// LAB PROGRAMS 3RD SEM OOJ

LAB 1:

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

```
import java.util.*;
public class Quadratic{

    public static void main(String []args){
    int a,b,c;
    double root1,root2,D;
    System.out.println("Enter a,b,c : ");
    Scanner sc = new Scanner(System.in);
    a=sc.nextInt();
    b=sc.nextInt();
    c=sc.nextInt();
    D=b*b-4*a*c;
    if(D>0)
    {
       System.out.println("real roots are : \n");
       root1 = (-b + Math.sqrt(D)) / (2 * a);
       root2 = (-b - Math.sqrt(D)) / (2 * a);
       System.out.println("root1 is "+root1+"root 2 is "+root2);

    }
    else if(D<0)
    {
       System.out.println("Imaginary roots");
       System.out.println("There are no real solutions");
```

```
    }


  }
}
```

```
C:\Users\Samarth\Documents\lab programs>javac Quadratic.java

C:\Users\Samarth\Documents\lab programs>java Quadratic
Enter a,b,c :
3 1 1
Imaginary roots
There are no real solutions

C:\Users\Samarth\Documents\lab programs>java Quadratic
Enter a,b,c :
1 3 1
real roots are :

root1 is -0.3819660112501051root 2 is -2.618033988749895
```

//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 StudentSGPA{
  int usn,i,j;
  String name=new String();
  int credits[]=new int[5];
  int marks[]=new int[5];
  float SGPA(){
    float sum=0;
    for(int i=0;i<5;i++){
      sum=sum+(credits[i]*marks[j]);
    }
```

```
    return sum/5;
    }
}
public class Main{

    public static void main(String []args){
        Scanner in = new Scanner(System.in);
        StudentSGPA Stud1 = new StudentSGPA();
        System.out.println("Enter Details");
        System.out.println("Entee Name : ");
        Stud1.name=in.nextLine();
        System.out.println("Enter USN : ");
        Stud1.usn=in.nextInt();
        System.out.println("Enter the Credits ");
        for(int j=0;j<5;j++){
            System.out.println("subject "+(j+1));
            int cd = in.nextInt();
            Stud1.credits[j]=cd;
        }
        System.out.println("Enter the marks ");
        for(int j=0;j<5;j++){
            System.out.println("subject "+(j+1));
            int mk = in.nextInt();
            Stud1.marks[j]=mk;
        }
        System.out.println("Student Details :");
        System.out.println("Name :"+Stud1.name);
        System.out.println("USN :"+Stud1.usn);
        System.out.println("SGPA :"+Stud1.SGPA());

    }
```

}

```
C:\Users\Samarth\Documents\lab programs>java Main
Enter Details
Entee Name :
SAM
Enter USN :
141
Enter the Credits
subject 1
3
subject 2
4
subject 3
3
subject 4
2
subject 5
4
Enter the marks
subject 1
76
subject 2
89
subject 3
67
subject 4
97
subject 5
56
Student Details :
Name :SAM
USN :141
SGPA :243.2

C:\Users\Samarth\Documents\lab programs>
```

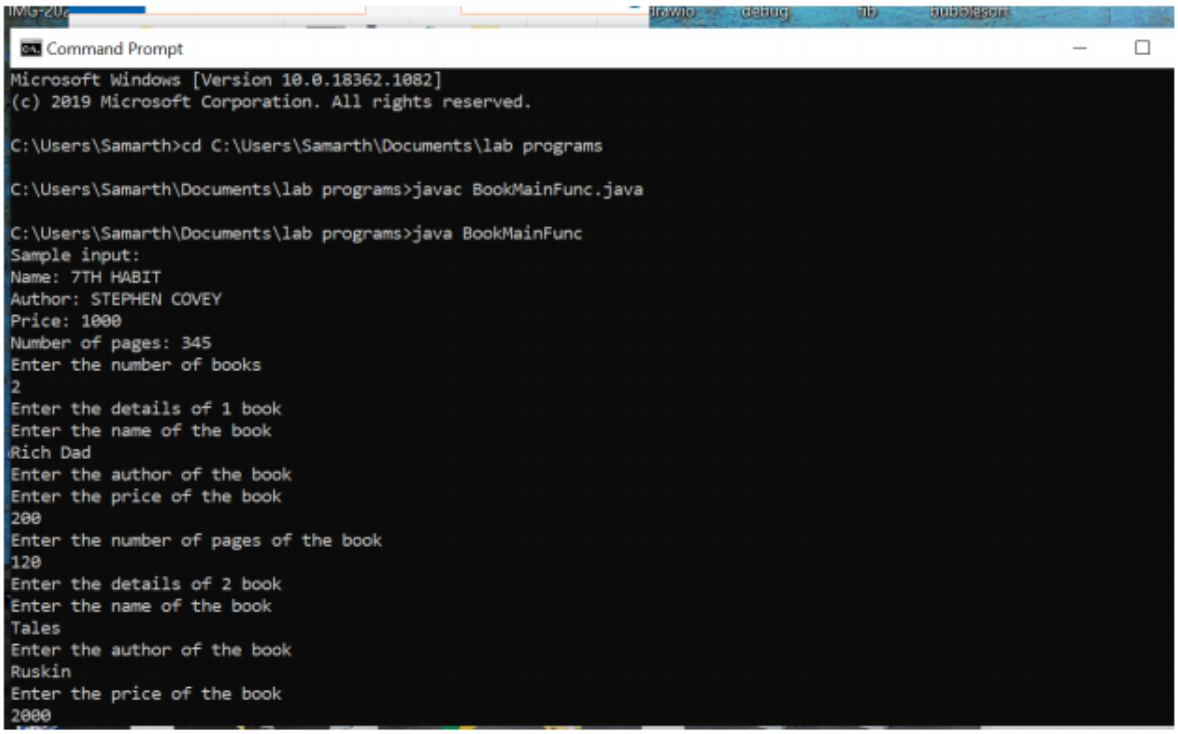
//LAB 3 :

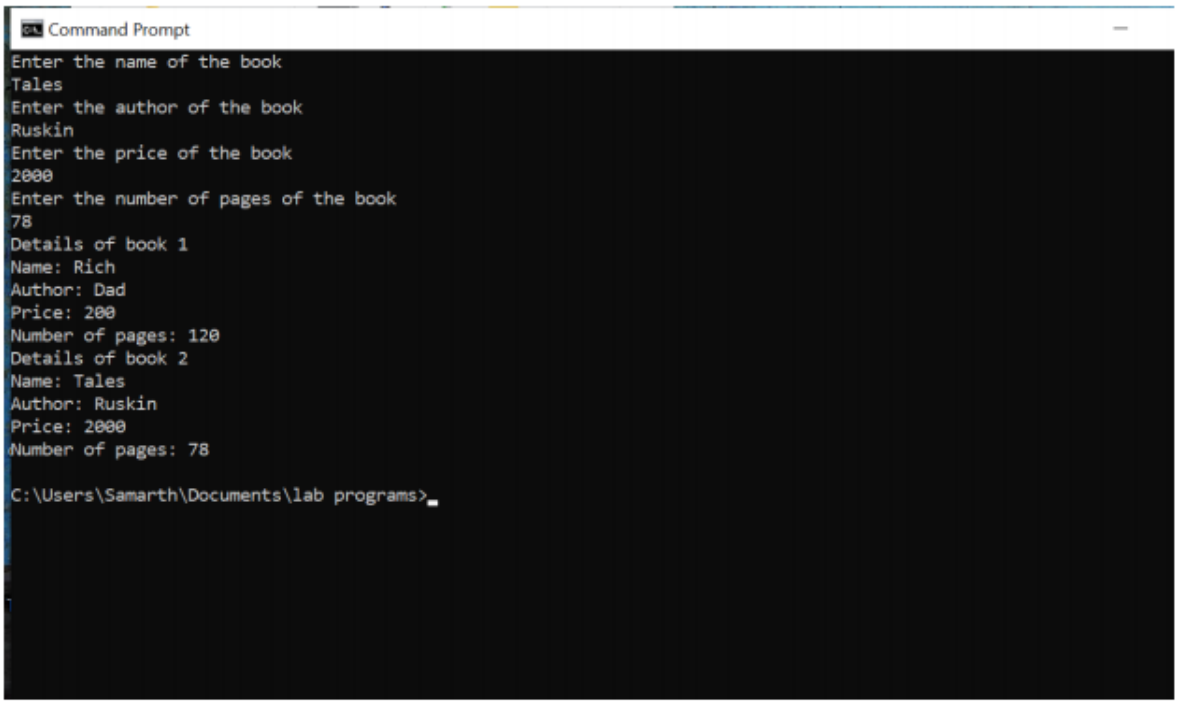
Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString( ) method that could display the complete details of the book. Develop a Java program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

```
import java.util.*;
class Book {
        String name;
```

```
	String author;
	int price;
	int num_pages;
	Book()
	{}
	Book(String name,String author,int price,int num_pages)
	{
		this.name=name;
		this.author=author;
		this.price=price;
		this.num_pages=num_pages;
	}
	void Read()
	{
		Scanner s=new Scanner(System.in);
		System.out.println("Enter the name of the book");
		name=s.next();
		System.out.println("Enter the author of the book");
		author=s.next();
		System.out.println("Enter the price of the book");
		price=s.nextInt();
		System.out.println("Enter the number of pages of the book");
		num_pages=s.nextInt();
	}
	public String toString()
	{
		return ("Name: "+name + "\n" + "Author: "+author + "\n" + "Price: "+price + "\n"
+"Number of pages: "+num_pages );
	}
}
public class BookMainFunc {
```

```
	public static void main(String args[])
	{
		Scanner a=new Scanner(System.in);
		Book b1=new Book("7TH HABIT","STEPHEN COVEY",1000,345);
		System.out.println("Sample input:\n"+b1);
		System.out.println("Enter the number of books");
		int n=a.nextInt();
		Book b[]=new Book[n];
		for(int i=0;i<n;i++)
		{
			b[i]=new Book();
			System.out.println("Enter the details of "+(i+1)+" book");
			b[i].Read();
		}
		for(int i=0;i<n;i++)
		{
			System.out.println("Details of book "+(i+1));
			System.out.println(b[i]);
		}
	}
}
```





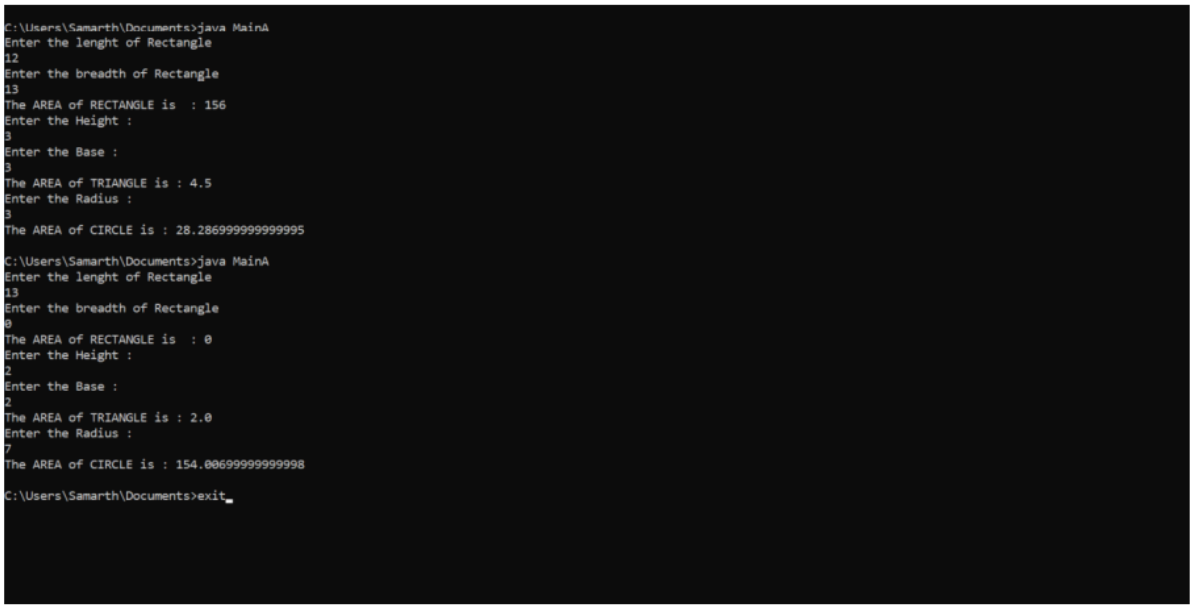
//LAB 4

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 class Shape. Each one of the classes containonly the method printArea( ) that prints the area of the given shape.

import java.util.*;

```
class Shape{
 int Sl;
 int Sb;
 void printArea(){

 }
 Scanner S_inp = new Scanner(System.in);
}
class Rectangle extends Shape{
 void printArea(){
 System.out.println("Enter the lenght of Rectangle");
 Sl = S_inp.nextInt();
 System.out.println("Enter the breadth of Rectangle");
 Sb = S_inp.nextInt();
 System.out.println("The AREA of RECTANGLE is : "+ (Sb*Sl));
 }
}
class Trinagle extends Shape{
 void printArea(){
 System.out.println("Enter the Height : ");
 Sl = S_inp.nextFloat();
 System.out.println("Enter the Base : ");
 Sb = S_inp.nextInt();
 System.out.println("The AREA of TRIANGLE is : " +(.5*Sb*Sl));
 }
}
class Circle extends Shape{
 void printArea(){
 System.out.println("Enter the Radius :");
 Sl = S_inp.nextInt();
 System.out.println("The AREA of CIRCLE is : "+(3.143*Sl*Sl));
 }
}
public class MainA {
```

```
 public static void main(String[] args){
 Rectangle R1 = new Rectangle();
 Trinagle T1 = new Trinagle();
 Circle C1 = new Circle();
 R1.printArea();
 T1.printArea();
 C1.printArea();
 }
}
```



//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 Curr-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: • Accept deposit from customer and update the balance. • Display the balance. • Compute and deposit interest • Permit withdrawal and update the balance • Check for the minimum balance, impose penalty if necessary and update the balance

```
class account{
 String name , acc_no ,acc_type;
 double balance;
```

```
 account(String name,String acc_no, String acc_type){
 this.name=name;
 this.acc_no=acc_no;
 this.acc_type=acc_type;
 balance=0;
 }
 void deposit(double amt){
 System.out.println("balance : "+balance);
 balance+=amt;
 System.out.println("updated balance : "+balance);
 }
 void withdraw(double amt){
 System.out.println("balance : "+balance);
 balance-=amt;
 System.out.println("updated balance : "+balance);
 }
}
class curr_acct extends account{
 curr_acct(String name,String acc_no, String acc_type){
 super(name,acc_no,acc_type);
 }
 double service= 100;
 double min_bal=3000;
 int charged=0;
 void check(){
 if(balance<min_bal&& charged==0){
 balance-=service;
 charged=1;
 System.out.println(service+" deducted due to low
balance");
 }
```

```
 if(charged==1)
 {
 System.out.println("your balance is low to avoid
beign fined again increase your balance");
 }
 }
 void disp_bal(){
 check();
 System.out.println("your account balance is
"+balance);
 }
}
class sav_acct extends account{
 sav_acct(String name,String acc_no, String acc_type){
 super(name,acc_no,acc_type);
 }
 int given=0;
 void interest(){
 if (balance>10000 && given==0) {
 balance+=0.007*balance;
 System.out.println("your account has been credited
with 0.7% interest ");
 given+=1;
 }
 if (balance>100000 && given==1) {
 balance+=0.005*balance;
 System.out.println("your account has been credited
with 0.5% interest ");
 given+=1;
 }
 if (balance>1000000 && given==2) {
```

```
 balance+=0.002*balance;
 System.out.println("your account has been credited
with 0.2% interest ");
 given+=1;
 }
 }
 void disp_bal(){
 interest();
 System.out.println("your account balance is
"+balance);
 }
}
class bank{
 public static void main(String[] args) {
 sav_acct sav = new sav_acct("A","1b","savings");
 System.out.println("savings account functions:");
 sav.deposit(11000);
 sav.disp_bal();
 sav.withdraw(5000);
 curr_acct cur = new curr_acct("B","2b","current");
 System.out.println("current account functions:");
 cur.deposit(5000);
 cur.withdraw(2500);
 cur.disp_bal();
 }
}
```

```
}
Enter the customer name

sammy
Enter the Account Number

11
Enter the Account type

current
Enter the money u want to deposit in current account in rupees
100
CUSTOMER  NAME : sammy
ACCOUNT NUMBER : 11
ACCOUNT TYPE : current
After your deposition of 100
Now your total balance is RS-27900
Enter the money you want to withdraw in rupees
900
After your withdrawal of 900
Now your total balance is RS-27000
After checking if u have minimum balance are not your updated total balance is RS-2700(
Enter the customer name

sammy
Enter the Account Number

11
Enter the Account type

savings
Enter the money u want to deposit in Saving account
100
CUSTOMER  NAME : sammy
ACCOUNT NUMBER : 11
ACCOUNT TYPE : savings
After your deposition of 100
Now your total balance is RS-27900
After interest ur updated balance is RS-41566
}
```

```
Enter the money u want to deposit in Saving account
100
CUSTOMER  NAME : sammy
ACCOUNT NUMBER : 11
ACCOUNT TYPE : savings
After your deposition of 100
Now your total balance is RS-27900
After interest ur updated balance is RS-41566
Enter the money you want to withdraw in Saving account
41567
After your withdrawal of RS-41567
Now your total balance is RS--1
After checking if u have minimum balance are not your updated total balance is RS--101
```

//LAB 6

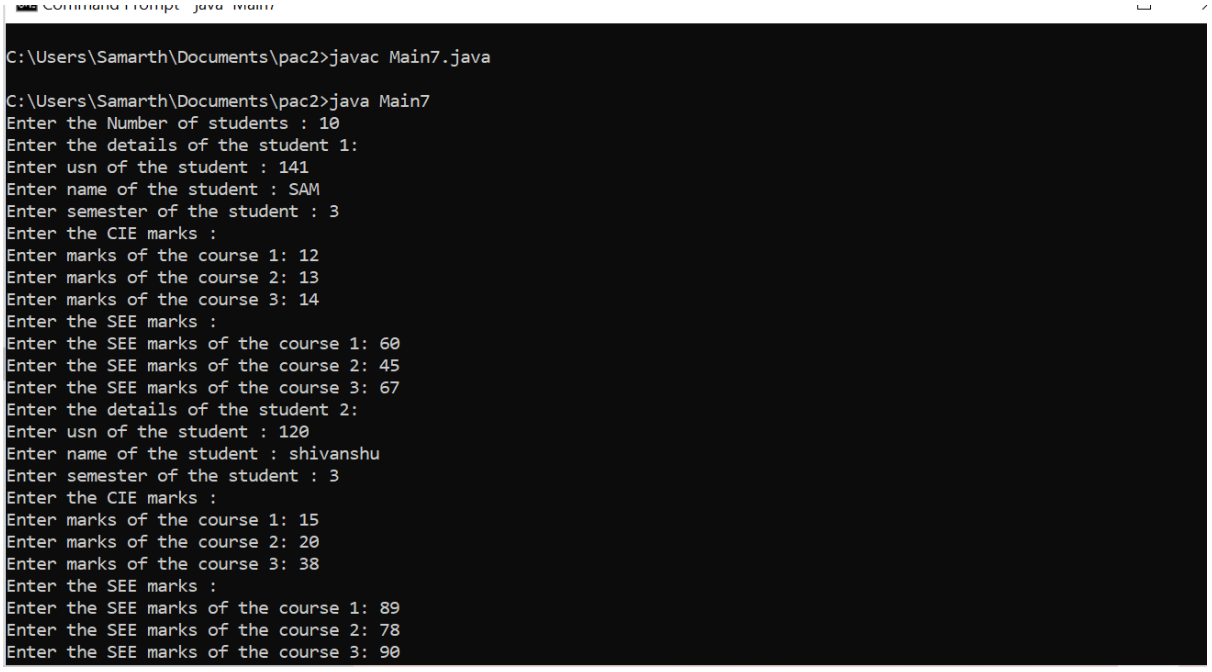
Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class Internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class

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 CIEp;
public class Student{
   public int usn;
   public String name;
   public int sem;
   public Student(int usn,String name,int sem){
      this.usn = usn;
      this.name = name;
      this.sem = sem;
   }
}
package CIEp;
public class Internals extends Student{
   public int[] cieMarks = new int[5];
   public Internals(int usn,String name,int sem,int[] cieMarks){
      super(usn,name,sem);
      this.cieMarks = cieMarks;
   }
}
package SEEp;

import CIEp.*;

public class Externals extends Student{
   public int[] seeMarks = new int[5];
   public Externals(int usn,String name,int sem,int[] seeMarks){
```

```
        super(usn,name,sem);
        this.seeMarks = seeMarks;
    }
}

import CIEp.*;
import SEEp.*;
import java.util.*;
public class Main7{
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        Externals[] e = new Externals[2];
        Internals[] in = new Internals[2];
        for(int i=0;i<2;i++){
            int usn1 = input.nextInt();
            String name1 = input.next();
            int sem1 = input.nextInt();
            int[][] cie = new int[2][5];
            int[][] see = new int[2][5];
            for(int j=0;j<5;j++){
                cie[i][j] = input.nextInt();
            }
            for(int j=0;j<5;j++){
                see[i][j] = input.nextInt();
            }
            e[i] = new Externals(usn1,name1,sem1,see[i]);
            in[i] = new Internals(usn1,name1,sem1,cie[i]);
            int total = 0;
            System.out.println("Name: "+e[i].name);
            System.out.println("USN: "+e[i].usn);
            System.out.println("sem: "+e[i].sem);
```

```
        for(int j=0;j<5;j++){
            total = e[i].seeMarks[j]+in[i].cieMarks[j];
            System.out.print("Final marks: "+total+" ");
        }
        System.out.println();
      }
   }
}
```



//LAB 7

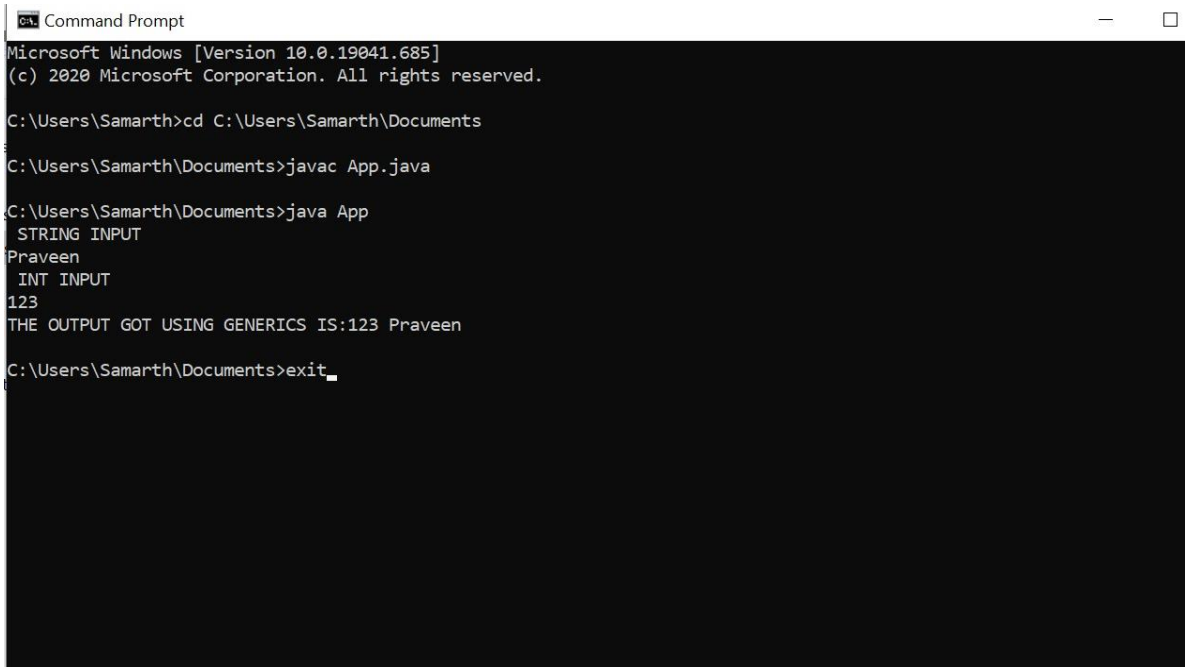
Write a program to demonstrate generics with multiple object parameters.

genrics

```
import java.util.*;

class Genrics<T>{
   T var1;

   void Genirics(T gvar){
      var1 = gvar;
```

```
    }

    T Gdisplay(){
        return var1;
    }
}



public class App {
    public static void main(String[] args) throws Exception {
        System.out.println("Hello, World!");

        Scanner Minp = new Scanner(System.in);

        Genrics<Integer> Rollno= new Genrics<Integer>();
        Genrics<String>  Name = new Genrics<String>();

        System.out.println("Enter Name of Student");
        String Sname = Minp.nextLine();
        Name.Genirics(Sname);

        System.out.println("Enter USN of Student");
        int Sno = Minp.nextInt();
        Rollno.Genirics(Sno);

        System.out.println("The student details are :");
        System.out.println("Name : "+ Name.Gdisplay());
        System.out.println("USN  : "+ Rollno.Gdisplay());

        Minp.close();
    }
```

}



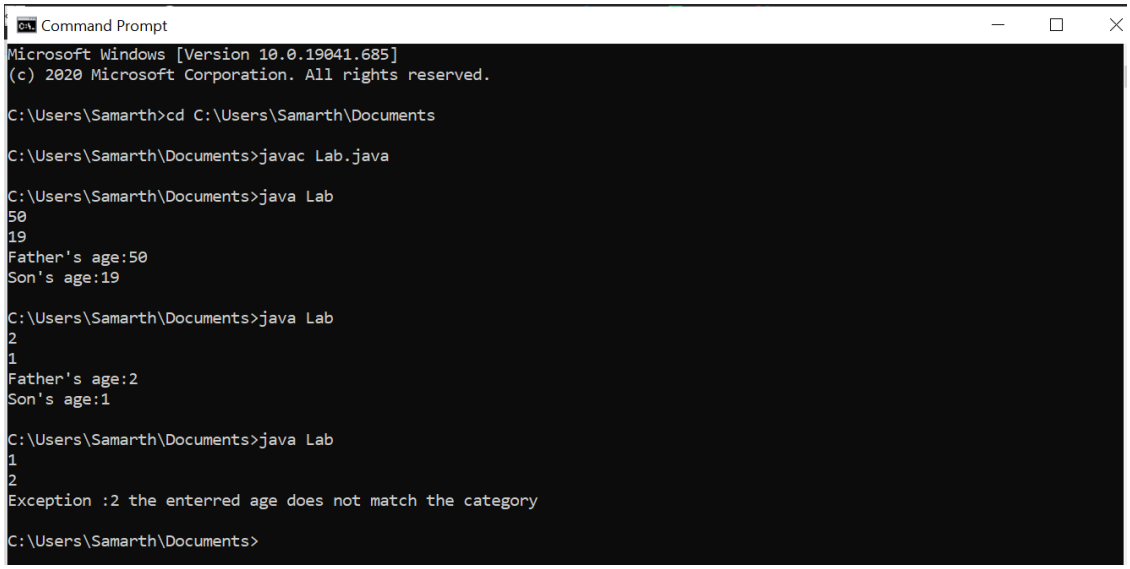
//LAB 8

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.*;

class ageException extends Exception{
   int detail;
   ageException(int a){
      detail = a;
   }
   public String toString(){
      return "Exception :"+detail+" the enterred age does not match the category";
```

```
    }
}
class Father{
    int age;
    Father(int age) throws ageException{
        this.age = age;
        if(this.age<=0){
            throw new ageException(this.age);
        }
    }
    void display(){
        System.out.println("Father's age:"+this.age);
    }
}

class Son extends Father{
    Father f;
    Son(int age,Father f) throws ageException{
        super(age);
        this.f = f;
        if(this.age>=this.f.age){
            //System.out.println(f.age);
            throw new ageException(this.age);
        }
    }
    void display(){
        this.f.display();
        System.out.println("Son's age:"+this.age);
    }
}
```

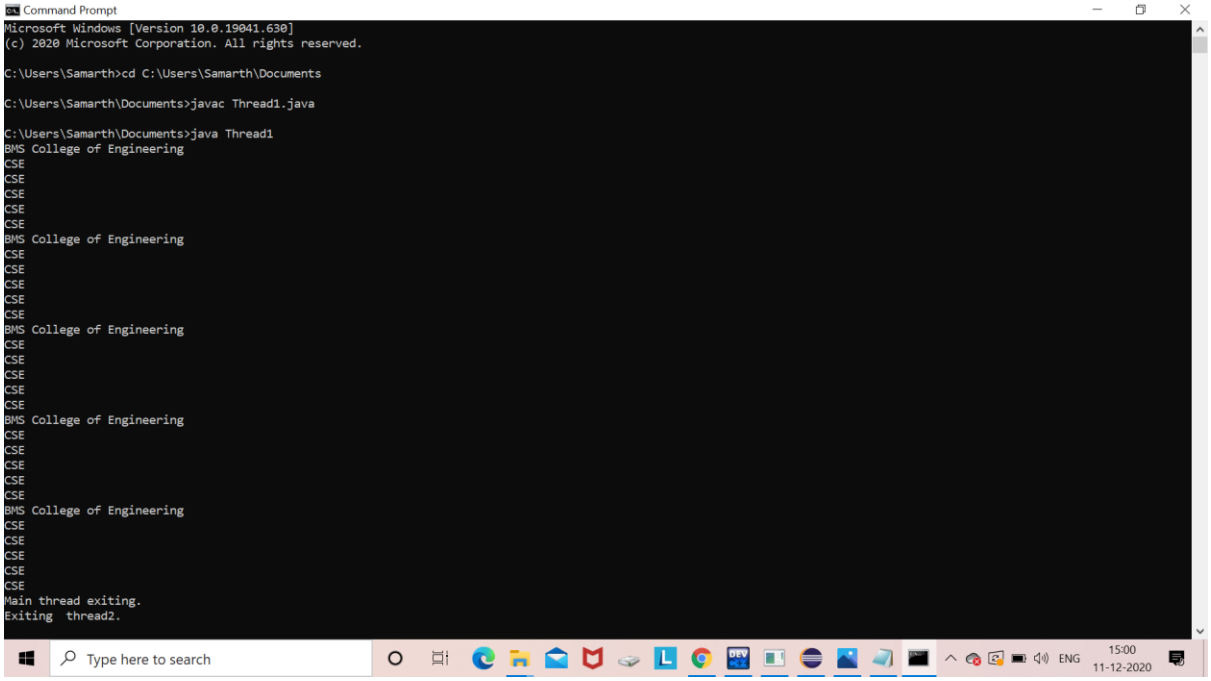
```
public class Lab{
   public static void main(String[] args){
      try{
         Scanner input = new Scanner(System.in);
         Father f = new Father(input.nextInt());
         Son s = new Son(input.nextInt(),f);
         s.display();
      }catch(Exception e){
         System.out.println(e);
      }
   }
```



// LAB 9

```
class NewThread implements Runnable {
Thread t;
NewThread() {
t = new Thread(this, "Demo Thread");
t.start();
}
public void run() {
try {
```

```
for(int i = 25; i > 0; i--) {
System.out.println("CSE");
Thread.sleep(2000);
}
} catch (InterruptedException e) {
System.out.println("thread2 interrupted.");
}
System.out.println("Exiting  thread2.");
}
}
class Thread1 {
public static void main(String args[]) {
new NewThread();
try {
for(int i = 5; i > 0; i--) {
System.out.println("BMS College of Engineering");
Thread.sleep(10000);
}  } catch (InterruptedException e) {
System.out.println("Main thread interrupted.");
}
System.out.println("Main thread exiting.");
}   }
```



//LAB10

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 java.awt.BorderLayout;

import java.awt.Button;

import java.awt.Color;

import java.awt.Dialog;

import java.awt.FlowLayout;

import java.awt.Frame;

import java.awt.Graphics;

import java.awt.Insets;

import java.awt.Label;

import java.awt.TextField;

import java.awt.event.ActionEvent;

import java.awt.event.ActionListener;

import java.awt.event.TextEvent;

import java.awt.event.TextListener;

import java.awt.event.WindowAdapter;
```

```
import java.awt.event.WindowEvent;


public class Lab10 extends Frame implements ActionListener{
	TextField t1,t2;
	String msg="";
	Button btn;
	Lab10(){
		Label l1 = new Label("First Number: ",Label.RIGHT);
		t1 = new TextField(10);
		Label l2 = new Label("Second Number: ",Label.RIGHT);


		t2 = new TextField(10);
		btn = new Button("Submit");
		//Label l = new Label("Updates:");
		l1.setBackground(Color.YELLOW);
		l2.setBackground(Color.YELLOW);
		//this.setResizable(false);
		this.add(l1);
		this.add(t1);
		this.add(l2);
		this.add(t2);
		//the following command will make sure that the input char is not visible to the user
		//(it has been added just to demonstrate). Can be used for passwords.
		//t1.setEchoChar('*');
		//t2.setEchoChar('#');
		this.add(btn,BorderLayout.CENTER);
		this.setVisible(true);
		this.setSize(600, 300);
		this.setLayout(new FlowLayout(FlowLayout.CENTER,20,10));
		//t1.addActionListener(this);
		btn.addActionListener(this);
```

```
        addWindowListener(new MyWindow());
        setBackground(Color.YELLOW);
        //System.out.println(BorderLayout.CENTER);
}
@Override
public Insets getInsets() {
        return new Insets(50,10,10,20);

}

@Override
public void actionPerformed(ActionEvent e) {

        String st1 = t1.getText();
        String st2 = t2.getText();
        double n1,n2;
        n1 = 0.0;
        n2 = 0.0;
        if(st1.equals("")||st2.equals("")) {

                msg="You cannot leave the text elements blank";
        }else{
                try {
                        n1 = Double.parseDouble(st1);
                        n2 = Double.parseDouble(st2);
                        try {
                                double res = n1/n2;
                                msg = "Result of division: "+res;
                        }catch(ArithmeticException e1) {
                                msg = e1.toString();
                        }
```

```
                }catch(NumberFormatException e2) {
                        msg = "Enter only numbers and not other things";
                }
        }
        new MyDialog(this,"Result Dialog",false,msg,n1,n2);
    }
    public static void main(String[] args) {
        new Lab10();
    }
}

class MyDialog extends Dialog implements ActionListener{

    public MyDialog(Frame owner, String title, boolean modal,String msg, double n1, double n2)
{
        super(owner, title, modal);
        this.setVisible(true);
        this.setSize(300, 400);
        this.setLayout(new FlowLayout());
        //System.out.println(owner);
        Label l1 = new Label("      Updates on the result:      ");
        //l1.setSize(300, 20);
        this.add(l1);
        this.add(new Label("First Number: "+n1));
        this.add(new Label("Second Number: "+n2));
        this.add(new Label(msg));

        Button b = new Button("Close");
        this.add(b);
        b.addActionListener(this);
        this.addWindowListener(new WindowAdapter() {
```

```
                public void windowClosing(WindowEvent e) {
                        dispose();
                }
        });
    }

    @Override
    public void actionPerformed(ActionEvent e) {
        dispose();

    }


}

class MyWindow extends WindowAdapter{
    public void windowClosing(WindowEvent e) {
        System.exit(0);
    }
}
```