**'4.3 – Understanding Object**

**Oriented Programming Theory**

For this assignment we will be using A Guide to Programming in JAVA by Beth Brown. Please type your answers in this document. When you are done, upload the file to your GitHub account in a repo called “Assignment 4-3” available at:

<https://bbarrettchs.weebly.com/uploads/3/7/7/8/37782575/lvp_java_text.pdf>

**Who are you?**

0. What is your name?

Mike Shu

**What is an Object?**

Read page 179-180 and answer the following questions:

1. The textbook describes an object as a collection of state and behaviour. What is meant by state and behaviour?

The state of an object is the data it stores. The behaviour is the action and communication it provides.

2. Define Encapsulation / Information Hiding.

Encapsulation / Information Hiding is protecting an object's data by hiding certain data from code outside the class.

3. Define client code.

Client code is an application that uses one or more classes.

**Designing and Writing a Class**

Read page 180-182 and answer the following questions:

4. Define Functional Decomposition.

Functional Decomposition is the process of creating clearly defined functions, or behavior for a class is sometimes called functional decomposition. A well-witten class has been functionall ydecomposed into a set of methods that cannot be simplified further.

5. What three things does the class declaration contain?

The class declaration contains the access level, the keyword class, and the class name.

6. What three things does the class body contain?

The class body contains the variables, constructors, and methods.

7. Access levels: what does it mean to make a variable or method public? What does it mean to make a variable or method private?

Public means that it is visible to other classes and can be used to instantiate objects in those classes, private means it is only visible to the class but not to the client code.

8. What is an interface?

An interface is how client code can interact with an object.

9. Define accessor method, modifier method, and helper method. Which one of these types of methods is NOT part of the interface?

Accessor method determines the value of a variable; modifier changes the value of it; and helper method helps complete a task and has access levle private. The helper method is not part of the interface.

10. Do the problem "Review: Circle - part 1 of 4" on page 182

public double circumference(){

return 2\*Pi\*radius;

}

**Writing Constructors**

Read page 183 and answer the following questions:

11. What does it mean for an object to be instantiated?

When an object is instantiated, the method members of the class can be called in any order.

12. What is a constructor method and what does it do?

A constructor method creates an instance of the class and defines its variables.

13. What two things are always true about constructor methods?

Constructor methods do not have a return type and always have the same names as the class.

13. What does it mean to "overload" a constructor method?

Overloading a constructor method provides more optiosns for instantiating an object.

14. Do the problem "Review: Circle - part 2 of 4" on page 184

public Circle (double r){

radius = r;

}

**Instance and Class Members**

Read page 184-185 and answer the following questions:

15. What is the difference between an instance variable and a class variable? How do you declare a variable as an instance variable? How do you declare a variable as a class variable? Give an example of each from the Circle class.

An instance variable is a copy of a previous variable, while a class is the only copy for all objects to refer to. A class variable is declared by the keyword static (eg. private static final double PI = 3.14), and an instance variable is declared by using a keyword that is the same type as the original variable (eg. private double radius).

16. What is the difference between an instance method and a class method? How do you declare a method as an instance method? How do you declare a method as a class method? Give an example of each from the Circle class.

An instance method changes the state of an object while a class method does not. An instance method is declared without static and modifies the instance, and a class method is declared with static (public static void displayAreaFormula()).

17. Do the problem "Review: Circle - Part 3 of 4" on page 185.

public static displayAreaFormula()){

System.println("The formula for the area of a circle is a=Pi\*r\*r");

}