Chapter 12 Inheritance and Polymorphism

1. To define a class that extends a base class, use

```
class SubClass(SuperClass):
```

`super()` refers to the superclass. To invoke the superclass's `__init__` method, use

super().__init__()

2. The data field i is defined in class A, but not inherited in B. So, you cannot access b.i for an object of B. To fix it, you have to invoke super().__init__() in the class B's __init__ method.

3.

False: A subclass is a subset of a superclass.

4. Python supports multiple inheritance. To define a class that extends multiple classes, use

```
class Subclass(SuperClass1, SuperClass2, ...):
    initializer
    methods
```

5.

True: You can override a non-private method defined in a superclass.

False: You can override a private method defined in a superclass.

False: You can override the constructor defined in a superclass.

False: When constructing an object from a subclass, its superclass's initializer is automatically invoked.

6. 4
01

7.

True: Every object is an instance of the object class.

True: If a class does not extend a superclass explicitly, it extends object by default.

8.

8

9.

```
B's __new__() invoked
A's __new__() invoked
```

10.

```
B's __init__() invoked
B's __new__() invoked
A's __init__() invoked
A's __new__() invoked
```

11.

```
B's __init__() invoked
A's __init__() invoked
```

12.

A
A

13. True

14. Encapsulation combines data and methods into a single object and hides the data fields and method implementation from the user. Inheritance defines a class that extends a superclass. Polymorphism means that an object of a subclass can be passed to a parameter of a superclass type.

15.

(a)
Person
Student

(b)
Person
Person

16.

(a) Is goldenDelicious an instance of Fruit? Yes
(b) Is goldenDelicious an instance of Orange? No
(c) Is goldenDelicious an instance of Apple? Yes
(d) Is goldenDelicious an instance of GoldenDelicious? Yes
(e) Is goldenDelicious an instance of Macintosh? No
(f) Is orange an instance of Orange? Yes
(g) Is orange an instance of Fruit? Yes
(h) Is orange an instance of Apple? No

(i) Suppose the method makeAppleCider is defined in the Apple class. Can goldenDelicious invoke this method? Yes

Can orange invoke this method? No

(j) Suppose the method makeOrangeJuice is defined in the Orange class. Can orange invoke this method? Yes Can goldenDelicious invoke this method? No

17. Association, Composition, and inheritance. For the graphical notation, see the text.

18.

- Company and Employee (Composition)
- Course and Faculty (Association)
- Student and Person (Inheritance)
- House and Window (Composition)
- Account and Savings Account (Inheritance)