Java Assignment No.4

```java
/*
    Ques : Write a program to calculate area and volume of sphere using static
    variable and method create two static methods for area and volume
    calculation. (insert data from user).
 */

import java.util.Scanner;

public class Ques_1 {

    private static final double PI = 3.14159265359;

    public static double calArea(double radius) {
        return 4 * PI * radius * radius;
    }

    public static double calVolume(double radius) {
        return (4.0 / 3.0) * PI * radius * radius * radius;
    }

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

        System.out.print("Enter the radius of the sphere: ");
        double radius = scanner.nextDouble();

        double area = calArea(radius);
        double volume = calVolume(radius);

        System.out.println("Area of the sphere: " + area);
        System.out.println("Volume of the sphere: " + volume);

        scanner.close();
    }
}
```

```java
/*
    Ques : Display all your information (prn, name, age, address, class) on console
           without creating any object and writing any code in main method.
 */

public class Ques 2 {

    private static String prn = "1234567890";
    private static String name = "John Doe";
    private static int age = 20;
    private static String address = "123 Main Street, City, Country";
    private static String className = "Class 10";


    static {
        System.out.println("PRN: " + prn);
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
        System.out.println("Address: " + address);
        System.out.println("Class: " + className);
    }

    public static void main(String args[])
    {

    }
}
```

```java
/*
    Ques : Demonstrate how to use static inner class and non-static inner class to
            access static and non-static members of outer class.
 */

public class Ques_3 {
    private static int staticOutVar = 10;
    private int nonstaticOutVar = 20;

    public static class StaticInnerClass {
        public void accessOuterStatic() {
            System.out.println("Accessing outer static variable from static inner class: "
+ staticOutVar);
        }
    }

    public class NonStaticInnerClass {
        public void accessOuterNonStatic() {
            System.out.println("Accessing outer static variable from non-static inner
class: " + staticOutVar);
            System.out.println("Accessing outer non-static variable from non-static inner
class: " + nonstaticOutVar);
        }
    }

    public static void main(String[] args) {

        Ques_3.StaticInnerClass staticInnerObj = new Ques_3.StaticInnerClass();
        staticInnerObj.accessOuterStatic();

        Ques_3 outerObj = new Ques_3();
        Ques_3.NonStaticInnerClass nonStaticInnerObj = outerObj.new NonStaticInnerClass();
        nonStaticInnerObj.accessOuterNonStatic();
    }
}
```

```java
/*
    Ques : Write a program using final variable to check speed limit exceeds or not
            on highway. If speed is greater than 100. Then generate alert message.
 */

import java.util.Scanner;

public class Ques_4 {

    private final static int MAX_SPEED_LIMIT = 100;
    static int speed;
    static Scanner in = new Scanner(System.in);

    public void getSpeed()
    {
        System.out.print("Enter Speed : ");
        speed = in.nextInt();
    }

    public static void checkSpeed(int speed) {
        if (speed > MAX_SPEED_LIMIT) {
            System.out.println("Alert: Speed limit exceeded! Your speed is " + speed + "
km/h, which exceeds the maximum limit of " + MAX_SPEED_LIMIT + " km/h.");
        } else {
            System.out.println("Your speed is within the limit.");
        }
    }

    public static void main(String[] args) {
        Ques_4 obj = new Ques_4();
        obj.getSpeed();
        checkSpeed(speed);
    }
}
```

```java
/*
    Ques : Create an abstract class 'Bank' with an abstract method 'getBalance'.
           $100, $150 and $200 are deposited in banks A, B and C respectively.
           'BankA', 'BankB' and 'BankC' are subclasses of class 'Bank', each having
           a method named 'getBalance'. Call this method by creating an object of
           each of the three classes.
 */

// Abstract class Bank
abstract class Bank {
    abstract int getBalance();
}

// Subclass BankA
class BankA extends Bank {
    private int balance = 100;


    int getBalance() {
        return balance;
    }
}

// Subclass BankB
class BankB extends Bank {
    private int balance = 150;


    int getBalance() {
        return balance;
    }
}

// Subclass BankC
class BankC extends Bank {
    private int balance = 200;
    int getBalance() {
        return balance;
    }
}

class Ques_5{
    public static void main(String[] args) {

        BankA bankA = new BankA();
        BankB bankB = new BankB();
        BankC bankC = new BankC();

        System.out.println("Balance in BankA: $" + bankA.getBalance());
        System.out.println("Balance in BankB: $" + bankB.getBalance());
        System.out.println("Balance in BankC: $" + bankC.getBalance());
    }
}
```

```java
/*
    Ques : An abstract class has a construtor which prints "This is constructor of
        abstract class", an abstract method named 'a method' and a non-abstract
        method which prints "This is a normal method of abstract class". A class
        'SubClass' inherits the abstract class and has a method named 'a method'
        which prints "This is abstract method". Now create an object of
        'SubClass' and call the abstract method and the non-abstract method.
*/

// Abstract class
abstract class AbstractClass {

    AbstractClass() {
        System.out.println("This is constructor of abstract class");
    }

    abstract void a_method();

    void normalMethod() {
        System.out.println("This is a normal method of abstract class");
    }
}

// Subclass
class SubClass extends AbstractClass {

    void a_method() {
        System.out.println("This is abstract method");
    }
}

public class Ques_6 {
    public static void main(String[] args) {

        SubClass obj = new SubClass();

        obj.a_method();

        obj.normalMethod();
    }
}

/*
```

```java
    Ques : We have to calculate the area of a rectangle, a square and a circle. Create
           an abstract class 'Shape' with three abstract methods namely
           'RectangleArea' taking two parameters, 'SquareArea' and 'CircleArea'
           taking one parameter each. The parameters of 'RectangleArea' are its
           length and breadth, that of 'SquareArea' is its side and that of 'CircleArea'
           is its radius. Now create another class 'Area' containing all the three
           methods 'RectangleArea', 'SquareArea' and 'CircleArea' for printing the
           area of rectangle, square and circle respectively. Create an object of class
           'Area' and call all the three methods.
 */

// Abstract class Shape
abstract class Shape {

    abstract double RectangleArea(double length, double breadth);

    abstract double SquareArea(double side);

    abstract double CircleArea(double radius);
}

class Area extends Shape {

    double RectangleArea(double length, double breadth) {
        return length * breadth;
    }

    double SquareArea(double side) {
        return side * side;
    }

    @Override
    double CircleArea(double radius) {
        return Math.PI * radius * radius;
    }
}

public class Ques 7 {
    public static void main(String[] args) {
        Area area = new Area();

        double rectangleArea = area.RectangleArea(5, 10);
        System.out.println("Area of rectangle: " + rectangleArea);

        double squareArea = area.SquareArea(7);
        System.out.println("Area of square: " + squareArea);

        double circleArea = area.CircleArea(3);
        System.out.println("Area of circle: " + circleArea);
    }
}
```

```java
/*
    Ques : Define a package named 'useful' with a class name 'Useme' having
            following methods:
            1. area → To calculate area of given shape.
            2. percentage → to calculate percentage given total marks and marks
            obtained.
            Develop a program to import above package and use both methods.
 */

import useful.Useme;

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

        Useme useme = new Useme();

        double rectangleArea = useme.area(5, 10);
        System.out.println("Area of rectangle: " + rectangleArea);

        double totalMarks = 500;
        double obtainedMarks = 450;
        double percentage = useme.percentage(totalMarks, obtainedMarks);
        System.out.println("Percentage obtained: " + percentage + "%");
    }
}
```

```java
package useful;

public class Useme {

    public double area(double length, double breadth) {
        return length * breadth;
    }

    public double percentage(double totalMarks, double obtainedMarks) {
        return (obtainedMarks / totalMarks) * 100;
    }
}
```