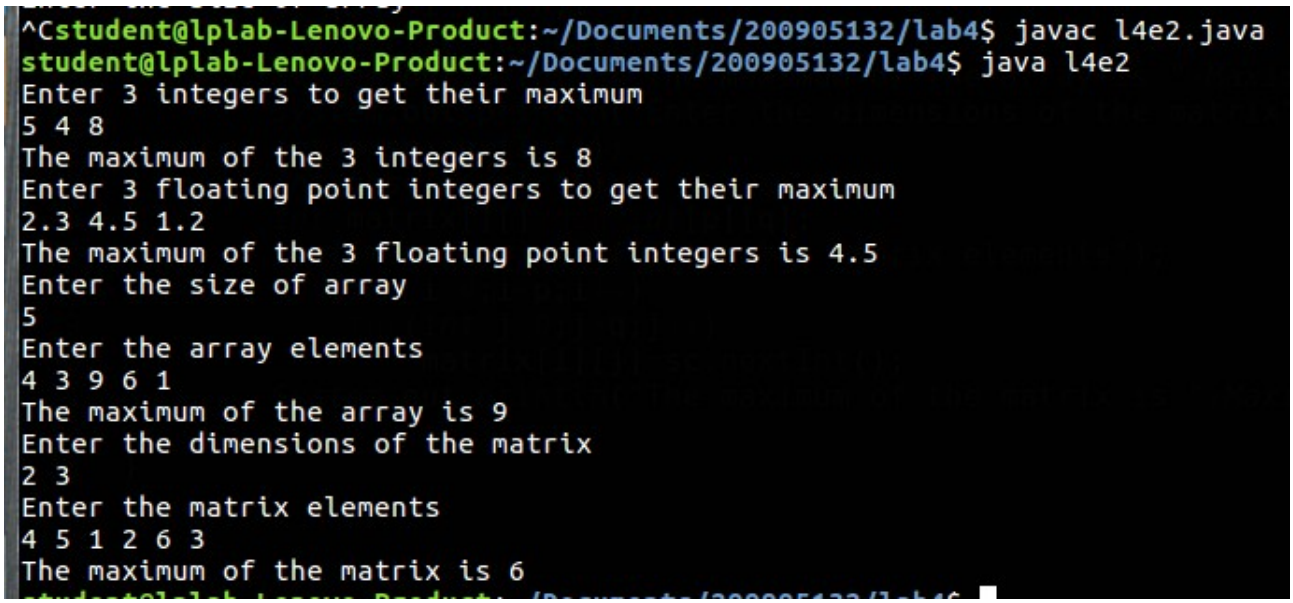
OOP LAB 4

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.

```
package myPackages.p1;
public class Maximum {
    public static int max(int x,int y,int z){
        int intermediate=x>y?x:y;
        int result=z>intermediate?z:intermediate;
        return result;
    }
    public static float max(float x,float y,float z){
        float intermediate=x>y?x:y;
        float result=z>intermediate?z:intermediate;
        return result;
    }
    public static int max(int[] arr){
        int maximum=0;
        for(int i=0;i<arr.length;i++)
        if(maximum<arr[i])
        maximum=arr[i];
        return maximum;
    }
    public static int max(int[][] arr){
        int maximum=0;
        for(int i=0;i<arr.length;i++)
        for(int j=0;j<arr[i].length;j++)
        if(maximum<arr[i][j])
        maximum=arr[i][j];
        return maximum;
    }
}

import myPackages.p1.Maximum;
import java.util.Scanner;
public class l4e2{
    public static void main(String[] args){
```

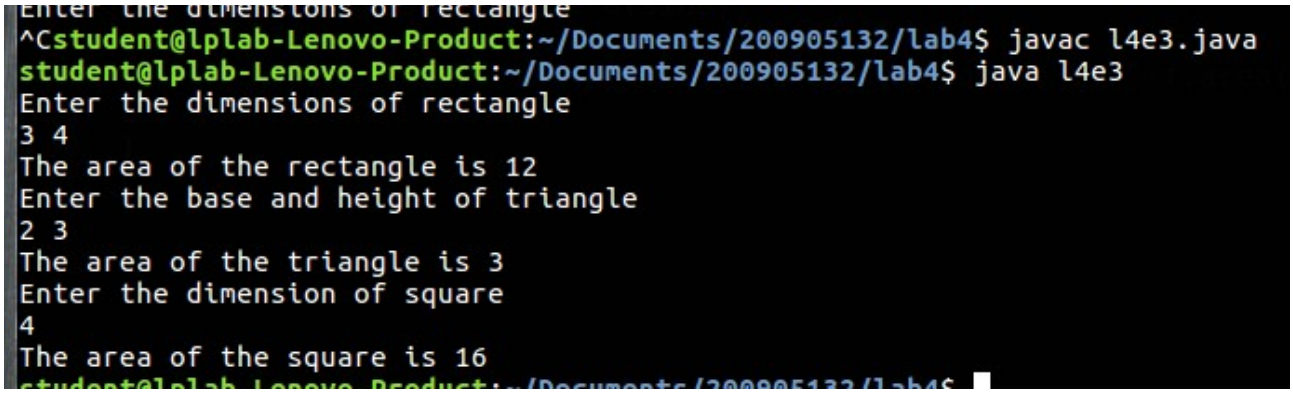
```
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter 3 integers to get their maximum");
        int x=sc.nextInt();
        int y=sc.nextInt();
        int z=sc.nextInt();
        System.out.println("The maximum of the 3 integers is "+Maximum.max(x,y,z));
        System.out.println("Enter 3 floating point integers to get their maximum");
        float a=sc.nextFloat();
        float b=sc.nextFloat();
        float c=sc.nextFloat();
        System.out.println("The maximum of the 3 floating point integers is
"+Maximum.max(a,b,c));
        System.out.println("Enter the size of array");
        int n=sc.nextInt();
        int arr[]=new int[n];
        System.out.println("Enter the array elements");
        for(int i=0;i<n;i++)
                arr[i]=sc.nextInt();
        System.out.println("The maximum of the array is "+Maximum.max(arr));
        System.out.println("Enter the dimensions of the matrix");
        int p=sc.nextInt();
        int q=sc.nextInt();
        int matrix[][]=new int[p][q];
        System.out.println("Enter the matrix elements");
        for(int i=0;i<p;i++)
                for(int j=0;j<q;j++)
                        matrix[i][j]=sc.nextInt();
        System.out.println("The maximum of the matrix is "+Maximum.max(matrix));
    }
}
```



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.Scanner;

abstract class Figure{
	int dim1,dim2;
	Figure(int x,int y){
		dim1=x;
		dim2=y;
	}
	abstract int area();
}

class Rectangle extends Figure{
	Rectangle(int x,int y){
		super(x,y);
	}
	int area(){
		return dim1*dim2;
	}
}

class Triangle extends Figure{
	Triangle(int x,int y){
		super(x,y);
	}
	int area(){
		return dim1*dim2/2;
	}
}
class Square extends Figure{
	Square(int x){
		super(x,x);
	}
	int area(){
		return dim1*dim2;
	}
}

public class l4e3{
```

```
        public static void main(String[] args){
                Scanner sc=new Scanner(System.in);
                Figure f;
                System.out.println("Enter the dimensions of rectangle");
                int dim1=sc.nextInt();
                int dim2=sc.nextInt();
                Rectangle r=new Rectangle(dim1,dim2);
                f=r;
                System.out.println("The area of the rectangle is "+f.area());
                System.out.println("Enter the base and height of triangle");
                int base=sc.nextInt();
                int height=sc.nextInt();
                Triangle t=new Triangle(base,height);
                f=t;
                System.out.println("The area of the triangle is "+f.area());
                System.out.println("Enter the dimension of square");
                int side=sc.nextInt();
                Square s=new Square(side);
                f=s;
                System.out.println("The area of the square is "+f.area());
        }
}
```



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.Scanner;
class Person{
    private String name;
    private int day,month,year;
    Person(String name, int d, int m, int y){
        this.name=name;
        day=d;
        month=m;
        year=y;
    }
    void setName(String name){
        this.name=name;
    }
    String getName(){
        return name;
    }
    void setDOB(int d, int m, int y){
        day=d;
        month=m;
        year=y;
    }
    String getDOB(){
        return day+"-"+month+"-"+year;
    }
}

class College_Graduate extends Person{
    private float GPA;
    private int year_of_graduation;
    College_Graduate(String name, int d, int m, int y, float gpa, int year_of_graduation){
        super(name, d, m, y);       // illustrating super method
        GPA=gpa;
        this.year_of_graduation=year_of_graduation;
    }
    void setGPA(float gpa){
        GPA=gpa;
    }
    float getGPA(){
        return GPA;
    }
    void setYOG(int y){
        year_of_graduation=y;
    }
    int getYOG(){
        return year_of_graduation;
    }
}
```

```
public class Main
{
        public static void main(String[] args) {
           Scanner sc=new Scanner(System.in);
           String name;
           int d,y,m,year_of_graduation;
           float gpa;
           System.out.println("Enter the person's name ");
           name=sc.nextLine();
           System.out.println("Enter the person's date of birth in day/month/year format");
           d=sc.nextInt();
           m=sc.nextInt();
           y=sc.nextInt();
           System.out.println("Enter the person's GPA ");
           gpa=sc.nextFloat();
           System.out.println("Enter the person's year of graduation ");
           year_of_graduation=sc.nextInt();
                College_Graduate A = new
College_Graduate(name,d,m,y,gpa,year_of_graduation);

                //demonstrating the usage of get methods defined
                System.out.println("The person's name is "+A.getName());
                System.out.println("The person's date of birth is "+A.getDOB());
                System.out.println("The person's GPA is "+A.getGPA());
                System.out.println("The person's year of graduation is "+A.getYOG());

                // making use of 4 set methods defined to change the values assigned
                A.setName("Karunya");
                A.setDOB(9,5,2002);
                A.setGPA(6.7f);
                A.setYOG(2023);

                //demonstrating the usage of get methods defined
                System.out.println("The person's name is "+A.getName());
                System.out.println("The person's date of birth is "+A.getDOB());
                System.out.println("The person's GPA is "+A.getGPA());
                System.out.println("The person's year of graduation is "+A.getYOG());
        }
}
```

```
Enter the person's name
Ganesh
Enter the person's date of birth in day/month/year format
24 7 2000
Enter the person's GPA
9.8
Enter the person's year of graduation
2021
The person's name is Ganesh
The person's date of birth is 24-7-2000
The person's GPA is 9.8
The person's year of graduation is 2021
The person's name is Karunya
The person's date of birth is 9-5-2002
The person's GPA is 6.7
The person's year of graduation is 2023
```