**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? Ali Hashemi

**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? State: refers to the data the object stores. Behaviour: defined by the action and communication it provides.

2. Define Encapsulation / Information Hiding. Encapsulation is when certain data is hidden and protected from outside use.

3. Define client code. Client code refers to an application that uses one or more classes. The Client can access the methods of the class, but cannot directly access the data defined in the class.

**Designing and Writing a Class**

Read page 180-182 and answer the following questions:

4. Define Functional Decomposition. Is a method of analysis that dissects a complex process to show its individual elements.

5. What three things does the class declaration contain? Access level, the keyword “class”, and the class name.

6. What three things does the class body contain? 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? Making something private means that it is only accessible and seen by the class, however making something public means that it is seen and accessible by all classes.

8. What is an interface? The public class methods of a class define the interface of an object. The 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 methods take information from the class and share them. Modifier methods take information and change/modify them then return them. Helper methods are called from within a class by other methods, they help complete a task and have private access. Helper methods are not part of the interface.

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

Public int Circumference(){

Int ans = spot.getRadius();

ans \*= (Math.PI \*2);

return ans;

}

**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 means that is given a starting value.

12. What is a constructor method and what does it do? Constructor methods create the variables needed in the class and instantiate them.

13. What two things are always true about constructor methods? Do not have a return type. Have the same name as the class.

13. What does it mean to "overload" a constructor method? They are overloaded to provide more options for instantiation.

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

Public Circle(double radius){

This.radius = radius;

}

**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.

Class variables are declared with the static keyword, instance variables are not. The difference is that each instance of the class maintains its own independent copy of each instance variable, whereas there is only 1 copy of a class variable for all instances of that class. In the Circle class, radius is an instance variable whereas 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.

Instance methods operate on the state of an object and must be called from an instance of a class. Class methods are called from the class itself, rather than an object of the class, to perform a task. Area(), getRadius(), and setRadius() are all instance methods, whereas displayAreaFormula is a class method.

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

public sattc void displayAreaFormula(){

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

}