VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

Object Oriented Java Programming

(23CS3PCOOJ)

Submitted by

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in partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

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Bull Temple Road, Bangalore 560019
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Department of Computer Science and Engineering

<u>CERTIFICATE</u>

This is to certify that the Lab work entitled "Object Oriented Java Programming (23CS3PCOOJ)" carried out by **Soumya Singh (1BF24CS298),** who is bonafide student of **B.M.S. College of Engineering.** It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of an Object-Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

Dr. Seema Patil Associate Professor Department of CSE, BMSCE	Dr. Kavitha Sooda Professor & HOD Department of CSE, BMSCE

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Github Link: https://github.com/soumyasinghcs-debug/298-OOJ-JAVA-

Program 1
Implement Quadratic Equation

Code:
```java
import java.util.*;
 public class quadratic{
    public static void main(String[] args ){
       Scanner sc=new Scanner(System.in);
       double a,b,c,d;
       System.out.println("Enter the value of a ");
       a= sc.nextInt();
       System.out.println("Enter the value of b");
       b= sc.nextInt();
       System.out.println("Enter the value of c");
       c= sc.nextInt();
       if(a==0){
       System.out.println("Not a quadratic equation");
       }
       else{
          d=b*b-4*a*c;
          if(d==0){
             double r1=(-b)/(2*a);
                   System.out.println("Roots are real and equal");
               System.out.println("roots"+r1);

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

```
X:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\ASUS\AppData\Roaming\Code\User\workspaceStorage\8878c7fd016
f657fea437b90daf38c05\redhat.java\jdt_ws\drive-download-20251210T053606Z-1-001_6d1336f0\bin' 'quadratic'
Enter the value of a
1
Enter the value of b
1
Enter the value of c
1
Roots are imaginary
roots are-0.5
roots are0.8660254037844386
PS C:\Users\ASUS\Desktop\drive-download-20251210T053606Z-1-001> ^C
PS C:\Users\ASUS\Desktop\drive-download-20251210T053606Z-1-001>
PS C:\Users\ASUS\Desktop\drive-download-20251210T053606Z-1-001>  c:; cd 'c:\Users\ASUS\Desktop\drive-download-2025
1210T053606Z-1-001'; & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp'
 'C:\Users\ASUS\AppData\Roaming\Code\User\workspaceStorage\8878c7fd016f657fea437b90daf38c05\redhat.java\jdt_ws\dri
ve-download-20251210T053606Z-1-001_6d1336f0\bin' 'quadratic'
Enter the value of a
1
Enter the value of b
2
Enter the value of c
5
Roots are imaginary
roots are-1.0
roots are2.0
PS C:\Users\ASUS\Desktop\drive-download-20251210T053606Z-1-001> ^C
PS C:\Users\ASUS\Desktop\drive-download-20251210T053606Z-1-001>
PS C:\Users\ASUS\Desktop\drive-download-20251210T053606Z-1-001>  c:; cd 'c:\Users\ASUS\Desktop\drive-download-2025
1210T053606Z-1-001'; & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp'
 'C:\Users\ASUS\AppData\Roaming\Code\User\workspaceStorage\8878c7fd016f657fea437b90daf38c05\redhat.java\jdt_ws\dri
ve-download-20251210T053606Z-1-001_6d1336f0\bin' 'quadratic'
Enter the value of a
1
Enter the value of b
-3
Enter the value of c
2
 roots are 2.0
 roots are1.0
PS C:\Users\ASUS\Desktop\drive-download-20251210T053606Z-1-001>
```

Program 2

SGPA Calculator

Code:
```java
import java.util.Scanner;
class Subject {
    int subjectMarks;
    int credits;
    int grade;
}
class Student {
    String name;
    String usn;
    double SGPA;
    Scanner s = new Scanner(System.in);
    Subject subject[];
    Student() {
        subject = new Subject[8]; // 8 subjects
        for (int i = 0; i < 8; i++) {
            subject[i] = new Subject();
        }
    }
    void getStudentDetails() {
        System.out.print("Enter Name: ");
        name = s.nextLine();
        System.out.print("Enter USN: ");
        usn = s.nextLine();
    }
    void getMarks() {
        for (int i = 0; i < 8; i++) {
            System.out.println("\nEnter details for Subject " + (i + 1) + ":");
            System.out.print("Enter Marks (0–100): ");
            subject[i].subjectMarks = s.nextInt();
            System.out.print("Enter Credits: ");
            subject[i].credits = s.nextInt();
            subject[i].grade = (subject[i].subjectMarks / 10) + 1;
            if (subject[i].grade == 11)
                subject[i].grade = 10;
            if (subject[i].grade <= 4)
                subject[i].grade = 0;
            if (subject[i].subjectMarks > 100 || subject[i].subjectMarks < 0) {
                System.out.println("Invalid marks! Setting grade = 0");
                subject[i].grade = 0;
            }
        }
    }
    void computeSGPA() {
        int effectiveScore = 0;
```

```java
        int totalCredits = 0;
        for (int i = 0; i < 8; i++) {
            effectiveScore += (subject[i].grade * subject[i].credits);
            totalCredits += subject[i].credits;
        }

        SGPA = (double) effectiveScore / totalCredits;
    }
    void displayDetails() {
        System.out.println("\n---------------------------");
        System.out.println("Name : " + name);
        System.out.println("USN : " + usn);
        System.out.printf("SGPA : %.2f\n", SGPA);
        System.out.println("---------------------------");
    }
}
public class StudentSGPA {
    public static void main(String[] args) {
        Student st = new Student();
        st.getStudentDetails();
        st.getMarks();
        st.computeSGPA();
        st.displayDetails();
    }
}
```

```
Enter marks for subject 1: 99
Enter credits for subject 2: 99
Enter marks for subject 2: 99
Enter credits for subject 3: 77
Enter marks for subject 3: 88
Enter credits for subject 4: 77
Enter marks for subject 4: 66
Enter credits for subject 5: 78
Enter marks for subject 5: 98
Enter credits for subject 6: 78
Enter marks for subject 6: 99
Enter credits for subject 7: 76
Enter marks for subject 7: 65

Enter details for Student 2:
Enter USN: 1BF24CS174
Enter Name: SAURAV
Enter credits for subject 1: 87
Enter marks for subject 1: 98
Enter credits for subject 2: 787
Enter marks for subject 2: 98
Enter credits for subject 3: 77
Enter marks for subject 3: 66
Enter credits for subject 4: 77
Enter marks for subject 4: 88
Enter credits for subject 5: 99
Enter marks for subject 5: 88
Enter credits for subject 6: 66
Enter marks for subject 6: 97
Enter credits for subject 7: 99
Enter marks for subject 7: 88

--- Student Details ---
USN: 1BF24CS298
Name: SOUMYASINGH
SGPA: 9.06

--- Student Details ---
USN: 1BF24CS174
Name: SAURAV
SGPA: 9.61
PS C:\Users\Admin\Desktop\1BF24CS298> cd "c:\Users\Admin\Desktop\1BF24CS298\" ; if ($?) { javac SGPA.java } ; if ($?) { java SGPA }
```

Program 3

Bookstore Program

(You should provide the screen shot of your observation book of Algorithm/Logic/Solving of respective problem)

Code:
```java
import java.util.Scanner;
class Book {
    String name;
    String author;
    int price;
    int numPages;
    Book(String name, String author, int price, int numPages) {
        this.name = name;
        this.author = author;
        this.price = price;
        this.numPages = numPages;
    }
    public String toString() {
        return "Book Name: " + name + "\n"
                + "Author Name: " + author + "\n"
                + "Price: " + price + "\n"
                + "Number of Pages: " + numPages + "\n";
    }
}

public class PROGRAM3 {
    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter number of books: ");
        int n = s.nextInt();
        Book[] books = new Book[n];
        for (int i = 0; i < n; i++) {
            System.out.println("\nEnter details for Book " + (i + 1) + ":");
            s.nextLine();
            System.out.print("Name: ");
            String name = s.nextLine();
            System.out.print("Author: ");
            String author = s.nextLine();
            System.out.print("Price: ");
            int price = s.nextInt();
            System.out.print("Number of pages: ");
            int numPages = s.nextInt();
            books[i] = new Book(name, author, price, numPages);
        }
        System.out.println("\n--- Book Details ---");
        for (Book b : books) {
            System.out.println(b.toString());
            s.close();
        }
    }
}
```

```
Enter details of book 1:
Name: Zenshin
Author: Yoshiharu Yoshi
Price: 499
Number of Pages: 1200

--- Book Details ---
Book Name: Zenshin
Author: Yoshiharu Yoshi
Price: Rs.499.0
Number of Pages: 1200

PS C:\Users\Admin\Desktop\1BF24CS298> cd "c:\Users\Admin\Desktop\1BF24CS298\" ; if ($?) { javac main.java } ; if ($?) { java main }
```

Program 4
Shapes Program

Code:
```java
import java.util.Scanner;
abstract class shape{
    int a,b,l,h,d;
    abstract void PrintArea();
}
class rectangle extends shape{
    rectangle(int x,int y){
        a=x;
        b=y;
    }
    void PrintArea(){
        System.out.println("Area of rectange="+(a*b));
    }
}
class triangle extends shape{
    triangle(int x, int y){
        l=x;
        h=y;
    }
    void PrintArea(){
        System.out.println("AREA OF TRIANGLE="+(h*l*0.5));
    }
}
class circle extends shape{
    circle(int r){
        d = r;
    }
    void PrintArea(){
        System.out.println("Area of circle="+(3.14*d*d));
    }
}
public class lab4{
    public static void main(String[]args){
        Scanner sc=new Scanner(System.in);
        shape s;
        System.out.println("Enter the dimension of the rectangle:");
        int a= sc.nextInt();
        int b= sc.nextInt();
        s= new rectangle(a,b);
        s.PrintArea();
        System.out.println("Enter the dimension of the triangle:");
        int l= sc.nextInt();
        int h= sc.nextInt();
        s= new triangle(l,h);
        s.PrintArea();
         System.out.println("Enter the dimension of the circle:")
  int d= sc.nextInt();
        s= new circle(d);
        s.PrintArea();
        sc.close();   } }
```

```
PROBLEMS  5    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS

Enter the dimensions of the rectangle (length and breadth):
2 3
area of rectangle = 6.0
Enter the dimensions of the triangle (base and height):
2 4
area of triangle = 4.0
Enter the dimension of the circle (radius):
3
area of circle = 28.274309999999996
PS C:\Users\student\Desktop\1bf24cs298>
```

Program 5
Bank Program

Code:
```java
import java.util.Scanner;
class Account {
String customerName;
int accountNumber;
String accountType;
double balance;
Account(String name, int number, String type) {
customerName = name;
accountNumber = number;
accountType = type.toLowerCase();
balance = 0.0;
}
void deposit(double amount) {
balance += amount;
System.out.println("Deposited: " + amount + ". Updated balance: " + balance);
}
void display() {
System.out.println("Customer name: " + customerName);
System.out.println("Account number: " + accountNumber);
System.out.println("Type of ACCOUNT: " + (accountType.equals("saving") ? "Savings account" : "Current
account"));
System.out.println("Balance = " + balance);
}
}
class Sav_acct extends Account {
Sav_acct(String name, int number) {
super(name, number, "saving");
}
void computeInterest() {
double interest = balance * 0.04; // 4% interest rate
balance += interest;
System.out.println("Interest added: " + interest + ". Updated balance: " + balance);
}
void withdraw(double amount) {
if (amount > balance) {
System.out.println("Insufficient balance!");
} else {
balance -= amount;
System.out.println("Withdrawn: " + amount + ". Updated balance: " + balance);
}
}
}
class Cur_acct extends Account {
final double minBalance = 500;
final double serviceCharge = 50;

Cur_acct(String name, int number) {
super(name, number, "current");
```

```java
}
void checkBalance() {
if (balance < minBalance) {
balance -= serviceCharge;
System.out.println("Balance below minimum. Service charge of Rs." + serviceCharge + " imposed.");
}
}
void withdraw(double amount) {
if (amount > balance) {
System.out.println("Insufficient balance!");
} else {
balance -= amount;
checkBalance();
System.out.println("Withdrawn: " + amount + ". Updated balance: " + balance);
}
}
}
public class bank {
public static void main(String[] args) {
Scanner sc = new Scanner(System.in);
System.out.print("Enter customer name: ");
String name1 = sc.nextLine();
System.out.print("Enter account number: ");
int accNum1 = sc.nextInt();
sc.nextLine();
System.out.print("Enter customer name: ");
String name2 = sc.nextLine();
System.out.print("Enter account number: ");
int accNum2 = sc.nextInt();
sc.nextLine();
Sav_acct sAcc = new Sav_acct(name1, accNum1);
Cur_acct cAcc = new Cur_acct(name2, accNum2);
int choice;
do {
System.out.println("\n-------MENU-------");
System.out.println("1. Deposit");
System.out.println("2. Withdraw");
System.out.println("3. Compute Interest for Savings Account");
System.out.println("4. Display account details");
System.out.println("5. Exit");
System.out.print("Enter your choice: ");
choice = sc.nextInt();
sc.nextLine();
switch (choice) {
case 1:
System.out.print("Enter the type of account (saving/current): ");
String type1 = sc.nextLine().toLowerCase();
System.out.print("Enter the deposit amount: ");
double depAmt = sc.nextDouble();
sc.nextLine();
if (type1.equals("saving"))
sAcc.deposit(depAmt);
```

```java
else
cAcc.deposit(depAmt);
break;
case 2:
System.out.print("Enter the type of account (saving/current): ");
String type2 = sc.nextLine().toLowerCase();
System.out.print("Enter the withdrawal amount: ");
double withAmt = sc.nextDouble();
sc.nextLine();
if (type2.equals("saving"))
sAcc.withdraw(withAmt);
else
cAcc.withdraw(withAmt);
break;
case 3:
System.out.print("Enter the type of account (saving/current): ");
String type3 = sc.nextLine().toLowerCase();
if (type3.equals("saving"))
sAcc.computeInterest();
else
System.out.println("No interest for current account.");
break;
case 4:
System.out.print("Enter the type of account (saving/current): ");
String type4 = sc.nextLine().toLowerCase();
if (type4.equals("saving"))
sAcc.display();
else
cAcc.display();
break;
case 5:
System.out.println("Exiting...");
break;
default:
System.out.println("Invalid choice!");
}
} while (choice != 5);

sc.close();
}
}
```

```
PS C:\Users\student\Desktop\1bf24cs298> cd "c:\Users\student\Desktop\1bf24cs298\" ; if ($?) { javac labno5.java } ; if ($?) { java labno5 }
Enter customer name: Soumya
Enter account number: 1
Enter customer name: aditi
Enter account number: 2

1.Deposit  2.Withdraw  3.Interest  4.Display  5.Exit
Enter choice: 1
Account type (saving/current): saving
Amount: 1000
Amount deposited.

1.Deposit  2.Withdraw  3.Interest  4.Display  5.Exit
Enter choice: 3
Interest added: 50.0

1.Deposit  2.Withdraw  3.Interest  4.Display  5.Exit
Enter choice: 2
Account type (saving/current): saving
Amount: 500

1.Deposit  2.Withdraw  3.Interest  4.Display  5.Exit
Enter choice: 4
Account type (saving/current): saving
Customer: Soumya
Account No: 1
Type: Savings
Balance: 550.0

1.Deposit  2.Withdraw  3.Interest  4.Display  5.Exit
Enter choice: 2
Account type (saving/current): saving
Amount: 200

1.Deposit  2.Withdraw  3.Interest  4.Display  5.Exit
Enter choice: 4
Account type (saving/current): saving
Customer: Soumya
Account No: 1
Type: Savings
Balance: 350.0

1.Deposit  2.Withdraw  3.Interest  4.Display  5.Exit
Enter choice: 1
Account type (saving/current): current
Amount: 600
Amount deposited.

1.Deposit  2.Withdraw  3.Interest  4.Display  5.Exit
Enter choice: 4
Account type (saving/current): current
Customer: aditi
Account No: 2
Type: Current
Balance: 600.0
```

<u>Program 6</u>

Packages

Code:

```java
package CIE;
import java.util.Scanner;

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

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

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

        System.out.print("Enter Semester: ");
        sem = s.nextInt();
    }

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

package CIE;
import java.util.Scanner;

public class Internals extends Student {

    protected int marks[] = new int[5];

    public void inputCIEmarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter 5 CIE marks: ");

        for (int i = 0; i < 5; i++) {
            System.out.print("CIE Mark in Subject " + (i + 1) + ": ");
            marks[i] = s.nextInt();
        }
    }
}
package SEE;
```

```java
import CIE.Internals;
import java.util.Scanner;

public class Externals extends Internals {

    protected int marks[];
    protected int finalMarks[];

    public Externals() {
        marks = new int[5];
        finalMarks = new int[5];
    }

    public void inputSEEmarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter 5 SEE marks: ");

        for (int i = 0; i < 5; i++) {
            System.out.print("SEE Mark in Subject " + (i + 1) + ": ");
            marks[i] = s.nextInt();
        }
    }

    public void calculateFinalMarks() {
        for (int i = 0; i < 5; i++) {
            finalMarks[i] = super.marks[i] + marks[i]/2;  // CIE + SEE
        }
    }

    public void displayFinalMarks() {
        System.out.println("\n--- Final Marks ---");
        displayStudentDetails();

        for (int i = 0; i < 5; i++) {
            System.out.println("Final Marks in Subject  " + (i + 1) + ": " + finalMarks[i]);
        }
    }
}

import SEE.Externals;

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

        Externals obj = new Externals();
```

```
        obj.inputStudentDetails();
        obj.inputCIEmarks();
        obj.inputSEEmarks();
        obj.calculateFinalMarks();
        obj.displayFinalMarks();
    }
}
```

```
Enter USN: 298
Enter Name: Soumya
Enter Semester: 3
Enter 5 CIE marks:
CIE Mark in Subject 1: 44
CIE Mark in Subject 2: 43
CIE Mark in Subject 3: 45
CIE Mark in Subject 4: 42
CIE Mark in Subject 5: 46
Enter 5 SEE marks:
SEE Mark in Subject 1: 45
SEE Mark in Subject 2: 43
SEE Mark in Subject 3: 46
SEE Mark in Subject 4: 42
SEE Mark in Subject 5: 44

--- Final Marks ---
USN: 298
Name: Soumya
Semester: 3
Final Marks in Subject  1: 89
Final Marks in Subject  2: 86
Final Marks in Subject  3: 91
Final Marks in Subject  4: 84
Final Marks in Subject  5: 90
```

Program 7
Errors

Code:
```java
import java.util.Scanner;
class WrongAge extends Exception{
   public WrongAge(String msg) {
      super(msg);
   }
}
class Father{
   int FatherAge;
   Father() throws WrongAge{
      Scanner sc=new Scanner(System.in);
      System.out.println("Enter Fathers Age: ");
      FatherAge=sc.nextInt();
      if(FatherAge<0){
         throw new WrongAge("FATHERS AGE CANNOT BE NEGATIVE");
      }
   }
}
class Son extends Father{
   int SonAge;
   Son()throws WrongAge{
      super();
      Scanner sc=new Scanner (System.in);
      System.out.println("Enter Sons Age:");
      SonAge=sc.nextInt();
      if(SonAge>=FatherAge){
         throw new WrongAge("Sons age is greater than fathers age");
      }
      else if (SonAge<0){
         throw new WrongAge("Sons Age cannot be negative");
      }
   }
   void display(){
      System.out.println("Sons Age:"+SonAge);
      System.out.println("Fathers Age:"+FatherAge);
   }
}
public class InheritanceAgeDemo{
   public static void main(String [] args){
      try{
         Son S=new Son();
         System.out.println();
         S.display();

         System.out.println("---Details----");
         S.display();

      }
      catch(WrongAge e){
         System.out.println("Exception:" +e.getMessage());
      }
   }}
```

```
PROBLEMS 2   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS                                                          ⟩ Code + ∨ ⫠

PS C:\Users\Admin\Desktop\298> cd "c:\Users\Admin\Desktop\298\" ; if ($?) { javac main.java } ; if ($?) { java main }
Enter Fathers Age: 52
Enter sons Age: 20
Fathers age: 52
Sons age: 20
PS C:\Users\Admin\Desktop\298> cd "c:\Users\Admin\Desktop\298\" ; if ($?) { javac main.java } ; if ($?) { java main }
Enter Fathers Age: 52
Enter sons Age: 500
Exception: Sons age cant be greater than fathers age
PS C:\Users\Admin\Desktop\298> cd "c:\Users\Admin\Desktop\298\" ; if ($?) { javac main.java } ; if ($?) { java main }
Enter Fathers Age: -10
Enter sons Age: 20
Exception: Fathers age cant be negative
PS C:\Users\Admin\Desktop\298> cd "c:\Users\Admin\Desktop\298\" ; if ($?) { javac main.java } ; if ($?) { java main }
Enter Fathers Age: 52
Enter sons Age: -20
Exception: Sons age cant be negative
PS C:\Users\Admin\Desktop\298> cd "c:\Users\Admin\Desktop\298\" ; if ($?) { javac lab7.java } ; if ($?) { java lab7 }
```

Program 8
Multi Threading

Code:
```java
class MessageThread extends Thread {
    String message;
    int interval;
    int count;

    MessageThread(String msg, int time, int count) {
        this.message = msg;
        this.interval = time;
        this.count = count;
    }

    public void run() {
        try {
            for (int i = 1; i <= count; i++) {
                System.out.println(message);
                Thread.sleep(interval);
            }
        } catch (InterruptedException e) {
            System.out.println("Thread Interrupted");
        }
    }
}

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

        MessageThread t1 = new MessageThread("BMS College of Engineering", 10000, 5);


        MessageThread t2 = new MessageThread("CSE", 2000, 10);

        t1.start();
        t2.start();
    }
}
```

```
PS C:\Users\Admin\Desktop\229988> cd "c:\Users\Admin\Desktop\229988\" ; if ($?) { javac TwoThreadsDemo.java } ; if ($?) { java TwoThreadsDemo }
n\Desktop\229988\" ; if ($?) { javac TwoThreadsDemoj
.java } ; if ($?) { java TwoThreadsDemo }
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```

Program 9
Open Ended Question 1

Code:

```java
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

public class DivisionUI extends JFrame implements ActionListener {
    JTextField num1Field, num2Field, resultField;
    JButton divideButton;
    DivisionUI() {
        setTitle("Integer Division");
        setSize(350, 200);
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        setLayout(new GridLayout(4, 2, 5, 5));
        add(new JLabel("Num 1:"));
        num1Field = new JTextField();
        add(num1Field);
        add(new JLabel("Num 2:"));
        num2Field = new JTextField();
        add(num2Field);
        divideButton = new JButton("Divide");
        add(divideButton);
        divideButton.addActionListener(this);
        add(new JLabel("Result:"));
        resultField = new JTextField();
        resultField.setEditable(false);
        add(resultField);
        setVisible(true);
    }
    public void actionPerformed(ActionEvent e) {
        try {
            int num1 = Integer.parseInt(num1Field.getText());
            int num2 = Integer.parseInt(num2Field.getText());

            if (num2 == 0) {
                throw new ArithmeticException("Cannot divide by zero");
            }
            int result = num1 / num2;
            resultField.setText(Integer.toString(result));
        } catch (NumberFormatException ex) {
            JOptionPane.showMessageDialog(this,
                    "Please enter valid integers!",
                    "Number Format Error",
                    JOptionPane.ERROR_MESSAGE);
        }
```
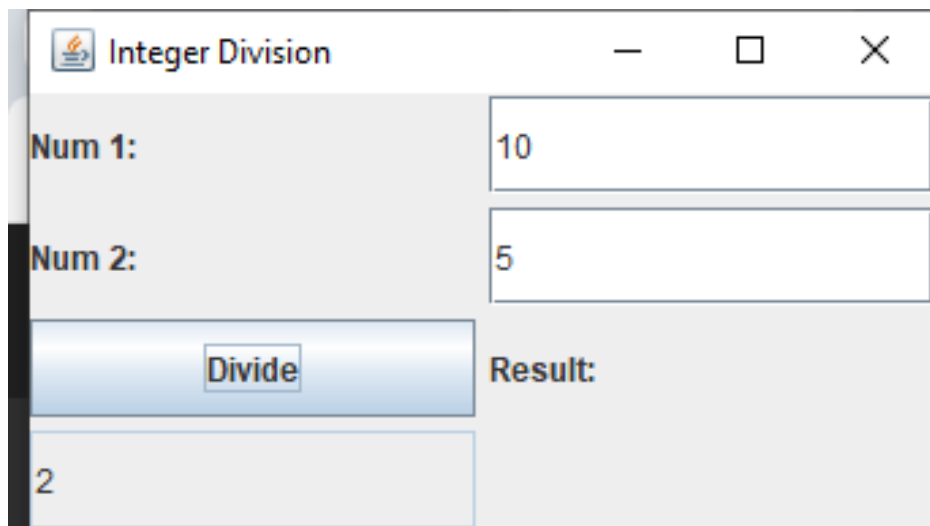
```java
catch (ArithmeticException ex) {
        JOptionPane.showMessageDialog(this,
            ex.getMessage(),
            "Arithmetic Error",
            JOptionPane.ERROR_MESSAGE);
    }
  }
  public static void main(String[] args) {
     new DivisionUI();
  }
}
```

Program 10
Open Ended Question 2

Code:
```java
class Q {
    int n;
    boolean valueSet = false;
    synchronized int get() {
        while (!valueSet) {
            try {
                System.out.println("\nConsumer waiting\n");
                wait();
            } catch (InterruptedException e) {
                System.out.println("InterruptedException caught");
            }
        }
        System.out.println("Got: " + n);
        valueSet = false;
        System.out.println("\nIntimate Producer\n");
        notify();
        return n;
    }
    synchronized void put(int n) {
        while (valueSet) {
            try {
                System.out.println("\nProducer waiting\n");
                wait();
            } catch (InterruptedException e) {
                System.out.println("InterruptedException caught");
            }
        }
        this.n = n;
        valueSet = true;
        System.out.println("Put: " + n);
        System.out.println("\nIntimate Consumer\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 < 5) {
            q.put(i++);
        }
    }
}
```

```java
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 < 5) {
            int r = q.get();
            System.out.println("Consumed: " + r);
            i++;
        }
    }
}
public class main {
    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

Intimate Consumer


Producer waiting

Got: 0

Intimate Producer

Put: 1

Intimate Consumer


Producer waiting

Consumed: 0
Got: 1

Intimate Producer

Consumed: 1
Put: 2

Intimate Consumer


Producer waiting

Got: 2

Intimate Producer
```

```
Intimate Producer

Consumed: 2
Put: 3

Intimate Consumer


Producer waiting

Got: 3

Intimate Producer

Consumed: 3
Put: 4

Intimate Consumer

Got: 4

Intimate Producer

Consumed: 4
```