner.nextInt();
                for (Account acc : accounts) {
                    if (acc.accountNumber == accNum && acc instanceof SavAcct) {
                        ((SavAcct) acc).computeInterest();
                    }
                }
                break;
            case 5:
                exit = true;
                break;
            default:
                System.out.println("Invalid choice. Please enter a valid option.");
        }
    }
}
}
```

Output:(Next Page)


Microsoft Windows [Version 10.0.19044.3086]
(c) Microsoft Corporation. All rights reserved.
C:\Users\admin>cd desktop
C:\Users\admin\Desktop>cd 1bm22cs193
C:\Users\admin\Desktop\1bm22cs193>javac Bank.java
C:\Users\admin\Desktop\1bm22cs193>java Bank
Enter the number of users: 2
User 1
Enter customer name: rani
Enter account number: 1
Enter initial deposit amount: INR 100000
Enter account type (Savings/Current): savings
User 2
Enter customer name: rohit
Enter account number: 2
Enter initial deposit amount: INR 150000
Enter account type (Savings/Current): current
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 1
Enter account number: 1
Enter deposit amount: INR 50000
Deposit of INR 50000.0 successful
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 3
Enter account number: 1
Account Number: 1
Customer Name: rani
Account Type: savings
Balance: INR 150000.0
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 2
Enter account number: 2
Enter withdrawal amount: INR 50000
Withdrawal of INR 50000.0 successful
Choose an option:
1. Deposit
2. Withdraw


Command Prompt
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 3
Enter account number: 2
Account Number: 2
Customer Name:
Account Type: current
Balance: INR 100000.0
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 4
Enter account number (for Savings account): 1
Interest of INR 7500.0 added to the account
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 3
Enter account number: 1
Account Number: 1
Customer Name: rani
Account Type: savings
Balance: INR 157500.0
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 2
Enter account number: 2
Enter withdrawal amount: INR 99999
Withdrawal of INR 99999.0 successful
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 3
Enter account number: 2
Account Number: 2
Customer Name:
Account Type: current
Balance: INR 1.0
Choose an option:
1. Deposit
2. Withdraw


Command Prompt
Withdrawal of INR 99999.0 successful
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 3
Enter account number: 2
Account Number: 2
Customer Name:
Account Type: current
Balance: INR 1.0
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 6
Invalid choice. Please enter a valid option.
Choose an option:
1. Deposit
2. Withdraw
3. Display Balance
4. Compute Interest (Savings only)
5. Exit
Enter your choice: 5
C:\Users\admin\Desktop\1bm22cs193>

Lab 6

Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.

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

```
package SEE;
```

```
import CIE.Student;
public class External extends Student {
    public int[] seeMarks;
    public External(String usn, String name, int sem, int[] seeMarks) {
        super(usn, name, sem);
        this.seeMarks = seeMarks;
    }
}

import CIE.Internals;
import SEE.External;
import java.util.Scanner;
public class FinalMarks {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the number of students: ");
        int n = scanner.nextInt();
        Internals[] cieStudents = new Internals[n];
        External[] seeStudents = new External[n];
        for (int i = 0; i < n; i++) {
            System.out.println("Enter details for CIE of student " + (i + 1));
            System.out.print("USN: ");
            String usn = scanner.next();
            System.out.print("Name: ");
            String name = scanner.next();
            System.out.print("Semester: ");
            int sem = scanner.nextInt();
            int[] cieMarks = new int[5];
            System.out.print("Enter CIE marks for 5 courses: ");
            for (int j = 0; j < 5; j++) {
```

```
            cieMarks[j] = scanner.nextInt();
        }
        cieStudents[i] = new Internals(usn, name, sem, cieMarks);
    }
    for (int i = 0; i < n; i++) {
        System.out.println("Enter details for SEE of student " + (i + 1));
        System.out.print("USN: ");
        String usn = scanner.next();
        System.out.print("Name: ");
        String name = scanner.next();
        System.out.print("Semester: ");
         int sem = scanner.nextInt();
        int[] seeMarks = new int[5];
        System.out.print("Enter SEE marks for 5 courses: ");
        for (int j = 0; j < 5; j++) {
            seeMarks[j] = scanner.nextInt();
         }
        seeStudents[i] = new External(usn, name, sem, seeMarks);
    }
    System.out.println("\nFinal Marks of Students:");
    for (int i = 0; i < n; i++) {
        System.out.println("\nDetails of Student " + (i + 1));
        System.out.println("USN: " + cieStudents[i].usn);
        System.out.println("Name: " + cieStudents[i].name);
        System.out.println("Semester: " + cieStudents[i].sem);
        System.out.println("CIE Marks: ");
        for (int j = 0; j < 5; j++) {
            System.out.print(cieStudents[i].internalMarks[j] + " ");
        }
        System.out.println("\nSEE Marks: ");
```

```
            for (int j = 0; j < 5; j++) {
                System.out.print(seeStudents[i].seeMarks[j] + " ");
            }
        }
    }
}
```

Output:

```
PS C:\Users\Admin\Desktop\1bm22cs193> javac FinalMarks.java
PS C:\Users\Admin\Desktop\1bm22cs193> java FinalMarks
Enter the number of students: 1
Enter details for CIE of student 1
USN: 1
Name: q
Semester: 1
Enter CIE marks for 5 courses: 34
50
45
46
47
Enter details for SEE of student 1
USN: 1
Name: q
Semester: 1
Enter SEE marks for 5 courses: 50
49
48
47
46

Final Marks of Students:

Details of Student 1
USN: 1
Name: q
Semester: 1

Total Marks:
84 99 93 93 93
```

Lab 7

Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called “Father” and derived class called “Son” which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge( ) when the input age<0. In Son

class, implement a constructor that cases both father and son's age and throws an exception if son's age is >=father's age.

```
import java.util.Scanner;
class WrongAge extends Exception {
    public WrongAge(String message) {
        super(message);
    }
}
class Father {
    protected int fatherAge;
    public Father(int age) throws WrongAge {
        fatherAge = age;
        if (fatherAge < 0) {
            throw new WrongAge("Father's age cannot be negative");
        }
    }
}
class Son extends Father {
    private int sonAge;
    public Son(int fatherAge, int sonAge) throws WrongAge {
        super(fatherAge);
        this.sonAge = sonAge;
        if (sonAge <= 0) {
            throw new WrongAge("Son's age cannot be negative or zero");
        }
        if (sonAge >= fatherAge) {
            throw new WrongAge("Son's age cannot be greater than or equal to father's age");
        }
    }
```

```
}
public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        try {
            System.out.print("Enter father's age: ");
            int fatherAge = scanner.nextInt();
            System.out.print("Enter son's age: ");
            int sonAge = scanner.nextInt();
            Son son = new Son(fatherAge, sonAge);
            System.out.println("Father's age: " + fatherAge);
            System.out.println("Son's age: " + sonAge);
        } catch (WrongAge e) {
            System.out.println("Exception caught: " + e);
            System.out.println("Exception caught: " + e.getMessage());
        } catch (Exception e) {
            System.out.println("Error: " + e);
            System.out.println("Error: " + e.getMessage());
        } finally {
            scanner.close();
        }
    }
}
```

Output:

```
vinuthnarajeswari@Vinuthnas-MacBook-Air vsc % javac Main.java
vinuthnarajeswari@Vinuthnas-MacBook-Air vsc % java Main
Enter father's age: 34
Enter son's age: 45
Exception caught: WrongAge: Son's age cannot be greater than or equal to father's age
Exception caught: Son's age cannot be greater than or equal to father's age
vinuthnarajeswari@Vinuthnas-MacBook-Air vsc % javac Main.java
vinuthnarajeswari@Vinuthnas-MacBook-Air vsc % java Main
Enter father's age: -9
Enter son's age: 34
Exception caught: WrongAge: Father's age cannot be negative
Exception caught: Father's age cannot be negative
vinuthnarajeswari@Vinuthnas-MacBook-Air vsc % javac Main.java
vinuthnarajeswari@Vinuthnas-MacBook-Air vsc % java Main
Enter father's age: 45
Enter son's age: -8
Exception caught: WrongAge: Son's age cannot be negative or zero
Exception caught: Son's age cannot be negative or zero
vinuthnarajeswari@Vinuthnas-MacBook-Air vsc % javac Main.java
vinuthnarajeswari@Vinuthnas-MacBook-Air vsc % java Main
Enter father's age: 56
Enter son's age: 20
Father's age: 56
Son's age: 20
```

Lab 8

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

```
class DisplayThread extends Thread {
    private String message;
    private int interval;
    private boolean running = true;
    public DisplayThread(String message, int interval) {
        this.message = message;
        this.interval = interval;
    }
    public void run() {
        while (running) {
            System.out.println(message);
            try {
                Thread.sleep(interval);
```

```
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }
    }
    public void stopThread() {
        running = false;
    }
}
public class ThreadEx {
    public static void main(String[] args) {
        DisplayThread bmsThread = new DisplayThread("BMS College of Engineering", 10000);
        DisplayThread cseThread = new DisplayThread("CSE", 2000);
        bmsThread.start();
        cseThread.start();
        System.out.println("Press Enter to stop the threads...");
        try {
            System.in.read();
        } catch (Exception e) {
            e.printStackTrace();
        }
        bmsThread.stopThread();
        cseThread.stopThread();
    }
}
```

Output:

```
PS C:\Users\Admin\Desktop\1BM22CS193> javac ThreadEx.java
PS C:\Users\Admin\Desktop\1BM22CS193> java ThreadEx
Press Enter to stop the threads...
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE

PS C:\Users\Admin\Desktop\1BM22CS193>
```

Lab 9

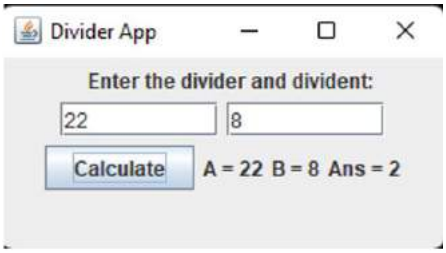
Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

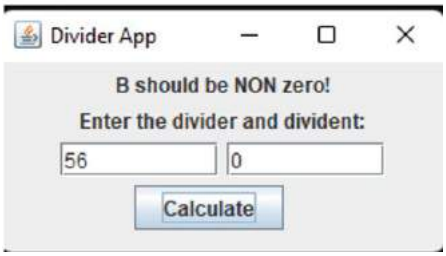
```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
class SwingDemo{
SwingDemo(){
JFrame jfrm = new JFrame("Divider App");
jfrm.setSize(275, 150);
jfrm.setLayout(new FlowLayout());
```

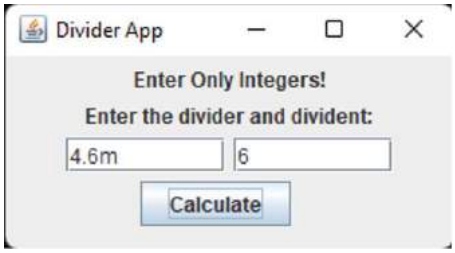
```
jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
JLabel jlab = new JLabel("Enter the divider and divident:");
JTextField ajtf = new JTextField(8);
JTextField bjtf = new JTextField(8);
JButton button = new JButton("Calculate");
JLabel err = new JLabel();
JLabel alab = new JLabel();
JLabel blab = new JLabel();
JLabel anslab = new JLabel();
jfrm.add(err); // to display error bois
jfrm.add(jlab);
jfrm.add(ajtf);
jfrm.add(bjtf);
jfrm.add(button);
jfrm.add(alab);
jfrm.add(blab);
jfrm.add(anslab);
ActionListener l = new ActionListener() {
public void actionPerformed(ActionEvent evt) {
System.out.println("Action event from a text field");
}
};
ajtf.addActionListener(l);
bjtf.addActionListener(l);
button.addActionListener(new ActionListener() {
public void actionPerformed(ActionEvent evt) {
try{
int a = Integer.parseInt(ajtf.getText());
int b = Integer.parseInt(bjtf.getText());
int ans = a/b;
```

```
alab.setText("\nA = " + a);
blab.setText("\nB = " + b);
anslab.setText("\nAns = "+ ans);
}
catch(NumberFormatException e){
alab.setText("");
blab.setText("");
anslab.setText("");
err.setText("Enter Only Integers!");
}
catch(ArithmeticException e){
alab.setText("");
blab.setText("");
anslab.setText("");
err.setText("B should be NON zero!");
}
}
});
jfrm.setVisible(true);
}
public static void main(String args[]){
SwingUtilities.invokeLater(new Runnable(){
public void run(){
new SwingDemo();
}
});
}
}
```

Output:







Lab 10

Demonstrate Inter process Communication and deadlock.

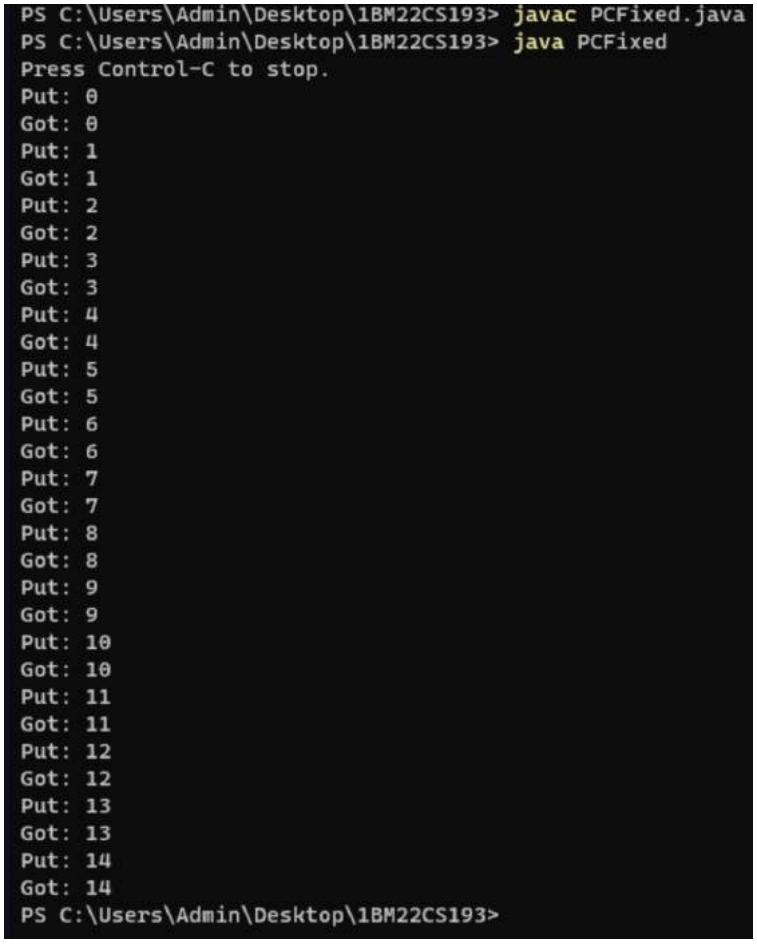
IPC

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

```
valueSet = false;
notify();
return n;
}
synchronized void put(int n) {
while(valueSet)
try {
wait();
} catch(InterruptedException e) {
System.out.println("InterruptedException caught");
}
this.n = n;
valueSet = true;
System.out.println("Put: " + n);
notify();
}
}
class Producer implements Runnable {
Q q;
Producer(Q q) {
this.q = q;
new Thread(this, "Producer").start();
}
public void run() {
int i = 0;
while(i<15) {
q.put(i++);
}
}
}
```

```
class Consumer implements Runnable {
Q q;
Consumer(Q q) {
this.q = q;
new Thread(this, "Consumer").start();
}
public void run() {
int i=0;
while(i<15) {
int r=q.get();
i++;
}
}
}
class PCFixed {
public static void main(String args[]) {
Q q = new Q();
new Producer(q);
new Consumer(q);
System.out.println("Press Control-C to stop.");
}
}
```

Output:



Deadlock

```
class A {
synchronized void foo(B b) {
String name = Thread.currentThread().getName();
System.out.println(name + " entered A.foo");
try {
Thread.sleep(1000);
} catch(Exception e) {
System.out.println("A Interrupted");
```

```
}
System.out.println(name + " trying to call B.last()");
b.last();
}
void last() {
System.out.println("Inside A.last");
}
}
class B {
synchronized void bar(A a) {
String name = Thread.currentThread().getName();
System.out.println(name + " entered B.bar");
try {
Thread.sleep(1000);
} catch(Exception e) {
System.out.println("B Interrupted");
}
System.out.println(name + " trying to call A.last()");
a.last();
}
void last() {
System.out.println("Inside A.last");
}
}
class Deadlock implements Runnable
{
A a = new A();
B b = new B();
Deadlock() {
Thread.currentThread().setName("MainThread");
```

```
Thread t = new Thread(this,"RacingThread");
t.start();
a.foo(b);
System.out.println("Back in mainthread");
}
public void run() {
b.bar(a);
System.out.println("Back in other thread");
}
public static void main(String args[]) {
new Deadlock();
}
}
```

Output: