**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? Jeff Zhang

**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 is the object’s stored data. The behaviour is the action and communication the object provides.

2. Define Encapsulation / Information Hiding.

Encapsulation is protecting an object’s data.

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 behaviour, for a class.

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 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?

A public variable or method is visible to other classes. A private variable or method is visible to the class but not to 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?

An accessor method determines the value of a variable. A modifier method changes the value of a variable. A helper method is called from within a class by other methods

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

**Writing Constructors**

Read page 183 and answer the following questions:

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

An object is instantiated when the constructor of a class is automatically executed.

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

The constructor is a method that initializes the variables. Variables are initialized in the constructor.

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

The constructor does not have a return type and has the same name as the class.

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

‘Overloading’ a constructor provides more options for instantiating an object

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

**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 created each time an object is declared. A class variable is created once for the class and then objects of the class refer to this copy. An instance variable is not declared with the keyword static. A Class variable is declared with the keyword static. private double radius is an instance variable. private static final double is PI is a class variable.

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 can only be called from an object of the class. A class method can be called from the class itself. Instance methods are declared without the keyword static. Class methods are declared with the keyword static.

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