Chapter 9

Section 9.1

9.1 Q1: Which of the following statements is not true?
   a. A subclass is generally larger than its superclass.
   b. A superclass object is a subclass object.
   c. The class following the `extends` keyword in a class declaration is the direct superclass of the class being declared.
   d. Java uses interfaces to provide the benefits of multiple inheritance.
   ANS: b. A superclass object is a subclass object.

9.1 Q2: Which term applies to the largest class in a class hierarchy?
   a. Superclass.
   b. Subclass.
   c. Base class.
   d. Parent class.

9.1 Q3: Focusing on the commonalities among objects in a system rather than specifics is known as
   a. Encapsulation.
   b. Abstraction.
   c. Inheritance.
   d. Simplification.
   ANS: b. Abstraction.

9.1 Q4: Inheritance is also known as the
   b. “has-a” relationship.
   c. “uses-a” relationship.
   d. “is-a” relationship.
   ANS: b. “has-a” relationship

Section 9.2

9.2 Q1: Which of the following is not a superclass/subclass relationship?
   a. Ford/Taurus.
   b. University/Brown University.
   c. Sailboat/Tugboat.
   d. Country/USA.
   ANS: c. Sailboat/Tugboat. A Sailboat is not a superclass for Tugboats. Both sailboat and tugboats would be subclasses of Boat.

9.2 Q2: An advantage of inheritance is that:
   a. All methods can be inherited.
   b. All instance variables can be uniformly accessed by subclasses and superclasses.
   c. Objects of a subclass can be treated like objects of their superclass.
   d. None of the above.
   ANS: c. Objects of a subclass can be treated like objects of their superclass. Note: constructors cannot be inherited, and instance variables that are `private` in a superclass cannot be directly accessed by a subclass.

Section 9.3

9.3 Q1: Which of the following keywords allows a subclass to access a superclass method even when the subclass has overridden the superclass method?
   a. `protected`.
   b. `this`.
   c. `public`.
   d. `super`.
   ANS: d. `super`.

9.3 Q2: Using the `protected` keyword gives a member:
9.3 Q3: Superclass methods with this level of access cannot be called from subclasses.
   a. private.
   b. public.
   c. protected.
   d. package.
   ANS: a. private.

Section 9.4

9.4 Q1: Overriding a method differs from overloading a method because:
   a. For an overloaded constructor, the superclass constructor will always be called first.
   b. For an overridden constructor, the superclass constructor will always be called first.
   c. Overloaded methods have the same signature.
   d. Overridden methods have the same signature.
   ANS: d. Overridden methods have the same signature.

9.4 Q2: Consider the classes below, declared in the same file:

```java
class A {
    int a;
    public A() {
        a = 7;
    }
}

class B extends A {
    int b;
    public B() {
        b = 8;
    }
}
```

Which of the statements below is not true?
   a. Both variables `a` and `b` are instance variables.
   b. After the constructor for `class B` is executed, the variable `a` will have the value 7.
   c. After the constructor for `class B` is executed, the variable `b` will have the value 8.
   d. A reference to `class A` can be treated as a reference to `class B`.
   ANS: d. A reference to `class A` can be treated as a reference to `class B`. The converse is true because `class A` is the superclass. Note that variables `a` and `b` both have package access.

9.4 Q3: Accessing a superclass method through a subclass reference is
   a. Polymorphism.
   b. Inheritance.
   c. A syntax error.
   d. Straightforward.
   ANS: c. A syntax error.

9.4 Q4: `private` fields of a superclass can be accessed in a subclass
   a. by calling `private` methods declared in the superclass.
   b. by calling `public` or `protected` methods declared in the superclass.
   c. directly.
   d. All of the above.
   ANS: c. directly.
ANS: b. calling public or protected methods declared in the superclass.

Section 9.5
( none )

Section 9.6

9.6 Q1: Which statement below is not true?
   a. Superclass finalizers should always be called as the last statement of a subclass finalizer.
   b. Superclass constructors should always be called as the first statement of a subclass constructor.
   c. Finalizers and constructors should always be declared protected so subclasses have access to the method.
   d. All are not true.
   
   ANS: c. Finalizers and constructors should always be declared protected so subclasses have access to the method. Constructors should be declared public so classes that use their classes can instantiate them.

9.6 Q2: Finalizers are used to:
   a. Clean up an object of a class before it is garbage collected.
   b. Draw the applet or JFrame used by an application.
   c. Initialize variables.
   d. Ensure that all variables are assigned valid values.
   
   ANS: a. Clean up an object of a class before it is garbage collected.

9.6 Q3: Which of the following sequences is in the correct order?
   a. Subclass constructor, superclass constructor, subclass finalizer, superclass finalizer.
   b. Superclass constructor, subclass constructor, superclass finalizer, subclass finalizer.
   c. Subclass constructor, superclass constructor, superclass finalizer, subclass finalizer.
   d. Superclass constructor, subclass constructor, subclass finalizer, superclass finalizer.
   
   ANS: d. Superclass constructor, subclass constructor, subclass finalizer, superclass finalizer.

Section 9.7

9.7 Q1: Which of the following statements are true?
   A. We can use inheritance to customize existing software.
   B. A superclass specifies commonality.
   C. A superclass can be modified without modifying subclasses
   D. A subclass can be modified without modifying its superclass.
      a. All of the above.
      b. None of the above.
      c. A, B and C.
      d. A, B and D.
   
   ANS: a. All of the above.

9.7 Q2: Which of the following is an example of a functionality that should not be “factored out” to a superclass?
   a. Both ducks and geese are birds that know how to start flying from the water.
   b. All vehicles know how to start and stop.
   c. All animals lay eggs, except for mammals.
   d. All paints have a color.
   
   ANS: c. All animals lay eggs except for mammals.