Assignment No. 05: Practice Assignment

1. Create a class Box that uses a parameterized method to initialize the dimensions of a box.(dimensions are width, height, depth of double type). The class should have a method that can return volume. Obtain an object and print the corresponding volume in main() function.

```
import java.util.*;
class Box{
	static double width, height, depth;
	static double volume;

	void dimensions(double w, double h, double d){
		this.width = w;
		this.height = h;
		this.depth = d;
	}
	static double volume(){
		volume = width*height*depth;
		return volume;
	}
	public static void main(String[] args){
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter width, height and depth:");
		double w = sc.nextDouble();
		double h = sc.nextDouble();
		double d = sc.nextDouble();
		Box b1 = new Box();
		b1.dimensions(w, h, d);
		System.out.println("Volume of box with dimensions width = "+w+ " height = "+h+ " width = "+d+ " is
"+Box.volume());
	}
}
```

2. Create a new class called "Calculator" which contains the following: A static method called powerInt(int num1,int num2) that accepts two integers and returns num1 to the power of num2 (num1 power num2).A static method called powerDouble(double num1,int num2) that accepts one double and one integer and returns num1 to the power of num2 (num1 power num2).Call your method from another class without instantiating the class (i.e. call it like Calculator.powerInt(12,10) since your methods are defined to be static) Hint: Use Math.pow(double,double) to calculate the power.

```
import java.util.*;


class Calculator{
	static double result;
	static double powerInt(int num1, int num2){
		System.out.println("Enter Integer number 1: " +num1);
		System.out.println("Enter Integer number 2: " +num2);



		return result =  Math.pow(num1, num2);


	}
	static double powerDouble(double num1, int num2){
		System.out.println("Enter Double number 1: " +num1);
		System.out.println("Enter Integer number 2: " +num2);


		return result =  Math.pow(num1, num2);
	}
}


class CalculatorMain{
	public static void main(String[] args){
		Calculator.powerInt(2, 3);
		System.out.println(Calculator.result);


		Calculator.powerDouble(2.0, 3);
		System.out.println(Calculator.result);
	}
}
```

3. Design a class that can be used by a health care professional to keep track of a patient's vital statistics. Here's what the class should do:

Construct a class called Patient

Store a String name for the patient

Store weight and height for patient as doubles

Construct a new patient using these values

Write a method called BMI which returns the patient's BMI as a double. BMI can be calculated as BMI = (Weight in Pounds / (Height in inches x Height in inches)) x 703

Next, construct a class called "Patients" and create a main method. Create a Patient object and assign some height and weight to that object. Display the BMI of that patient.

```
import java.util.*;

class Patient{
	String name;
	double weight;
	double height;
	double BMI;

	Patient(String n, double w, double h){
		this.name = n;
		this.weight = w;
		this.height = h;
		BMI();
	}

	double BMI(){
		return BMI = ( weight / ( height * height ) ) * 703;
	}

}

class Patients{
	public static void main(String... args){
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter Name: ");
		String name = sc.next();
```

```
                System.out.println("Enter Weight in Pounds: ");
                double weight = sc.nextDouble();
                System.out.println("Height in inches: ");
                double height = sc.nextDouble();

                Patient p1 = new Patient(name, weight, height);
                System.out.println("Name: "+name+ "\nWeight: "+weight+ "\nWeight: "+height+ "\nBMI: "+p1.BMI);

        }
}
```

=Inheritance=

1 Create a class named ‘Animal’ which includes methods like eat () and sleep (). Create a child class of Animal named ‘Bird’ and override the parent class methods. Add a new method named fly (). Create an instance of Animal class and invoke the eat and sleep methods using this object. Create an instance of Bird class and invoke the eat, sleep and fly methods using this object.

```
class Animal{
	void eat(){
		System.out.println("Animal : eat()");
	}

	void sleep(){
		System.out.println("Animal : sleep()");
	}
}
class Bird extends Animal{
	@Override
	void eat(){
		System.out.println("Bird : eat()");
	}

	@Override
	void sleep(){
		System.out.println("Bird : sleep()");
	}

	void fly(){
		System.out.println("Bird : fly()");
	}
}
class AnimalBird{
	public static void main(String[] args){
		Animal a = new Animal();
		a.eat();
		a.sleep();

		Bird b = new Bird();
```

```
                b.eat();
                b.sleep();
                b.fly();
        }
}
```

2 Create a class called Person with a member variable name. Save it in a file called Person.java Create a class called Employee who will inherit the Person class.The other data members of the employee class are annual salary (double), the year the employee started to work, and the national insurance number which is a String.Save this in a file called Employee.java Your class should have a reasonable number of constructors and accessor methods. Write another class called TestEmployee, containing a main method to fully test your class definition.

```
class Person{
	String name;

	Person(String name){
		this.name = name;
	}
}
class Employee extends Person{
	double sal;
	int year;
	String NIS;

	Employee(String name, double annualSalary, int yearOfJoining, String nationalInsuranceNumber){
		super(name);
		this.name = name;
		this.sal = annualSalary;
		this.year = yearOfJoining;
		this.NIS = nationalInsuranceNumber;
	}

	void display(){
		System.out.println("Name = "+name+ "\nYear of joining = "+year+ "\nAnnual Salary = "+sal+
"\nNational Insurance Number = "+NIS);
	}

}

import java.util.Scanner;
class TestEmployee{
	public static void main(String[] args){
```

```
        Scanner sc = new Scanner(System.in);
        System.out.println("====Enter the following Employee Details====");
        System.out.println("Name, Annaual Salary, Year of Joining and National Insurance Number.");
        String name = sc.nextLine();
        double sal = sc.nextDouble();
        int year = sc.nextInt();
        //scan.nextLine();
        String nis = sc.next();

        //Employee e1 = new Employee("Shrutika", 22000.2, 2022, "NIS1245");
        Employee e1 = new Employee(name, sal, year, nis);
        System.out.println("======Employee Details======");
        e1.display();
    }
}
```

3 A HighSchool application has two classes: the Person superclass and the Student subclass. Using inheritance, in this lab you will create two new classes, Teacher and CollegeStudent. A Teacher will be like Person but will have additional properties such as salary (the amount the teacher earns) and subject (e.g. "Computer Science", "Chemistry", "English", "Other"). The CollegeStudent class will extend the Student class by adding a year (current level in college) and major (e.g. "Electrical Engineering", "Communications", "Undeclared").

```
package packb;


public class Person{
	private String name;
	private int age;
	private String gender;

	public Person(String name, int age, String gender){
		this.name = name;
		this.age = age;
		this.gender = gender;
	}

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

	public void setName(String name){
		this.name = name;
	}

	public int getAge(){
		return this.age;
	}

	public void setAge(int age){
		this.age = age;
	}

	public String getGender(){
```

```
		return this.gender;
	}

	public void setGender(String gender){
		this.gender = gender;
	}

	public void display(){
		System.out.println("Name = "+getName()+ "\nAge = "+getAge()+ "\nGender = "+getGender());
		System.out.println();
	}
}

package packb;

public class Student extends Person{
	private int studentRollNo;

	public Student(String name, int age, String gender, int studentRollNo){
		super(name, age, gender);
		//this.name;
		//this.age;
		//this.gender;
		this.studentRollNo = studentRollNo;
	}

	public int getStudentRollNo(){
		return this.studentRollNo;
	}

	public void setStudentRollNo(int studentRollNo){
		this.studentRollNo = studentRollNo;
	}

	public void display(){
```

```
                System.out.println("Name = "+getName()+ "\nAge = "+getAge()+ "\nGender = "+getGender()+
                "\nStudent Roll No. = "+getStudentRollNo());
                System.out.println();
        }
}

package packc;
import packb.Person;

public class Teacher extends Person{

        private double salary;
        public String subject;

        public Teacher(String name, int age, String gender, double salary, String subject){
                super(name, age, gender);
                this.salary = salary;
                this.subject = subject;
        }

        public double getSalary(){
                return this.salary;
        }

        public void setSalary(double salary){
                this.salary = salary;
        }

        public void display(){

                System.out.println("Name = "+getName()+ "\nAge = "+getAge()+ "\nGender = "+getGender()+
                "\nSalary = "+getSalary()+ "\nSubject taught: "+subject);
                System.out.println();
        }
}
```

```
package packc;
import packb.Student;

public class CollegeStudent extends Student{
	public int year;
	public String major;

	public CollegeStudent(String name, int age, String gender, int studentRollNo, int year, String major){
		super(name, age, gender, studentRollNo);
		this.year = year;
		this.major = major;
	}

	public void display(){

		CollegeStudent cs1 = new CollegeStudent("Harry Potter", 18, "Male", 1294, 1, "Communications");
		System.out.println("Name = "+getName()+ "\nAge = "+getAge()+ "\nGender = "+getGender()+
		"\nStudent Roll No. = "+getStudentRollNo()+ "\nYear = "+year+ "\nMajor = "+major);
		System.out.println();
	}

}

package packa;
import packb.Person;
import packb.Student;
import packc.CollegeStudent;
import packc.Teacher;

class HighSchool{
	public static void main(String[] args){

		System.out.println("Person's Information:");
		Person p1 = new Person("Khoa Nyugen", 27, "Male");
```

```
        p1.display();

        System.out.println("Student's Information:");
        Student s1= new Student("Ron Weasly", 16, "Male", 1234);
        s1.display();

        System.out.println("Teacher's Information:");
        Teacher t1 = new Teacher("Severus Snape", 34, "Male", 50000, "Computer Science");
        t1.display();

        System.out.println("College Student's Information:");
        CollegeStudent cs1 = new CollegeStudent("Harry Potter", 18, "Male", 1294, 1, "Communications");
        cs1.display();

        p1.setName("Keren Nyugen");
        p1.setGender("Female");
        System.out.println("Name = "+p1.getName()+ "\nAge = "+p1.getAge()+ "\nGender = "+p1.getGender());
        System.out.println();

        t1.setName("Minerva McGonagall");
        t1.setAge(55);
        t1.setGender("Female");
        t1.display();
    }
}
```