ATLURI LUHIT
200905164
D2
25

LAB 4:

1)Create a Person class with private instance variables for the person's name and birth date. Add appropriate accessor methods for these variables. Then create a subclass College Graduate with private instance variables for the student's GPA and year of graduation and appropriate accessors for these variables. Include appropriate constructors for your classes. Then create a separate class with main() method that demonstrates your classes. Use keyword super appropriately.

```
import java.util.*;
import java.text.*;
import java.lang.*;

class Person
{
   private String name;
   private GregorianCalendar dob;

   public Person()
   {
         this.name = "";
         this.dob = new GregorianCalendar();
   }

   public Person(String name, GregorianCalendar dob)
   {
         this.name = name;
         this.dob = dob;
   }

   public void set_name(String name)
```

```
    {
        this.name = name;
    }

    public void set_dob(int y, int m, int d)
    {
        this.dob = new GregorianCalendar(y,m,d);
    }

    public String get_name()
    {
        return this.name;
    }

    public String get_dob()
    {
        return
(this.dob.get(Calendar.DATE)+"/"+this.dob.get(Calendar.MONTH)+"/"+this.dob.get(Calendar.Y
EAR));
    }

    public void input()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter name: ");
        set_name(sc.nextLine());

        System.out.print("Enter DOB(yyyy mm dd): ");
        set_dob(sc.nextInt(),sc.nextInt()-1,sc.nextInt());
    }

    public void display()
    {
        SimpleDateFormat dateFormat = new SimpleDateFormat("dd/MM/yyyy");
        System.out.println("Name: "+ this.name);
        System.out.println("DOB: "+ dateFormat.format(this.dob.getTime()));
    }
}

class CollegeGraduate extends Person
```

```
{
   private float gpa;
   private int gradYear;

   public CollegeGraduate()
   {
         super();
         this.gpa = 0.0f;
         this.gradYear = 0;
   }

   public CollegeGraduate(String name, GregorianCalendar dob, float gpa ,int gradYear)
   {
         super(name,dob);
         this.gpa = gpa;
         this.gradYear = gradYear;
   }

   public void set_gpa(float gpa)
   {
         this.gpa = gpa;
   }

   public void set_gradYear(int gradYear)
   {
         this.gradYear = gradYear;
   }

   public float get_gpa()
   {
         return(this.gpa);
   }

   public int get_gradYear()
   {
         return(this.gradYear);
   }

   public void input()
   {
```

```
        Scanner sc = new Scanner(System.in);
        super.input();
        System.out.print("Enter GPA: ");
        set_gpa(sc.nextFloat());

        System.out.print("Enter Year of Graduation: ");
        set_gradYear(sc.nextInt());
    }

    public void display()
    {
        System.out.println("\nCollege Graduate Details:");
        super.display();
        System.out.println("GPA: "+this.gpa);
        System.out.println("Year of graduation: "+this.gradYear+"\n");
    }
}

public class PersonDemo
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int opt;

        while(true)
        {

            System.out.print("Choose (1)Person (2)College Graduate (3)Exit: ");
            opt = sc.nextInt();

            switch(opt)
            {
                case 1:
                    Person person = new Person();
                    person.input();
                    System.out.println("\nPerson Details:");
                    person.display();
                    System.out.println();
                    break;
```

```
                    case 2:
                        CollegeGraduate cg = new CollegeGraduate();
                        cg.input();
                        cg.display();
                        break;

                    case 3:
                        System.exit(0);
                }
            }
        }
}
```

```
student@lplab-Lenovo-Product:~/200905164/lab4$ javac PersonDemo.java
student@lplab-Lenovo-Product:~/200905164/lab4$ java PersonDemo
Choose (1)Person (2)College Graduate (3)Exit: 1
Enter name:
Luhit Atluri
Enter DOB(yyyy mm dd): 2002 07 05

Person Details:
Name: Luhit Atluri
DOB: 05/07/2002

Choose (1)Person (2)College Graduate (3)Exit: 2
Enter name:
Rahul Mowa
Enter DOB(yyyy mm dd): 2003 12 1
Enter GPA: 9.1
Enter Year of Graduation: 2025

College Graduate Details:
Name: Rahul Mowa
DOB: 01/12/2003
GPA: 9.1
Year of graduation: 2025

Choose (1)Person (2)College Graduate (3)Exit: 3
student@lplab-Lenovo-Product:~/200905164/lab4$
```

2)Define a class Maximum with the following overloaded static methods

1)max (which finds maximum among three integers and returns the maximum integer)

2)max (which finds maximum among three floating point numbers and returns the maximum among them)

3)max (which finds the maximum in an array and returns it)

4)max (which finds the maximum in a matrix and returns the result)

Place this in a package called p1. Let this package be present in a folder called "myPackages", which is a folder in your present working directory (eg: c\student\3rdsem \mypackages\p1). Write a main method to use the methods of Max class in a package p1.

Maximum.java

```
package mypackages.p1;

public class Maximum
{
   public int max(int a, int b, int c)
   {
         if(a>b)
         {
               if(a>c)
                     return a;
               else
                     return c;
         }
         else
         {
               if(b>c)
                     return b;
               else
                     return c;
         }
   }

   public float max(float a, float b, float c)
   {
         if(a>b)
         {
               if(a>c)
                     return a;
               else
                     return c;
         }
         else
```

```
        {
                if(b>c)
                        return b;
                else
                        return c;
        }
    }

    public int max(int[] arr)
    {
        int len = arr.length;
        int large = arr[0];

        for(int i=1;i<len;i++)
        {
                if(arr[i] > large)
                        large = arr[i];
        }
        return large;
    }

    public int max(int[][] mat, int row, int col)
    {
        int large = mat[0][0];
        for(int i=0;i<row;i++)
        {
                for(int j=0;j<col;j++)
                {
                        if(mat[i][j] > large)
                                large = mat[i][j];
                }
        }
        return large;
    }
}
```

MaxDemo.java

```
import java.util.*;
import mypackages.p1.*;
```

```
import java.lang.*;

public class MaxDemo
{
   public static void main(String[] args)
   {
        Scanner sc = new Scanner(System.in);
        Maximum m = new Maximum();
        int opt;

        while(true)
        {
                System.out.print("Choose (1)Max of 3 Int (2)Max of 3 Float (3)Max of array
(4)Max of a Matrix (5)Exit: ");
                opt = sc.nextInt();

                switch(opt)
                {
                        case 1:
                                System.out.println("Enter 3 Integers: ");
                                int a = sc.nextInt();
                                int b = sc.nextInt();
                                int c = sc.nextInt();
                                System.out.println("Greatest of the 3 integers: "+m.max(a,b,c));
                                System.out.println();
                                break;

                        case 2:
                                System.out.println("Enter 3 Floating point numbers: ");
                                float p = sc.nextFloat();
                                float q = sc.nextFloat();
                                float r = sc.nextFloat();
                                System.out.println("Greatest of the 3 floating point numbers:
"+m.max(p,q,r));
                                System.out.println();
                                break;

                        case 3:
                                System.out.print("Enter the size of the array: ");
                                int n = sc.nextInt();
```

```
                        int[] arr = new int[n];
                        System.out.println("Enter the elements of the array: ");
                        for(int i=0;i<n;i++)
                                arr[i] = sc.nextInt();
                        System.out.println("Greatest number in the array is:
"+m.max(arr));
                        System.out.println();
                        break;

                case 4:
                        System.out.print("Enter teh dimensions of the matrix(rows
columns): ");
                        int row = sc.nextInt();
                        int col = sc.nextInt();
                        int[][] mat = new int[row][col];
                        System.out.println("Enter the elements of the matrix:");
                        for(int i=0;i<row;i++)
                        {
                                for(int j=0;j<col;j++)
                                        mat[i][j] = sc.nextInt();
                        }
                        System.out.println("Greatest number in the matrix is:
"+m.max(mat,row,col));
                        System.out.println();
                        break;

                case 5:
                        System.exit(0);
                }
        }


   }
}
```

```
student@lplab-Lenovo-Product:~/200905164/lab4$ javac MaxDemo.java
student@lplab-Lenovo-Product:~/200905164/lab4$ java MaxDemo
Choose (1)Max of 3 Int (2)Max of 3 Float (3)Max of array (4)Max of a Matrix (5)Exit: 1
Enter 3 Integers:
1
2
3
Greatest of the 3 integers: 3

Choose (1)Max of 3 Int (2)Max of 3 Float (3)Max of array (4)Max of a Matrix (5)Exit: 2
Enter 3 Floating point numbers:
9.1
8.7
10.4
Greatest of the 3 floating point numbers: 10.4

Choose (1)Max of 3 Int (2)Max of 3 Float (3)Max of array (4)Max of a Matrix (5)Exit: 3
Enter the size of the array: 5
Enter the elements of the array:
5 4 3 2 1
Greatest number in the array is: 5

Choose (1)Max of 3 Int (2)Max of 3 Float (3)Max of array (4)Max of a Matrix (5)Exit: 4
Enter teh dimensions of the matrix(rows columns): 3 3
Enter the elements of the matrix:
9 8 7
6 5 4
3 2 1
Greatest number in the matrix is: 9

Choose (1)Max of 3 Int (2)Max of 3 Float (3)Max of array (4)Max of a Matrix (5)Exit: 5
student@lplab-Lenovo-Product:~/200905164/lab4$
```

3)Create an abstract class Figure with abstract method area and two integer dimensions. Create three more classes Rectangle, Triangle and Square which extend Figure and implement the area method. Show how the area can be computed dynamically during run time for Rectangle, Square and Triangle to achieve dynamic polymorphism. (Use the reference of Figure class to call the three different area methods)

```
import java.util.*;

abstract class Figure
{
   int d1,d2;
   public Figure(int a, int b)
   {
         this.d1 = a;
         this.d2 = b;
   }
   abstract int area();
}
```

```
class Rectangle extends Figure
{
   public Rectangle(int a, int b)
   {
         super(a,b);
   }

   public int area()
   {
         return(this.d1*this.d2);
   }
}

class Square extends Figure
{
   public Square(int a)
   {
         super(a,a);
   }

   public int area()
   {
         return(this.d1*this.d2);
   }
}

class Triangle extends Figure
{
   public Triangle(int a, int b)
   {
         super(a,b);
   }

   public int area()
   {
         return(this.d1*this.d2/2);
   }
}

public class AbstractDemo
```

```
{
   public static void main(String[] args)
   {
         Scanner sc = new Scanner(System.in);

         Figure f;

         System.out.print("Enter the dimensions for the Rectangle(l,b): ");
         Rectangle r = new Rectangle(sc.nextInt(), sc.nextInt());
         f = r;
         System.out.println("Area of Rectangle: "+f.area());

         System.out.print("Enter the dimensions for the Square(l): ");
         Square s = new Square(sc.nextInt());
         f = s;
         System.out.println("Area of Square: "+f.area());

         System.out.print("Enter the dimensions for the Triangle(b,h): ");
         Triangle t = new Triangle(sc.nextInt(), sc.nextInt());
         f = t;
         System.out.println("Area of Triangle: "+f.area());


   }
}
```

```
student@lplab-Lenovo-Product:~/200905164/lab4$ javac AbstractDemo.java
student@lplab-Lenovo-Product:~/200905164/lab4$ java AbstractDemo
Enter the dimensions for the Rectangle(l,b): 10 5
Area of Rectangle: 50
Enter the dimensions for the Square(l): 6
Area of Square: 36
Enter the dimensions for the Triangle(b,h): 6 8
Area of Triangle: 24
student@lplab-Lenovo-Product:~/200905164/lab4$
```