

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.



LAB REPORT on

Object Oriented Java Programming (23CS3PCOOJ)

Submitted by

ADIKAR CHARVI SREE TEJA (1BM22CS012)

in partial fulfillment for the award of the degree of
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Lab Program 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 discriminant b^2-4ac is negative, display a message stating that there are no real solutions.

CODE:

```
import java.util.*;
public class QuadraticEq{
    public static void main(String args[])
    {
        float a,b,c,d,r1,r2;
        System.out.println("Enter values of a,b,c");
        Scanner scan=new Scanner(System.in);
        a=scan.nextFloat();
        b=scan.nextFloat();
        c=scan.nextFloat();
        if(a==0||b==0||c==0)
        {
            System.out.println("Invalid Input");
        }
        else
        {
            d=b*b-4*a*c;
            if(d>0)
            {
                r1=(float)(-b+Math.sqrt(d))/(2*a);
                r2=(float)(-b-Math.sqrt(d))/(2*a);
                System.out.println("Roots are real and distinct r1="+r1+"r2="+r2);
            }
            else if(d<0)
            {
                System.out.println("Roots are Imaginary");
            }
            else
            {
                r1=-b/(2*a);
                r2=r1;
                System.out.println("Roots are equal r1="+r1+"r2="+r2);
            }
        }
        System.out.println("NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012");
    }
}
```

OUTPUT:

```
C:\Users\bmsce\Desktop\1BM22CS012>java QuadraticEq
Enter the values for a,b,c
32
47
85
Roots are imaginary
NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012

C:\Users\bmsce\Desktop\1BM22CS012>javac QuadraticEq.java

C:\Users\bmsce\Desktop\1BM22CS012>java QuadraticEq
Enter the values for a,b,c
29
172
46
Roots are real and distinct r1=-0.2807294r2=-5.650305
NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012

C:\Users\bmsce\Desktop\1BM22CS012>javac QuadraticEq.java

C:\Users\bmsce\Desktop\1BM22CS012>java QuadraticEq
Enter the values for a,b,c
12.5
25
12.5
Roots are equal r1=-1.0r2=-1.0
NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012
```

```
C:\Users\bmsce\Desktop\1BM22CS012>java QuadraticEq
Enter the values for a,b,c
0
1
0
Invalid Input

NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012
```

Lab Program 2:

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

CODE:

```
import java.util.*;
public class Student
{
    String name, usn;
    int credits[], marks[];

    public void display(double res)
    {
        System.out.println("\nName : "+name);
        System.out.println("\nUSN : "+usn);
        for(int i=0; i<credits.length;i++)
        {
            System.out.println("\nSubject "+(i+1)+" : \t Marks= "+marks[i]+" \t Credits= "+credits[i]);
        }
        System.out.println("\nSGPA : "+res);
    }

    public double sgpa()
    {
        double tc=0;
        double tgp=0;
        for(int i=0; i<credits.length;i++)
        {
            tc+=credits[i];
            tgp+=calgp(marks[i])*credits[i];
        }
        return(tgp/tc);
    }

    public double calgp(int m)
    {
        if(m>=90)
        {
            return 10;
        }
        else if(m>=80)
        {
            return 9;
        }
    }
}
```

```

else if(m>=70)
{
    return 8;
}
else if(m>=60)
{
    return 7;
}
else if(m>=50)
{
    return 6;
}
else
{
    return 0;
}
}

```

```

public static void main(String args[])
{
    Scanner read=new Scanner(System.in);
    System.out.println("\nEnter name: ");
    name=read.nextLine();
    System.out.println("\nEnter USN: ");
    usn=read.next();
    System.out.println("\nEnter no. of subjects: ");
    int n=read.nextInt();
    credits[]=new int[n];
    marks[]=new int[n];
    System.out.println("\nEnter marks and credits:\n");
    for(int i=0; i<n;i++)
    {
        System.out.println("\nMarks: ");
        credits[i]=read.nextInt();
        System.out.println("\nCcredit: ");
        marks[i]=read.nextInt();
    }
    Student ob=new Student();
    double res=ob.sgpa;
    ob.display();
    System.out.println("NAME:ADIKAR CHARVI USN:1BM22CS012");
}
}

```

OUTPUT:

```
Student Details are:
Enter Student USN:
abc
Enter Student Name:
xyz
Enter Subject Details
Enter Credits1
3
Enter Marks1
80
Enter Credits2
2
Enter Marks2
80
Enter Credits3
4
Enter Marks3
90
Enter Credits4
4
Enter Marks4
90
Enter Credits5
3
Enter Marks5
90
Enter Credits6
3
Enter Marks6
90
Enter Credits7
3
Enter Marks7
90
Enter Credits8
4
Enter Marks8
90
Student Name is:xyz
Student USN is:abc
Student Sgpa is9.0
Name:Adikar Charvi USN:1BM22CS012
```

Lab Program 3:

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

CODE:

```
import java.util.*;
class Book
{
    Scanner input=new Scanner(System.in);
    String name,author;
    int price,num_page;
    Book(String name,String author,int price,int num_page)
    {
        this.name=name;
        this.author=author;
        this.price=price;
        this.num_page=num_page;
    }
    String getName()
    {
        System.out.println("Enter name");
        String name1=input.nextLine();
        return(name1);
    }
    String getAuthor()
    {
        System.out.println("Enter Author");
        String author1=input.nextLine();
        return(author1);
    }
    int getPrice()
    {
        System.out.println("Enter Price");
        int price1=input.nextInt();
        return(price1);
    }
    int getPages()
    {
        System.out.println("Enter Number of pages");
```



```

        int num_page1=input.nextInt();
        return(num_page1);
    }
    void set(String name,String author,int price,int num_page)
    {
        this.name=name;
        this.author=author;
        this.price=price;
        this.num_page=num_page;
    }
    void toprt()
    {
        System.out.println("Name of book: "+name);
        System.out.println("Name of author: "+author);
        System.out.println("Price of book: "+price);
        System.out.println("number of pages of book: " +num_page);
    }

    public static void main(String args[])
    {
        System.out.println("enter the number of books");
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        Book book[]=new Book[n];
        for(int i = 0;i<n;i++)
        {
            book[i]=new Book("null","null",0,0);
            String name = book[i].getName();
            String author = book[i].getAuthor();
            int price = book[i].getPrice();
            int num_page = book[i].getPages();
            book[i].set(name,author,price,num_page);
        }
        System.out.println("THE BOOK LIBRARY");
        for(int i=0;i<n;i++)
        {
            book[i].toprt();
        }
        System.out.println("NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012");
    }
}

```

OUTPUT:

```
enter the number of books
2
Enter name
xyz
Enter Author
abc
Enter Price
2000
Enter Number of pages
120
Enter name
dfg
Enter Author
efg
Enter Price
500
Enter Number of pages
150
THE BOOK LIBRARY
Name of book: xyz
Name of author: abc
Price of book: 2000
number of pages of book: 120
Name of book: dfg
Name of author: efg
Price of book: 500
number of pages of book: 150
NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012
```

Lab Program 4:

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

CODE:

```
import java.util.*;
abstract class Shape
{
    int x,y;
    void printArea()
    {
    }
}
class Rectangle extends Shape
{
    Rectangle(int l,int b)
    {
        x=l;
        y=b;
    }
    void printArea()
    {
        double res;
        res=x*y;
        System.out.println("Rectangle area is"+res);
    }
}
class Triangle extends Shape
{
    Triangle(int l,int h)
    {
        x=l;
        y=h;
    }
    void printArea()
    {
        double res;
        res=0.5*x*y;
        System.out.println("Triangle area is"+res);
    }
}
class Circle extends Shape
```

```

{
    Circle(int r)
    {
        x=r;
    }
    void printArea()
    {
        double res;
        res=3.14*x*x;
        System.out.println("Circle area is"+res);
    }
}
class Main
{
    public static void main(String args[])
    {
        Shape ob=new Rectangle(2,4);
        ob.printArea();
        Shape ob1=new Triangle(4,4);
        ob1.printArea();
        Shape ob2=new Circle(5);
        ob2.printArea();
        System.out.println("NAME:ADIKAR CHARVI SREE TEJA
        USN:1BM22CS012");
    }
}

```

OUTPUT:

```

C:\Users\BMSCE\Desktop\1BMSSCS014\week3>javac Main.java
C:\Users\BMSCE\Desktop\1BMSSCS014\week3>java Main
Rectangle area is8.0
Triangle area is8.0
Circle area is78.5
NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012

```

Lab Program 5:

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

Create a class Account that stores customer name, account number and type of account. From this derive the classes Cur-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:

a) Accept deposit from customer and update the balance.

b) Display the balance.

c) Compute and deposit interest

d) Permit withdrawal and update the balance

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

CODE:

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

```
class Account {
    String cust_name;
    int accno;
    double bal;

    Account(String cust_name, int accno, double bal) {
        this.cust_name = cust_name;
        this.accno = accno;
        this.bal = bal;
    }

    void accept(double deposit) {
        bal += deposit;
        System.out.println("Deposit success Balance is:" + bal);
    }

    void displayBal() {
        System.out.println("Balance is:" + bal);
    }
}
```

```
class CurrAct extends Account {
    double min;
    boolean chequebook;
```

```

float service_charge;

CurrAct() {
    min = 1500.00;
    chequebook = true;
    service_charge = 50.0;
}

void minbal() {
    if (bal < min) {
        System.out.println("Below min balance");
        bal -= service_charge;
        System.out.println("Balance is:" + bal);
    }
}

void withdrawl(double amt) {
    this.minbal();
    bal -= amt;
    System.out.println("Withdrawal success remaining Balance:" + bal);
}

}

class SaveAct extends Account {
    double interest;

    SaveAct(double interest) {
        this.interest = interest;
    }

    void ChequeBook1() {
        System.out.println("NO FACILITY");
    }

    void withdrawl(double amt) {
        bal -= amt;
        System.out.println("Remaining Balance is:" + bal);
    }

    void CompoundInt(double interest, int yr) {
        double it;
        it = bal * Math.pow((1 + interest / 100), yr) - bal;
        bal += it;
        System.out.println("Compound interest \n New Bal" + bal);
    }
}

```

```

class Bank {
    public static void main(String args[]) {
        Scanner input = new Scanner(System.in);
        System.out.println("Enter Details");
        System.out.println("Enter Name");
        String n = input.nextLine();
        System.out.println("Enter Accno");
        int acc_num = input.nextInt();
        System.out.println("Enter Balance");
        float b = input.nextFloat();
        Account obj = new Account(n, acc_num, b);
        obj.accept(20000.00);
        obj.displayBal();
        CurrAct obj1 = new CurrAct();
        obj1.withdrawl(2000);
        SaveAct obj2 = new SaveAct(7.5);
        obj2.ChequeBook1();
        obj2.withdrawl(5000);
        obj2.CompoundInt(7.5, 2);
        System.out.println("NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012");
    }
}

```

OUTPUT:

```

Enter Details
Enter Name
xyz
Enter Accno
213
Enter Balance
12000
Deposit success Balance is:32000.0
Balance is:32000.0
Withdrawal success remaining Balance:10000.0
NO FACILITY
Remaining Balance is:7000.0
Compound interest
New Bal8089.374999999999
NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012

```

Lab Program 6:

Create a package CIE which has two classes- Student and Internals. The class Student 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.

CODE:

```
package CIE;
import java.util.*;
public class Student{
    public String name;
    public String usn;
    public int sem;

    public void accept()
    {
        Scanner input=new Scanner(System.in);
        System.out.println("Enter details");
        System.out.println("Name:");
        name= input.nextLine();
        System.out.println("USN:");
        usn= input.nextLine();
        System.out.println("Sem:");
        sem= input.nextInt();
    }
}
```

```
package CIE;
public class Internals
{
    public int int_marks[]=new int[5];
}
```

```
package SEE;
import CIE.Student;
public class External extends Student
{
    public int ext_marks[]=new int[5];
}
import java.util.*;
import CIE.*;
import SEE.*;
```



```

public class FinalMarks
{
    public static void main(String args[])
    {
        int final_marks[]=new int[5];
        Scanner input=new Scanner(System.in);
        System.out.println("Enter n");
        int n=input.nextInt();
        CIE.Internals obj[]=new CIE.Internals[n];
        SEE.External obj1[]=new SEE.External[n];
        for(int i=0;i<n;i++)
        {
            obj[i]=new CIE.Internals();
            obj1[i]=new SEE.External();
            System.out.println("Enter Student details for student"+(i+1));
            obj1[i].accept();
            for(int j=0;j<5;j++)
            {
                System.out.println("Enter Internal and final marks");
                obj[i].int_marks[j]=input.nextInt();
                obj1[i].ext_marks[j]=input.nextInt();
                final_marks[j]=obj[i].int_marks[j]+ obj1[i].ext_marks[j];
            }
            System.out.println("Final marks of"+obj1[i].name);
            for(int k=0;k<5;k++)
            {
                System.out.println("Course"+(k+1)+":"+final_marks[k]);
            }
        }
        System.out.println("NAME:ADIKAR CHARVI SREE TEJA
USN:1BM22CS012");
    }
}

```

OUTPUT:

```
Enter n
2
Enter Student details for student1
Enter details
Name:
cHARVI
USN:
1nm22cs012
Sem:
3
Enter Internal and final marks
23
23
Enter Internal and final marks
23
23
Enter Internal and final marks
23
23
Enter Internal and final marks
34
34
Enter Internal and final marks
45
45
Final marks ofcHARVI
Course1:46
Course2:46
Course3:46
Course4:68
Course5:90
Enter Student details for student2
Enter details
Name:
ABC
USN:
1BM22CS012
Sem:
3
Enter Internal and final marks
12
12
Enter Internal and final marks
12
12
Enter Internal and final marks
12
12
Enter Internal and final marks
12
12
Enter Internal and final marks
12
12
Final marks ofABC
Course1:24
Course2:24
Course3:24
Course4:24
Course5:24
NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012
```

Lab Program 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.

CODE:

```
import java.util.*;
class WrongAge extends Exception
{
    String message;
    public WrongAge(String msg)
    {
        this.message=msg;
        System.out.println(msg);
    }
}

class Father
{
    int f_age;
    Father(int f_age) throws WrongAge
    {
        this.f_age=f_age;

        if(f_age<0)
        {
            throw new WrongAge("Age cant be less than 0");
        }
    }
    int getAge()
    {
        return f_age;
    }
}

class Son extends Father
{
    int s_age;
    Son(int f_age,int s_age) throws WrongAge
    {
        super(f_age);
        this.s_age=s_age;
        if(f_age<=s_age)
        {
            throw new WrongAge("Son's age is greater than or equal to Father's age");
        }
    }
}
```

```

        throw new WrongAge("Father can't be younger than son");
    }}
    int getSage()
    {
        return s_age;
    }
}

class Main
{
    public static void main(String args[])
    {
        int n1,n2;
        Scanner input=new Scanner(System.in);
        System.out.println("Enter Fathers age");
        n1=input.nextInt();
        System.out.println("Enter Sons age");
        n2=input.nextInt();
        try{
            Father ob1=new Father(n1);
            Son ob2=new Son(n1,n2);
        }
        catch(WrongAge e)
        {
            System.out.println("Caught");
        }

        System.out.println("Name:Adikar Charvi USN:1BM22CS012");
    }
}

```

OUTPUT:

```
C:\Users\BMSCE\Desktop\1BM22CS012\lab7,8>javac Main.java

C:\Users\BMSCE\Desktop\1BM22CS012\lab7,8>java Main
Enter Fathers age
0
Enter Sons age
10
Father cant be younger than son
Caught
Name:Adikar Charvi USN:1BM22CS012

C:\Users\BMSCE\Desktop\1BM22CS012\lab7,8>javac Main.java

C:\Users\BMSCE\Desktop\1BM22CS012\lab7,8>java Main
Enter Fathers age
-25
Enter Sons age
12
Age cant be less than 0
Caught
Name:Adikar Charvi USN:1BM22CS012

C:\Users\BMSCE\Desktop\1BM22CS012\lab7,8>javac Main.java

C:\Users\BMSCE\Desktop\1BM22CS012\lab7,8>java Main
Enter Fathers age
20
Enter Sons age
12
Name:Adikar Charvi USN:1BM22CS012
```

Lab Program 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.

CODE:

```
import java.util.*;
class One extends Thread{
    public void run()
    {
        int i=0;
        while(i<5)
        {
            try
            {
                System.out.println("BMS College of Engineering");
                Thread.sleep(10000);
            }
            catch(InterruptedException e)
            {
                System.out.println(e);
            }
            i++;
        }
    }
}
class Two extends Thread
{
    public void run()
    {
        int i=0;
        while(i<5)
        {
            try
            {
                System.out.println("CSE");
                Thread.sleep(2000);
            }
            catch(InterruptedException e)
            {
                System.out.println(e);
            }
            i++;
        }
    }
}
```

```

}
public class TDemo {
    public static void main(String[] args) {
        Thread t1 = new One();
        Thread t2 = new Two();
        System.out.println("Name:Adikar Charvi USN:1BM22CS012");
        t1.start();
        t2.start();
        try{
            Thread.sleep(60000);
        }
        catch(InterruptedException e)
        {
        }
    }
}
}

```

OUTPUT:

```

C:\Users\BMSCE\Desktop\1BM22CS012\lab7,8>javac TDemo.java
C:\Users\BMSCE\Desktop\1BM22CS012\lab7,8>java TDemo
Name:Adikar Charvi USN:1BM22CS012
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering
C:\Users\BMSCE\Desktop\1BM22CS012\lab7,8>

```

Lab Program 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 `ArithmeticException`. Display the exception in a message dialog box.

CODE:

```
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 dividend");
        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);
        jfrm.add(jlab);
        jfrm.add(ajtf);
        jfrm.add(bjtf);
        jfrm.add(button);
        jfrm.add(alab);
        jfrm.add(blab);
        jfrm.add(anslab);

        ActionListener I = new ActionListener(){
            public void actionPerformed(ActionEvent evt)
            {
```



```

        System.out.println("Action event from a text field");
    }
};

ajtf.addActionListener(I);
bjtf.addActionListener(I);

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("\n A="+a);
            blab.setText("\n B="+b);
            anslab.setText("\n Ans="+ans);
            System.out.println("NAME:ADIKAR CHARVI SREE TEJA
            USN:1BM22CS012");
        }
        catch(NumberFormatException e)
        {
            alab.setText("");
            blab.setText("");
            anslab.setText("");
            err.setText("Enter only integer");
        }
        catch(ArithmeticException e){
            alab.setText("");
            blab.setText("");
            anslab.setText("");
            err.setText("B should be nonzero");}
        }
    });

    jfrm.setVisible(true);
}

public static void main(String args[])
{
    SwingUtilities.invokeLater(new Runnable() {
        public void run() {
            new SwingDemo();
        }
    });
}
}

```

OUTPUT:

```
C:\Users\admin\Desktop\ooj12>
C:\Users\admin\Desktop\ooj12>javac SwingDemo.java

C:\Users\admin\Desktop\ooj12>java SwingDemo
NAME:ADIKAR CHARVI SREE TEJA USN:1BM22CS012
```

