

Program 1

Question: Write a Java program that creates a class named 'Employee' having the following members: Name, Age, Phone number, Address, and Salary. It also has a method named 'printSalary()' which prints the salary of the Employee. Two classes 'Officer' and 'Manager' inherit the 'Employee' class. The 'Officer' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address, and salary to an officer and a manager by making an object of both of these classes and print the same.

Program Code:

```
// Employee.java (or part of the main file)

class Employee
{
    String
    name; int
    age;
    String phoneNo;
    String address;
    double salary;

    void printSalary()
    {
        System.out.println("Salary:" + salary);
    }
}

class Officer extends Employee
{
    String
    specialization;
    String department;
}
```

```
class Manager extends Employee
```

```
{
```

```
    String department;
```

```
    String
```

```
    specialization;
```

```
}//
```

```
class emplyeemain
```

```
{
```

```
    public static void main(String[] args)
```

```
    {
```

```
        Officer officer = new Officer(); //
```

```
        officer.name="John Doe"; //
```

```
        officer.age=30; //
```

```
        officer.phoneNo="9876543210"; //
```

```
        officer.address="Street MAin"; //
```

```
        officer.salary=50000.0; //
```

```
        officer.specialization="Engineering";
```

```
        // officer.department="Staff"; //
```

```
        System.out.println("Officer Details:");//
```

```
        System.out.println("Name:" + officer.name); //
```

```
        System.out.println("Age:" + officer.age); //
```

```
        System.out.println("Phone No:" + officer.phoneNo); //
```

```
        System.out.println("Address:" + officer.address); //
```

```
        officer.printSalary(); //
```

```
        System.out.println("Specialization" + officer.specialization); //
```

```
        System.out.println("Department:" + officer.department); //
```

```

Manager manager = new Manager(); //
manager.name = "Jame Smith"; //
manager.age = 40; //
manager.phoneNo = "7906543210";
// manager.address = "Street 1 2 3 ";
// manager.salary = 70000.0; //
manager.department = "HR"; //
manager.specialization = "Developer"; //

System.out.println("\n Manager Details:"); //
System.out.println("Name:" + manager.name); //
System.out.println("Age:" + manager.age); //
System.out.println("Phone No:" + manager.phoneNo); //
System.out.println("Address:" + manager.address); //
manager.printSalary(); //
System.out.println("Specialization" + manager.specialization); //
System.out.println("Department:" + manager.department); //
}
}

```

Program 2

Question: Create a package named **Shapes** and define abstract class **Shape** inside it. The Shape class should have an abstract method **getArea()**. Define two subclasses **Rectangle** and **Circle** that extend the Shape class and implement the **getArea()** method. Create a class **FindArea** in a different package and use the Rectangle and Circle classes to find the areas of a rectangle and a circle.

Program Code:

Part 1: Abstract Class Shape (Save as Shape.java)

Package Shapes;

Public abstract class Shape

{

```
Public abstract void area();  
  
}
```

Part 2: Class Rectangle (Save as Rectangle.java)

```
Package Shapes;
```

```
Public class Rectangle extends Shape  
{  
    double l, b;  
    Public Rectangle( double a, double c)  
    {  
        l = a;  
        b = c;  
    }  
    Public void area()  
    {  
        double a = l * b;  
        System.out.prantl("rectangle area = " + a)  
    }  
}
```

Part 3: Class circle (Save as circle.java)

```
Package Shapes;
```

```
Public class circle extends Shape  
{  
    double r;
```

```
Public circle (double a)
```

```
{
```

```
    r = a;
```

```
}
```

```
Public void area()
```

```
{
```

```
    double a = 3.14 * r * r;
```

```
    System.out.println("circle area = " + a);
```

```
}
```

```
}
```

Main Execution Class (Untitled, Implied Save Location)

```
import shapes.*;
```

```
Class Findarea
```

```
{
```

```
    Public static void main(String arg)
```

```
{
```

```
    Shape S;
```

```
    Rectangle r = new Rectangle(10, 20);
```

```
    circle c = new circle(10);
```

```
    S = r;
```

```
    S.area();
```

```
    S = c;
```

```
S.area();
```

```
}
```

```
}
```

Program 3

Question: Create a class called 'student' which contain the class 'studinfo' (datamembers: int regno, String name, int mark[]=new mark, int total). Functions for this class are getdata() and display(). Inherit this class to another class 'studmark' and compute total mark of the student and display the student details.

Program Code:

```
import java.io.*;

import java.util.Scanner;

class student
{
    // Note: The question specified an inner class 'studinfo', but the code
    // implements all variables directly within the 'student'

    class int regno;

    String name;

    int m[]=new int; //
    int total=0; //

    void getdata()
    {
        Scanner s = new Scanner(System.in); //
        System.out.println("enter register no:"); //
        regno=s.nextInt(); //
        System.out.println("enter name:"); //
        name=s.next(); //
        System.out.println("enter 3 subject
marks:"); // for(int i=0;i<3;i++)
        {
            m[i]=s.nextInt(); //
        }
    }
}
```

```

    }

    void display()
    {
        System.out.println("Student details"); //
        System.out.println("register no:"+regno); //
        System.out.println("name:"+name); //
        System.out.println("marks:"); //
        for(int i=0;i<3;i++)
        {
            System.out.println(m[i]); //
        }
        System.out.println("total mark:"+total); //
    }
}

```

```

class studmark extends student //
{
    void totalmark() //
    {
        for(int i=0;i<3;i++) //
        {
            total+=m[i]; //
        }
    }
}

```

```

class student7 // Main class

```

```

{
    public static void main(String args[])
    {
        studmark n=new studmark();//
        n.getdata();//
        n.totalmark();//
        n.display();//
    }
}

```

Program 4

Question: Write a package to perform the mathematical operations - Addition, Subtraction, Multiplication, Division, and Modulus. Write a menu-driven program for all these operations and import the package for the above-said operation.

Program Code:

```
// mathoperation.java (inside mypack package)
```

```
package mypack; //
```

```
import java.io.*; //
```

```
public class mathoperation //
```

```
{
```

```
    int x,y; //
```

```
    public mathoperation(int a, int b) //
```

```
{
```

```
    x=a; //
```

```
    y=b; //
```

```
}
```

```
    public void addition() //
```

```
{  
    int sum=x+y; //  
    System.out.println("sum=" + sum); //  
}
```

```
public void subtraction() //  
{  
    int sub=x-y; //  
    System.out.println("subtraction=" + sub); //  
}
```

```
public void multiplication() //  
{  
    int multi=x*y; //  
    System.out.println("multiplication=" + multi);  
    //  
}
```

```
public void division() //  
{  
    int div=x/y; //  
    System.out.println("division=" + div); //  
}
```

```
public void modulus() //  
{  
    int mod=x%y; //  
    System.out.println("modulus=" + mod); //  
}
```

```
}
```

```
// mathmain.java
```

```
import mypack.*; //
```

```
import java.io.*; //
```

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

```
class math // Main class
```

```
{
```

```
    public static void main(String a[])
```

```
    {
```

```
        int num1,num2,ch; //
```

```
        String c; //
```

```
        Scanner s=new Scanner(System.in); //
```

```
        System.out.println("enter 2 number");
```

```
        // num1=s.nextInt(); //
```

```
        num2=s.nextInt(); //
```

```
        mathoperation mp=new mathoperation(num1,num2); //
```

```
        do
```

```
        {
```

```
        System.out.println("1=Addition/n2=Substraction/n3=multiplication/n4=division/n  
5=modulus/n enter your choice"); //
```

```
            ch=s.nextInt(); //
```

```
            switch(ch) //
```

```
            {
```

```

        case 1: mp.addition(); break; //
        case 2: mp.substraction(); break; //
        case 3: mp.multiplication(); break; //
        case 4: mp.division(); break; //
        case 5: mp.modulus(); break; //
        default: System.out.println("Invalid"); break; //
    }

    System.out.println("do you want to continue:press Y/y");//
    c=s.next(); //
} while(c.equals("Y") || c.equals("y")); //
}
}

```

Program 5

Question: Create an abstract class called Figure which contains three data members: length, breadth, and height. Include an abstract method to find the area. Figure class also contains concrete methods to read the data members and to display them. Derive two classes Rectangle and Triangle from Figure and override area() to find the area of a rectangle and triangle.

Program Code:

```

import java.io.*; //
import java.util.Scanner; //

abstract class Figure //
{
    double l,b,h; //

    Figure(double x,double y,double z) //

```

```

{
    l=x; //
    b=y; //
    h=z; //
}

abstract double area(); //
abstract void displayData(); //
}

class Rectangle extends Figure //
{
    Rectangle(double x,double y,double z) //
    {
        super(x,y,z); //
    }

    void displayData() //
    {
        System.out.println("Length=" + l); //
        System.out.println("Breadth=" + b); //
    }

    double area() //
    {
        double a=l*b; //
        return a; //
    }
}

```

```
}
```

```
class Triangle extends Figure //
```

```
{
```

```
    Triangle(double x,double y,double z) //
```

```
    {
```

```
        super(x,y,z); //
```

```
    }
```

```
    void displayData() //
```

```
    {
```

```
        System.out.println("Length=" + l);
```

```
        // System.out.println("Height=" +
```

```
        h); //
```

```
    }
```

```
    double area() //
```

```
    {
```

```
        double a=(l*h)/2; //
```

```
        return a; //
```

```
    }
```

```
}
```

```
class areamain // Main class
```

```
{
```

```
    public static void main(String args[])
```

```
    {
```

```
        double l,b,h; //
```

```
        Scanner s = new Scanner(System.in); //
```

```

System.out.println("Enter length:"); //
l=s.nextDouble(); //
System.out.println("Enter Breadth"); //
b=s.nextDouble(); //
System.out.println("Enter Height"); //
h=s.nextDouble(); //

Figure c; //
Rectangle r=new Rectangle(l,b,h); //
c=r; //
c.displayData(); //
double m=c.area(); //
System.out.println("Area of rectangle=" + m); //

Triangle t=new Triangle(l,b,h); //
c=t; //
c.displayData(); //
double n=c.area(); //
System.out.println("Area of triangle=" + n); //
}
}

```

Program 6

Question: Write a multithreaded program to print odd numbers and even numbers from two different threads with suitable delay.

Program Code:

```
import java.io.*; //
```

```

// class for printing even numbers (Thread 1)
class sample extends Thread //
{
    int i; //

    sample() //
    {
        super("demo");
        // start(); //
    }

    public void run() //
    {
        try
        {
            for(i=2;i<=20;i+=2) //
            {
                System.out.println("even:" + i); //
                Thread.sleep(500); //
            }
        }
        catch(InterruptedException e) {} //
    }
}

// class for printing odd numbers (Thread 2 - implicitly Main
thread) class samplemain //
{

```

```

public static void main(String m[])
{
    int i; //
    sample s = new sample(); // Starts Thread 1

    try
    {
        for(i=1;i<=20;i+=2) //
        {
            System.out.println("odd:" + i); //
            Thread.sleep(1000); //
        }
    }
    catch(InterruptedException e) {} //
}
}

```

Program 7

Question: Create an interface Department containing attributes deptName and deptHead. It has a method showData() for printing the attributes. Create a class Hostel containing hostelname, hostellocation and noofrooms and also have methods readData() for reading the details. Then write another class named Student extending the Hostel class and implementing the Department interface. This class which contains the attributes studname, regno, mark of three subjects. Use getData() and caluculate() for reading and computing the total and percentage mark of the students.

Program Code:

```

import java.util.Scanner; //

```

```

interface Department //

```

```

{

```

```
    final String deptName = "computer science";  
    // final String deptHead = "jintu"; //  
    void showData(); //  
}
```

```
class Hostel //  
{  
    String hostelname; //  
    String hostelloc; //  
    int numofrooms; //  
  
    void readData() //  
    {  
        Scanner s = new Scanner(System.in); //  
        System.out.println("Enter hostel name:"); //  
        hostelname = s.nextLine(); //  
        System.out.println("Enter hostel location:"); //  
        hostelloc = s.nextLine(); //  
        System.out.println("Enter number of rooms:"); //  
        // numofrooms = s.nextInt(); //  
    }  
}
```

```
class Student extends Hostel implements Department //  
{  
    String studName;  
    // String regno; //  
    int m1, m2, m3; //
```

```

void getData() //
{
    Scanner s = new Scanner(System.in); //
    System.out.println("Enter student name:");
    // studName = s.nextLine(); //
    System.out.println("Enter registration
no:"); // regno = s.nextLine(); //
    System.out.println("Enter marks of 1st
sub"); // m1 = s.nextInt(); //
    System.out.println("Enter marks of 2nd sub"); //
    m2 = s.nextInt(); //
    System.out.println("Enter marks of 3rd
sub"); // m3 = s.nextInt(); //
}

```

```

void calculate() //
{
    int total = m1 + m2 + m3; //
    double perc = total / 3.0; //
    System.out.println("Total Marks:" + total); //
    System.out.println("Percentage:" + perc + "%"); //
}

```

```

public void showData() // Implementation of Department interface method
{

```

// Note: The code snippet defines a new Scanner here, though it's not strictly needed for printing.

```

// Scanner s = new Scanner(System.in);
System.out.println("student name:" + studName); //
System.out.println("registration no:" + regno); //
System.out.println("Hostel Name" + hostelname); //
System.out.println("Hostel location" + hostellocc); //
System.out.println("No of Rooms" + numofrooms); //
System.out.println("department name:" + deptName); //
System.out.println("department head:" + deptHead); //
}
}

```

```

class studmain // Main class
{
    public static void main(String[] args)
    {
        Student student = new Student(); //
        student.readData(); // Reads Hostel
        details student.getData(); // Reads
        Student details student.calculate(); //
        student.showData(); // Prints all details
    }
}

```

Program 8

Question: Write a Java program to read n numbers and raise an exception called NegativeException when you input a negative number.

Program Code:

```

import java.io.*; //

```

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

class samples //
{
    public static void main(String m[]) //
    {
        int i,n,num; //

        Scanner s = new Scanner(System.in); //

        System.out.println("enter the limit");//
        n=s.nextInt(); //

        try //
        {
            System.out.println("enter the number");//
            for(i=1;i<=n;i++) //
            {
                num=s.nextInt(); //

                if(num<0) //
                {
                    throw new Exception("demo");//
                }
            }
        }
        catch(Exception e) //
        {
            System.out.println("Negative Exception occurred");//
        }
    }
}
```

```
    }  
    }  
}
```

/* Note: The handwritten code in sources is very similar but uses `throw new Exception("demo")` instead of a custom `NegativeException` class, and prints "Negative Exception occured". The typed code in also uses a generic `Exception` and prints "Negative Exception occured". ***/**

Program G

Question: Write an applet program to display National flag.

Program Code:

```
import java.applet.*; //  
import java.awt.*; //
```

```
/*
```

```
<applet code="Flag.class" width="400" height="300">
```

```
</applet>
```

```
*/
```

```
public class Flag extends Applet //
```

```
{
```

```
    public void paint(Graphics g) //
```

```
    {
```

```
        // Pole (Black)
```

```
        g.setColor(Color.black); //
```

```
        g.fillRect(70, 50, 10, 200); //
```

```
        // Saffron/Orange band (Color 255, 153, 51)
```

```

g.setColor(new Color(255, 153, 51)); //
g.fillRect(80, 50, 200, 40); //

// White band
g.setColor(Color.white); //
g.fillRect(80, 90, 200, 40); //

// Green band (Color 19, 136, 8)
g.setColor(new Color(19, 136, 8)); //
g.fillRect(80, 130, 200, 40); //

// Ashoka Chakra (Blue)
g.setColor(Color.blue); //
g.drawOval(165, 95, 30, 30);
//

// Chakra Spokes
g.drawLine(180, 110, 180, 95);
//
g.drawLine(180, 110, 180, 125); //
g.drawLine(180, 110, 165, 110); //
g.drawLine(180, 110, 195, 110); //
g.drawLine(180, 110, 170, 100); //
g.drawLine(180, 110, 190, 100); //
g.drawLine(180, 110, 170, 120); //
g.drawLine(180, 110, 190, 120); //
}
}

```

Question: Write an applet program to load an image and display it.

Program Code:

```
import java.applet.*; //
import java.awt.*; //

/*
<applet code="ImageDisplay.class" width="500" height="400">
</applet>
*/

public class ImageDisplay extends Applet //
{
    Image picture; //

    public void init() //
    {
        picture = getImage(getDocumentBase(), "photo.jpg"); //
    }

    public void paint(Graphics g) //
    {
        g.drawImage(picture, 100, 100, this); //
    }
}
```

Program 11

Question: Write an applet program to display a traffic light.

Program Code:

```

import java.awt.*; //
import java.applet.*; //

/*
<applet code="TrafficLight.class" width=300 height=400>
</applet>
*/

public class TrafficLight extends Applet //
{
    public void paint(Graphics g) //
    {
        // Main structure and supports
        g.setColor(Color.black); //
        g.fillRect(150,50,100,260); // Main traffic light
        box
        g.drawRect(151,51,98,258); // Drawing outline/inner box

        // Red Light
        g.setColor(Color.red); //
        g.fillOval(170,70,60,60); //

        // Yellow Light
        g.setColor(Color.yellow);
        //
        g.fillOval(170,150,60,60);
        //

        // Green Light
        g.setColor(Color.green); //

```

```
g.fillOval(170,230,60,60);
```

```
//
```

```

// Support Post and Base (Black)
g.setColor(Color.black); //

// This fillRect seems to be the pole (195, 310, 10, 100)
g.fillRect(150,400,100,20); // This fillRect seems to be the
base

// Text
g.drawString("TRAFFIC LIGHT", 160, 440); //
}
}

```

Program 12

Question: Write an applet program to draw a human face.

Program Code:

```

import java.awt.*; //
import java.applet.*; //

/*
<applet code="humanface.class" width="400" height="400">
</applet>
*/

public class humanface extends Applet //
{
    public void paint(Graphics g) //
    {
        // Face (Orange)
        g.setColor(Color.orange); //

```

```
g.fillOval(100, 50, 200, 200); //

// Eyes (White)
g.setColor(Color.white); //
g.fillOval(150, 100, 30, 20); // Left Eye white
g.fillOval(220, 100, 30, 20); // Right Eye white

// Pupils (Black)
g.setColor(Color.black); //
g.fillOval(160, 108, 10, 10); // Left
Pupil
g.fillOval(230, 108, 10, 10); // Right Pupil

// Eyebrows (Black, drawn as lines)
g.drawLine(200, 120, 190, 160); //
g.drawLine(190, 160, 210, 160); //

// Mouth (Red Arc/Smile)
g.setColor(Color.red); //
g.drawArc(160, 160, 80, 40, 0, -180);
//

// Ears (Orange)
g.setColor(Color.orange); //
g.fillOval(85, 110, 25, 40); // Left Ear
g.fillOval(290, 110, 25, 40); // Right Ear

// Hair (Black, drawn as lines)
g.setColor(Color.black); //
g.drawLine(120, 70, 150, 40); //
```

```
        g.drawLine(150, 40, 180, 50); //
        g.drawLine(180, 50, 210, 40); //
        g.drawLine(210, 40, 240, 50); //
        g.drawLine(240, 50, 270, 40); //
    }
}
```

Program 13

Question: Write a Java program that implements educational hierarchy using inheritance. (Implied implementation: Abstract office class derived by teach and nonteach classes).

Program Code:

```
import java.io.*; //
import java.util.Scanner; //

abstract class office //
{
    int empno; //
    String empname; //
    double sal; //

    office(int a, String b, double c) // constructor
    {
        empno=a; //
        empname=b; //
        sal=c; //
    }

    abstract void display(); //
```

```
}
```

```
class teach extends office //
```

```
{
```

```
    String design; //
```

```
    teach(int a, String b, double c, String d) // constructor
```

```
{
```

```
    super(a,b,c); //
```

```
    design=d; //
```

```
}
```

```
void display() //
```

```
{
```

```
    System.out.println("teaching staff details..."); //
```

```
    System.out.println("employee no" + empno); //
```

```
    System.out.println("employee name" + empname); //
```

```
    System.out.println("salary" + sal); //
```

```
    System.out.println("designation" + design); //
```

```
}
```

```
}
```

```
class nonteach extends office //
```

```
{
```

```
    String des; //
```

```
    nonteach(int a, String b, double c, String e) // constructor
```

```
{
```

```

        super(a,b,c); //
        des=e; //
    }

    void display() //
    {
        System.out.println("non teaching staff
        details..."); // System.out.println("employee no"
        + empno); // System.out.println("employee name"
        + empname); // System.out.println("salary" +
        sal); // System.out.println("designation" + des); //
    }
}

class samplee // Main class
{
    public static void main(String m[])
    {
        teach obj1=new teach(101,"anu",50000,"professor"); //
        nonteach obj2=new nonteach(203,"aparna",30000,"clerk");
        // office ref; //

        ref=obj1; //
        ref.display(); //
        ref=obj2; //
        ref.display(); //
    }
}

```

Program 14

Question: Write a Java program that implements a multi-thread application that has three threads. The first thread generates a multiplication table of 3. The second thread generates the multiplication table of 7. The third thread gives the multiplication table of

9. Display the output interchangeably with proper delay.

Program Code:

```
import java.io.*; //

class Table3 extends Thread // Thread 1
{
    Table3()
    {
        super("demo");
        // start(); //
    }

    public void run() //
    {
        try
        {
            int i; //
            for(i=1;i<=10;i++) //
            {
                System.out.println("3x" + i + "=" + (3*i)); //
                Thread.sleep(500); //
            }
        }
        catch(InterruptedException e) {} //
```

```
}  
}
```

```
class Table7 extends Thread // Thread 2
```

```
{
```

```
    Table7()
```

```
    {
```

```
        super("demo");
```

```
        // start(); //
```

```
    }
```

```
    public void run()
```

```
    {
```

```
        inti; //
```

```
        try
```

```
        {
```

```
            for(i=1;i<=10;i++)
```

```
            {
```

```
                System.out.println("7x" + i + "=" + (7*i)); //
```

```
                Thread.sleep(800); //
```

```
            }
```

```
        }
```

```
        catch(InterruptedException e) {}
```

```
    }
```

```
}
```

```
class Table9 extends Thread // Thread 3
```

```
{
```

```

Table9()
{
    super("demo");
    // start(); //
}

public void run()
{
    inti; //
    try
    {
        for(i=1;i<=10;i++) //
        {
            System.out.println("9x" + i + "=" + (9*i)); //
            Thread.sleep(1000); //
        }
    }
    catch(InterruptedException e) {}
}

class sample7 // Main Class
{
    public static void main(String s[])
    {
        Table3 t1 = new Table3(); //
        Table7 t2 = new Table7(); //
        Table9 t3 = new Table9();
        //
    }
}

```

```
}  
}
```

Program 15

Question: Create a class called **Matrix** which contains a 2d integer array, **m C n** (order of matrix) as data members. Include the following member functions: a. To read the matrix, b. To display the matrix, c. Method **product ()** to find the product of two matrices, d. Method **sum ()** to find the sum of two matrices, e. Method **transpose ()** to find the transpose of two matrices.

Program Code:

```
import java.io.*; //  
import java.util.Scanner; //  
  
class matrix //  
{  
    int a[][]=new int; // Matrix 1  
    int b[][]=new int; // Matrix 2  
    int c[][]=new int; // Result Matrix  
    int m,n,l,k,j; // Dimensions and loop variables  
  
    void getmn() // To read the matrix  
    {  
        Scanner s=new Scanner(System.in); //  
        System.out.println("Enter the order of the matrix's :"); //  
        m=s.nextInt(); //  
        n=s.nextInt(); //  
  
        System.out.println("Enter the matrix 1 value"); //  
        for(int i=0;i<m;i++) //
```

```
{  
    for(j=0;j<n;j++) //  
    {  
        a[i][j]=s.nextInt(); //  
    }  
}
```

```
System.out.println("Enter the matrix 2 value"); //  
for(int i=0;i<m;i++) //  
{  
    for(j=0;j<n;j++) //  
    {  
        b[i][j]=s.nextInt(); //  
    }  
}  
}
```

```
void sum() // To find the sum of two matrices  
{  
    for(int i=0;i<m;i++)  
    {  
        for(j=0;j<n;j++)  
        {  
            c[i][j]=a[i][j] + b[i][j]; //  
        }  
    }  
}
```

```
void sub() // To find the subtraction of two matrices
```

```
{  
    for(int i=0;i<m;i++)  
    {  
        for(j=0;j<n;j++)  
        {  
            c[i][j]=a[i][j] - b[i][j]; //  
        }  
    }  
}
```

```
void multi() // To find the product of two matrices
```

```
{  
    for(int i=0;i<m;i++)  
    {  
        for(j=0;j<n;j++)  
        {  
            c[i][j]=0; // Initialization for multiplication  
            for(k=0;k<n;k++)  
            {  
                c[i][j]=a[i][k] * b[k][j]; //  
            }  
        }  
    }  
}
```

```
void transone() // Transpose of Matrix 1 (a) - stores in c
```

```
{
```

```

for(int i=0;i<m;i++)
{
    for(j=0;j<n;j++)
    {
        c[i][j]=a[j][i]; //
    }
}
}

```

void transtwo() // Transpose of Matrix 2 (b) - stores in c

```

{
    for(int i=0;i<m;i++)
    {
        for(j=0;j<n;j++)
        {
            c[i][j]=b[j][i]; //
        }
    }
}

```

void displaymatrix() // To display the matrix

```

{
    System.out.println("The result of you selected operation are :"); //
    for(int i=0;i<m;i++) //
    {
        for(j=0;j<n;j++) //
        {

```

```

        System.out.print(c[i][j]); //
        System.out.print(" "); //
    }
    System.out.println(""); //
}
}
}

```

```

class matrixmain // Main class
{
    public static void main(String args[])
    {
        int c; //
        String ch; //
        Scanner p=new Scanner(System.in);
        // matrix s=new matrix(); //
        s.getmn(); //

        do
        {
            System.out.println("press
1.Addition\n2.Subtraction\n3.Multiplication\n4.Transpose"); //
            c=p.nextInt(); //

            switch(c)
            {
                case 1: s.sum(); s.displaymatrix(); break;
                // case 2: s.sub(); s.displaymatrix();
                break; //
            }
        }
    }
}

```

```

        case 3: s.multi(); s.displaymatrix(); break;
        // case 4: s.transone();
        s.displaymatrix();
            s.transtwo(); s.displaymatrix(); break; //
        default: System.out.println("Invalid value"); break; //
    }

    System.out.println("do you want to continue...press y/Y to continue");//
    ch=p.next();//

    } while(ch.equals("y") || ch.equals("Y"));//
    }
}

```

Program 16

Question: Write a program using Swing to accept values in two textboxes and display the results of mathematical operations in the third text box. Use four buttons add, subtract, multiply, and divide.

Program Code:

```

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

class mathsoop extends JFrame implements ActionListener //
{
    Container con; //
    JTextField t1,t2,t3; //
    JButton b1,b2,b3,b4; //
    JLabel l1,l2,l3; //

```

```

mathsop()
{
    super("demo"); //
    con=getContentPane(); //
    con.setLayout(new FlowLayout());
    //

    l1 = new JLabel("FIRST NUMBER"); //
    l2 = new JLabel("SECOND
NUMBER"); // l3 = new
JLabel("RESULT"); //

    t1 = new JTextField(20); //
    t2 = new JTextField(20); //
    t3 = new JTextField(20); //

    b1 = new JButton("ADD"); //
    b2 = new
JButton("SUBTRACT"); // b3 =
new JButton("MULTIPLY"); // b4
= new JButton("DIVIDE"); //

    con.add(l1); con.add(t1); //
    con.add(l2); con.add(t2); //
    con.add(b1); con.add(b2); con.add(b3); con.add(b4); //
    con.add(l3); con.add(t3); //

    b1.addActionListener(this);
    //
    b2.addActionListener(this);

```

```
//  
b3.addActionListener(this);  
//  
b4.addActionListener(this);  
//
```

```
addWindowListener(new WindowAdapter() //
{
    public void windowClosing(WindowEvent e) //
    {
        System.exit(0); //
    }
});
}
```

```
public void actionPerformed(ActionEvent e) //
{
    int a,b,r; //
    a = Integer.parseInt(t1.getText()); //
    b = Integer.parseInt(t2.getText()); //

    if(e.getSource() == b1) // ADD
    {
        r = a + b; //
        t3.setText(String.valueOf(r)); //
    }
    else if(e.getSource() == b2) // SUBSTRACT
    {
        r = a - b; //
        t3.setText(String.valueOf(r)); //
    }
    else if(e.getSource() == b3) // MULTIPLY
    {
```

```

        r = a * b; //
        t3.setText(String.valueOf(r)); //
    }
    else if(e.getSource() == b4) // DIVIDE
    {
        r = a / b; //
        t3.setText(String.valueOf(r)); //
    }
}
}

```

```

class mathsopmain // Main class
{
    public static void main(String z[])
    {
        mathsop m=new mathsop();
        // m.setSize(600,800); //
        m.setVisible(true); //
    }
}

```

Program 17

Question: Write a program using Swing to accept values in a textbox and display whether the number is palindrome or not in another textbox.

Program Code:

```

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

```

```
class palindrome extends JFrame implements ActionListener //
```

```
{
```

```
    Container con; //
```

```
    JLabel l1,l2; //
```

```
    JTextField t1,t2; //
```

```
    JButton b1; //
```

```
    palindrome()
```

```
{
```

```
    super("Palindrome checkers"); //
```

```
    con=getContentPane(); //
```

```
    con.setLayout(new FlowLayout()); //
```

```
    l1 = new JLabel("enter a number:"); //
```

```
    l2 = new JLabel("Result:"); //
```

```
    t1 = new JTextField(15); //
```

```
    t2 = new JTextField(15); //
```

```
    b1 = new JButton("check"); //
```

```
    con.add(l1); con.add(t1); //
```

```
    con.add(l2); con.add(t2); //
```

```
    con.add(b1); //
```

```
    b1.addActionListener(this); //
```

```
    addWindowListener(new WindowAdapter() //
```

```
{  
    public void windowClosing(WindowEvent e) //  
    {  
        System.exit(0); //  
    }  
});  
}
```

```
public void actionPerformed(ActionEvent e) //
```

```
{  
    int r, rev=0, temp; //  
    int num=Integer.parseInt(t1.getText());  
    // temp=num; //
```

```
while(num>0) // Palindrome logic
```

```
{  
    r=num%10; //  
    rev=rev*10+r; //  
    num=num/10; //  
}
```

```
if(temp==rev) //
```

```
{  
    t2.setText("palindrome"); //  
}
```

```
else //
```

```
{  
    t2.setText("Not Palindrome"); //
```

```
    }  
    }  
}
```

```
class palindromechecker // Main class
```

```
{  
    public static void main(String a[])  
    {  
        palindrome p = new palindrome();  
        // p.setVisible(true); //  
        p.setSize(400,600); //  
    }  
}
```

Program 18

Question: Write a swing program to accept an integer in a textbox then find the factorial of that number and display the result in the second textbox.

Program Code:

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

```
class sample extends JFrame implements ActionListener //
```

```
{  
    Container con; //  
    JLabel l1,l2; //  
    JTextField t1,t2; //  
    JButton b1; //
```

```
sample()
{
    super("demo"); //
    con=getContentPane(); //
    con.setLayout(new FlowLayout());
    //

    l1 = new JLabel("enter the number");
    // l2 = new JLabel("result"); //

    t1 = new JTextField(10); //
    t2 = new JTextField(10); //

    b1 = new JButton("factorial"); //

    con.add(l1); con.add(t1); //
    con.add(b1); //
    con.add(l2); con.add(t2); //

    b1.addActionListener(this); //

    addWindowListener(new WindowAdapter()
    {
        public void windowClosing(WindowEvent e)
        {
            System.exit(0); //
        }
    });
});
```

```

    }

    public void actionPerformed(ActionEvent e) //
    {
        int i,n; //

        long fact=1; // Using long for factorial result
        n=Integer.parseInt(t1.getText()); //

        if(e.getSource() == b1) //
        {
            for(i=1;i<=n;i++) // Factorial calculation
            {
                fact=fact*i; //
            }

            t2.setText(String.valueOf(fact)); //
        }
    }
}

```

```

class factoriali // Main Class
{
    public static void main(String a[])
    {
        sample s = new sample();
        // s.setSize(600,800); //
        s.setVisible(true); //
    }
}

```

Program 1G

Question: Write a swing program to accept a value in a textbox then find the area and perimeter of a circle and display the result in another textboxes. (Note: The provided implementation uses radio buttons to select Area or Perimeter.)

Program Code:

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

class sample extends JFrame implements ItemListener // Implements ItemListener
for radio buttons
{
    Container con; //
    JLabel l1,l2; //
    JTextField t1,t2; //
    JRadioButton r1,r2; //
    ButtonGroup bg; //

    sample()
    {
        super("demo"); //
        con=getContentPane(); //
        con.setLayout(new FlowLayout());
        //

        l1 = new JLabel("enter radius");
        // l2 = new JLabel("result"); //

        t1 = new JTextField(20); //
```

```

t2 = new JTextField(20); //

r1 = new JRadioButton("Area"); //
r2 = new JRadioButton("perimeter"); //

bg = new ButtonGroup(); //
bg.add(r1); bg.add(r2); //

con.add(l1); con.add(t1); //
con.add(l2); con.add(t2); //
con.add(r1); con.add(r2); //

r1.addItemListener(this);
//
r2.addItemListener(this);
//

addWindowListener(new WindowAdapter()
{
    public void windowClosing(WindowEvent e)
    {
        System.exit(0); //
    }
});
}

public void itemStateChanged(ItemEvent e) // Handles radio button selection
{
    double area, peri; //

    double r = Double.parseDouble(t1.getText()); // Reads radius

```

```

        if(r1.isSelected()) // Area calculation
        {
            area=3.14*r*r; //
            t2.setText(String.valueOf(area)); //
        }

        if(r2.isSelected()) // Perimeter calculation
        {
            peri=2*3.14*r; //
            t2.setText(String.valueOf(peri)); //
        }
    }
}

class smaine // Main class
{
    public static void main(String args[])
    {
        sample s = new sample();
        // s.setSize(500,800); //
        s.setVisible(true); //
    }
}

```

Program 20

Question: Write a swing program to accept an integer in a textbox then reverse that number and display the result in the second textbox.

Program Code:

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

class inter extends JFrame implements ActionListener //
{
    Container con; //
    JLabel l1,l2; //
    JButton b1; //
    JTextField t1,t2; //

    inter()
    {
        super("demo"); //
        con=getContentPane(); //
        con.setLayout(new FlowLayout());
        //

        l1 = new JLabel("enter the number");
        // l2 = new JLabel("result"); //

        b1 = new JButton("Reverse"); //

        t1 = new JTextField(10); //
        t2 = new JTextField(10); //

        con.add(l1); con.add(t1); //
        con.add(b1); //
```

```
con.add(l2); con.add(t2); //
```

```
b1.addActionListener(this); //
```

```
addWindowListener(new WindowAdapter()  
{  
    public void windowClosing(WindowEvent e)  
    {  
        System.exit(0); //  
    }  
});  
}
```

```
public void actionPerformed(ActionEvent e)  
{  
    int a = Integer.parseInt(t1.getText()); //
```

```
    if(e.getSource() == b1) //  
    {  
        int r, rev=0; //  
        while(a>0) // Reversal logic  
        {  
            r=a%10; //  
            rev=rev*10+r; //  
            a=a/10; //  
        }  
        t2.setText(String.valueOf(rev)); //  
    }
```

```

    }
}

class intermain // Main class
{
    public static void main(String arg[])
    {
        inter s=new inter(); //
        s.setSize(500,800);
        // s.setVisible(true);
        //
    }
}

```

Program 21

Question: Write a swing program to interchange the values of two textboxes.

Program Code:

```

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

class inter extends JFrame implements ActionListener //
{
    Container con; //
    JLabel l1,l2; //
    JTextField t1,t2; //
    JButton b1; //

    inter()

```

```

{
    super("demo"); //
    con=getContentPane(); //
    con.setLayout(new FlowLayout());
    //

    l1 = new JLabel("enter value 1");
    // l2 = new JLabel("enter value
    2"); //

    t1 = new JTextField(20); //
    t2 = new JTextField(20); //

    b1 = new JButton("Interchange"); //

    con.add(l1); con.add(t1); //
    con.add(l2); con.add(t2); //
    con.add(b1); //

    b1.addActionListener(this); //

    addWindowListener(new WindowAdapter()
    {
        public void windowClosing(WindowEvent e)
        {
            System.exit(0); //
        }
    });
}

```

```

public void actionPerformed(ActionEvent e) //
{
    int a = Integer.parseInt(t1.getText()); // Read value 1
    int b = Integer.parseInt(t2.getText()); // Read value 2

    if(e.getSource() == b1) // Interchange logic
    {
        t1.setText(String.valueOf(b)); // Set t1 to old value of b
        t2.setText(String.valueOf(a)); // Set t2 to old value of a
    }
}
}

```

```

class intermain // Main class
{
    public static void main(String arg[])
    {
        inter s=new inter(); //
        s.setSize(300,600);
        // s.setVisible(true);
        //
    }
}

```

Program 22

Question: Write a Java program to accept a number then check whether a given number is even or odd and display the result in the second textbox.

Program Code:

```

import javax.swing.*; //

```

```
import java.awt.*; //
import java.awt.event.*; //

class evens extends JFrame implements ActionListener //
{
    Container con; //
    JLabel l1,l2; //
    JTextField t1,t2; //
    JButton b1; //

    evens()
    {
        super("demo"); //
        con=getContentPane(); //
        con.setLayout(new FlowLayout());
        //

        l1 = new JLabel("enter the number"); //
        l2 = new JLabel("result of the number"); //

        t1 = new JTextField(20); //
        t2 = new JTextField(20); //

        b1 = new JButton("check even/odd"); //

        con.add(l1); con.add(t1); //
        con.add(b1); //
        con.add(l2); con.add(t2); //
```

```
b1.addActionListener(this); //
```

```
addWindowListener(new WindowAdapter()  
{  
    public void windowClosing(WindowEvent e)  
    {  
        System.exit(0); //  
    }  
});  
}
```

```
public void actionPerformed(ActionEvent e) //  
{  
    int a = Integer.parseInt(t1.getText()); //  
  
    if(e.getSource() == b1) //  
    {  
        if(a%2 == 0) // Check if even  
        {  
            t2.setText("even"); //  
        }  
        else  
        {  
            t2.setText("odd"); //  
        }  
    }  
}  
}
```

```
class evensmain // Main class
{
    public static void main(String args[])
    {
        evens s = new evens(); //
        s.setSize(500,800); //
        s.setVisible(true); //
    }
}
```

Program 23

Question: Create a swing program to read the name and basic pay of the employee by using appropriate labels and text box. When you press the button ta,da,hra,and total salary should be displayed in the appropriate text fields. Given Equations:
ta=10% of basic pay, Da=15% of basic pay, Hra=25% of basic pay,
Totalsalary=basic pay+ta+da+hra.

Program Code: *No code is provided in the sources for Program 23.*