HW to Chapter 10

Non-programming Assignment:

1. Can a class be derived (inherit) from two different independent classes?

In Java, a class cannot inherit from multiple classes directly, which is a concept called multiple inheritance and is not allowed due to the complexity and ambiguity it may introduce. However, one can use interfaces or a combination of single inheritance with interfaces to achieve a similar effect.

1. Can a class be derived (inherit) from a “final” class?

A class cannot be derived from a final class in Java. The final modifier indicates that the class is complete in itself and cannot be extended further. It's Java's way to ensure that certain functionalities remain stable and unmodifiable.

1. What is polymorphism, how it works, and why is it needed?

Polymorphism is a foundational concept in OOP that allows objects to be treated as instances of their parent class rather than their actual class. It works through method overriding and interface implementation. Polymorphism is needed for code flexibility and the ability to implement dynamic method dispatch, where the method that is executed is determined at runtime.

1. What is an inner (nested) class?

An inner (nested) class is defined within another class. They are useful for logically grouping classes that will be used only in one place, increasing encapsulation, and creating more readable and maintainable code.

1. What is an abstract class and why is it needed?

An abstract class cannot be instantiated on its own and is intended to be subclassed. It often contains abstract methods that must be implemented by subclasses. It's needed when a base class should provide a common structure and behavior, but complete implementation details are inherently specific to subclasses.

1. What is an “interface” class in Java?

An interface in Java is a reference type that can contain only constants, method signatures, default methods, static methods, and nested types. Interfaces cannot contain an implementation of the methods, except for static and default methods. It's used to achieve full abstraction and multiple inheritance, as a class can implement multiple interfaces.