

# CSE110: Principles of programming

## Inheritance

Name:

ID:

Program:

### Multiple Choice Questions

- 1) When an "is a" relationship exists between objects, it means that the specialized object has:  
A) some of the characteristics of the general class, but not all, plus additional characteristics  
B) some of the characteristics of the general object, but not all  
C) none of the characteristics of the general object  
D) all the characteristics of the general object, plus additional characteristics
- 2) Which of the following statements declares Salaried as a subclass of PayType?  
A) `public class Salaried extends PayType`  
B) `public class Salaried implements PayType`  
C) `public class Salaried derivedFrom(Paytype)`  
D) `public class PayType derives Salaried`
- 3) If ClassA extends ClassB, then:  
A) public and private members of ClassB are public and private, respectively, in ClassA  
B) public members in ClassB are public in ClassA, but private members in ClassB cannot be directly accessed in ClassA  
C) neither public or private members in ClassB can be directly accessed in ClassA  
D) private members in ClassB are changed to protected members in ClassA
- 4) In an inheritance relationship:  
A) The superclass constructor always executes before the subclass constructor  
B) The subclass constructor always executes before the superclass constructor  
C) The constructor with the lowest overhead always executes first regardless of inheritance  
D) The unified constructor always executes first regardless of inheritance
- 5) In UML diagrams, inheritance is shown:  
A) With a line that has an open arrowhead at one end that points to the superclass  
B) With a line that has an open arrowhead at one end that points to the subclass  
C) With a line that has a closed arrowhead at one end that points to the superclass  
D) With a line that has a closed arrowhead at one end that points to the subclass
- 6) What key word can you use to call a superclass constructor explicitly?  
A) `goto`  
B) `this`  
C) `super`  
D) `extends`
- 7) What is wrong with the following code?

```
public class ClassB extends ClassA
```

```

{
    public ClassB()
    {
        int init = 10;
        super(40);
    }
}

```

- A) Nothing is wrong with the code.
- B) The method `super` is not defined.
- C) The call to the method `super` must be the first statement in the constructor.
- D) No values may be passed to `super`.

8) Look at the following code and determine what the call to `super` will do.

```

public class ClassB extends ClassA
{
    public ClassB()
    {
        super(10);
    }
}

```

- A) This cannot be determined from the code shown.
- B) It will call the constructor of `ClassA` that receives an integer as an argument.
- C) It will call the method named `super` and pass the value 10 to it as an argument.
- D) The method `super` will have to be defined before we can say what will happen.

9) If a subclass constructor does not explicitly call a superclass constructor:

- A) it must include the code necessary to initialize the superclass fields
- B) the superclass fields will be set to the default values for their data types
- C) Java will automatically call the superclass's default or no-arg constructor immediately after the code in the subclass's constructor executes
- D) Java will automatically call the superclass's default or no-arg constructor just before the code in the subclass's constructor executes

10) The `super` statement that calls the superclass constructor:

- A) must be the first statement in the superclass's constructor
- B) can appear in any method of the subclass
- C) must be the first statement in the subclass's constructor
- D) is deprecated and is no longer supported in newer versions of Java

11) Replacing inadequate superclass methods with more suitable subclass methods is known as what?

- A) Method upgrading
- B) Tactical inheritance
- C) Method overriding
- D) Method overloading

12) If two methods have the same name but different signatures, they are:

- A) overridden
- B) overloaded
- C) superclass methods
- D) subclass methods

13) Look at the following code. The method in line \_\_\_\_\_ will override the method in line \_\_\_\_\_.

```
Line 1  public class ClassA
Line 2  {
Line 3      public ClassA() {}
Line 4      public int method1(int a){}
Line 5      public double method2(int b){}
Line 6  }
Line 7  public ClassB extends ClassA
Line 8  {
Line 9      public ClassB(){}
Line 10     public int method1(int b, int c){}
Line 11     public double method2(double c){}
Line 12 }
```

- A) 10, 4
- B) 11, 5
- C) Both A and B
- D) None of the above

14) Look at the following code. Which line will cause a compiler error?

```
Line 1  public class ClassA
Line 2  {
Line 3      public ClassA() {}
Line 4      public final int method1(int a){}
Line 5      public double method2(int b){}
Line 6  }
Line 7  public ClassB extends ClassA
Line 8  {
Line 9      public ClassB(){}
Line 10     public int method1(int b){}
Line 11     public double method2(double c){}
Line 12 }
```

- A) 4
- B) 5
- C) 10
- D) 11

15) When a subclass overloads a superclass method:

- A) Both methods may be called with a subclass object
- B) Only the subclass method may be called with a subclass object
- C) Only the superclass method may be called with a subclass object
- D) Neither method may be called with a subclass object

16) A protected member of a class may be directly accessed by:

- A) methods of the same class
- B) methods of a subclass
- C) methods in the same package
- D) All of the above

17) When declaring class data members, it is best to declare them as:

- A) private members
- B) public members
- C) protected members
- D) restricted members

18) If you do not provide an access specifier for a class member, the class member is given \_\_\_\_\_ by default.

- A) private
- B) public
- C) protected
- D) package

19) When a method is declared with the \_\_\_\_\_ modifier, it cannot be overridden in a subclass.

- A) extends
- B) final
- C) super
- D) public

20) If ClassC extends ClassB, which extends ClassA, this would be an example of:

- A) multiple inheritance
- B) a chain of inheritance
- C) a family tree
- D) packaging

21) Look at the following code.

```
Line 1  public class ClassA
Line 2  {
Line 3      public ClassA() {}
Line 4      public void method1() {}
Line 5  }
Line 6  public class ClassB extends ClassA
Line 7  {
Line 8      public ClassB() {}
Line 9      public void method1() {}
Line 10 }
Line 11 public class ClassC extends ClassB
Line 12 {
Line 13     public ClassC() {}
Line 14     public void method1() {}
Line 15 }
```

Which method1 will be executed as a result of the following statements?

```
ClassA item1 = new ClassC();
item1.method1();
```

- A) Line 4
- B) Line 9
- C) Line 14
- D) This is an error and will cause the program to crash.

22) Look at the following code.

```
Line 1  public class ClassA
Line 2  {
Line 3      public ClassA() {}
Line 4      public void method1(int a){}
Line 5  }
Line 6  public class ClassB extends ClassA
Line 7  {
Line 8      public ClassB(){}
Line 9      public void method1(){}
Line 10 }
Line 11 public class ClassC extends ClassB
Line 12 {
Line 13     public ClassC(){}
Line 14     public void method1(){}
Line 15 }
```

Which method will be executed as a result of the following statements?

```
ClassB item1 = new ClassA();
item1.method1();
```

- A) Line 4
- B) Line 9
- C) Line 14
- D) This is an error and will cause the program to crash.

23) If a class contains an abstract method:

- A) you cannot create an instance of the class
- B) the method will have only a header, but not a body, and end with a semicolon
- C) the method must be overridden in subclasses
- D) All of the above

24) Given the following code which of the following is TRUE?

```
public class ClassB implements ClassA{}
```

- A) ClassA must override each method in ClassB.
- B) ClassB must override each method in ClassA.
- C) ClassB inherits from ClassA.
- D) ClassA inherits from ClassB.

25) All fields declared in an interface:

- A) are final and static
- B) have protected access
- C) must be initialized in the class implementing the interface
- D) have private access

26) Look at the following code. Which line has an error?

```
Line 1  public interface Interface1
Line 2  {
Line 3      int FIELD1 = 55;
```

```
Line 4    public int methodA(double){}
Line 5    }
```

- A) 1
- B) 2
- C) 3
- D) 4

27) Look at the following code. Which line in ClassA has an error?

```
Line 1    public interface MyInterface
Line 2    {
Line 3        int FIELDA = 55;
Line 4        public int methodA(double);
Line 5    }
Line 6    public class ClassA implements MyInterface
Line 7    {
Line 8        FIELDA = 60;
Line 9        public int methodA(double) { }
Line 10   }
```

- A) 6
- B) 7
- C) 8
- D) 9

28) Look at the following code. What is missing from ClassA?

```
Line 1    public interface MyInterface
Line 2    {
Line 3        int FIELDA = 55;
Line 4        public int methodA(double);
Line 5    }
Line 6    public class ClassA implements MyInterface
Line 7    {
Line 8        FIELDA = 60;
Line 9        public int methodB(double) { }
Line 10   }
```

- A) It does not override methodA.
- B) It does not have a constructor.
- C) It does not overload methodA.
- D) Nothing is missing. It is a complete class.

29) When one object is a specialized version of another object, there is this type of relationship between them.

- A) "has a"
- B) "is a"
- C) direct
- D) "contains a"

30) A subclass can directly access:

- A) all members of the superclass
- B) only public and private members of the superclass
- C) only protected and private members of the superclass
- D) only public and protected members of the superclass

31) In the following statement, which is the superclass?

```
public class ClassA extends ClassB implements ClassC
```

- A) ClassA
- B) ClassB
- C) ClassC
- D) Cannot tell

32) A subclass may call an overridden superclass method by:

- A) prefixing its name with the `super` key word and a dot (.)
- B) prefixing its name with the name of the superclass in parentheses
- C) using the `extends` keyword before the method is called
- D) calling the superclass method first and then calling the subclass method

33) In the following statement, which is the subclass?

```
public class ClassA extends ClassB implements ClassC
```

- A) ClassA
- B) ClassB
- C) ClassC
- D) Cannot tell

34) In the following statement, which is the interface?

```
public class ClassA extends ClassB implements ClassC
```

- A) ClassA
- B) ClassB
- C) ClassC
- D) Cannot tell

35) What is wrong with the following code?

```
public class ClassB extends ClassA
{
    public ClassB()
    {
        super(40);
    }
}
```



```
        System.out.println("This is the last statement " +
                           "in the constructor.");
    }
}
```

A) Nothing is wrong with the code.  
B) The method `super` is not defined.  
C) The call to the method `super` must be the first statement in the constructor.  
D) No values may be passed to `super`.

36) In the following code, what will the call to `super` do?

```
public class ClassB extends ClassA
{
    public ClassB()
    {
        super(40);
        System.out.println("This is the last statement "+
                           "in the constructor.");
    }
}
```

A) This cannot be determined from the code.  
B) It will call the method `super` and pass the value 40 to it as an argument.  
C) It will call the constructor of `ClassA` that receives an integer as an argument.  
D) The method `super` will have to be defined before we can say what will happen.

37) If a superclass does not have a default constructor or a no-arg constructor:

A) then a class that inherits from it, must initialize the superclass values.  
B) then a class that inherits from it, must call one of the constructors that the superclass does have.  
C) then a class that inherits from it, does not inherit the data member fields from the superclass.  
D) then a class that inherits from it, must contain the default constructor for the superclass.

38) Look at the following code. The method in line \_\_\_\_\_ will override the method in line \_\_\_\_\_.

```
Line 1  public class ClassA
Line 2  {
Line 3      public ClassA() {}
Line 4      public int method1(int a){}
Line 5      public int method2(int b){}
Line 6  }
Line 7  public ClassB extends ClassA
Line 8  {
Line 9      public ClassB(){}
Line 10     public int method1(int b){}
Line 11     public int method2(double c){}
Line 12 }
```

- A) 4, 10
- B) 5, 11
- C) 10, 4
- D) 11, 5
- E) Both A and B

39) Look at the following code. Which line will cause a compiler error?

```
Line 1  public class ClassA
Line 2  {
Line 3      public ClassA() {}
Line 4      public int method1(int a){}
Line 5      public final int method2(double b){}
Line 6  }
Line 7  public ClassB extends ClassA
Line 8  {
Line 9      public ClassB(){}
Line 10     public int method1(int b){}
Line 11     public int method2(double c){}
Line 12 }
```

- A) 4
- B) 5
- C) 10
- D) 11

40) Protected members are:

- A) not quite private
- B) not quite public
- C) both A and B
- D) neither A nor B

41) Protected class members are denoted in a UML diagram with the symbol

- A) \*
- B) #
- C) +
- D) -

42) Which of the following is TRUE about protected access?

- A) Protected members may be accessed by methods in the same package or in a subclass, even when the subclass is in a different package.
- B) Protected members may be accessed by methods in the same package or in a subclass, but only if the subclass is in the same package.
- C) Protected members cannot be accessed by methods in any other classes.
- D) Protected members are actually named constants.

43) Like a family tree, a \_\_\_\_\_ shows the inheritance relationship between classes.

- A) flowchart
- B) class map
- C) class hierarchy
- D) binary tree

44) In a class hierarchy:

- A) the more general classes are toward the bottom of the tree and the more specialized are toward the top
- B) the more general classes are toward the top of the tree and the more specialized are toward the bottom
- C) the more general classes are toward the left of the tree and the more specialized are toward the right
- D) the more general classes are toward the right of the tree and the more specialized are toward the left

45) Look at the following code:

```
Line 1  public class ClassA
Line 2  {
Line 3      public ClassA() {}
Line 4      public void method1(int a){}
Line 5  }
Line 6  public class ClassB extends ClassA
Line 7  {
Line 8      public ClassB(){}
Line 9      public void method1(){}
Line 10 }
Line 11 public class ClassC extends ClassB
Line 12 {
Line 13     public ClassC(){}
Line 14     public void method1(){}
Line 15 }
```

Which method1 will be executed when the following statements are executed?

```
ClassA item1 = new ClassB();
item1.method1();
```

- A) Line 4
- B) Line 9
- C) Line 14
- D) This is an error and will cause the program to crash.

46) Look at the following code:

```
Line 1  public class ClassA
Line 2  {
Line 3      public ClassA() {}
Line 4      public void method1(int a){}
Line 5  }
Line 6  public class ClassB extends ClassA
Line 7  {
Line 8      public ClassB(){}
Line 9      public void method1(){}
Line 10 }
Line 11 public class ClassC extends ClassB
Line 12 {
Line 13     public ClassC(){}
Line 14     public void method1(){}
Line 15 }
```

Which method will be executed when the following statements are executed?

```
ClassC item1 = new ClassA();
item1.method1();
```

- A) Line 4
- B) Line 9
- C) Line 14
- D) This is an error and will cause the program to crash.

47) If a class contains an abstract method:

- A) you must create an instance of the class
- B) the method will have only a header, but not a body, and end with a semicolon
- C) the method cannot be overridden in subclasses
- D) All of the above.

48) In an interface all methods have:

- A) private access
- B) protected access
- C) public access
- D) packaged access

49) Which of the following statements correctly specifies three interfaces?

- A) public class ClassA implements Interface1, Interface2, Interface3
- B) public class ClassA implements [Interface1, Interface2, Interface3]
- C) public class ClassA implements (Interface1, Interface2, Interface3)
- D) public class ClassA implements Interface1 Interface2 Interface3

50) What is wrong with the following code?

```
IntCalculator square = new IntCalculator() {  
    public int calculate(int number)  
    {  
        return number * number;  
    }  
}
```

- A) The outer braces are not needed.
- B) The inner braces are not needed.
- C) The new key word is not needed.
- D) The statement does not end with a semicolon.

51) This is a variable whose value is never changed, but it isn't declared with the `final` key word.

- A) virtually constant variable
- B) effectively `final` variable
- C) default variable
- D) anonymous inner variable

52) Which of the following is an example of a lambda expression?

- A) `int x = x * factor;`
- B) `IntCalculator = new divider(x, 2);`
- C) `IntCalculator multiplier = x -> x * factor;`
- D) All of the above

## True/False Questions

- 1) Inheritance involves a subclass, which is the general class, and a superclass, which is the specialized class.
- 2) Private members of the superclass cannot be accessed by the subclass.
- 3) It is not possible for a superclass to call a subclass's method.
- 4) When a subclass extends a superclass, the public members of the superclass become public members of the subclass.
- 5) If a method in a subclass has the same signature as a method in the superclass, the subclass method overloads the superclass method.
- 6) Every class is either directly or indirectly derived from the `Object` class.
- 7) An abstract class is not instantiated, but serves as a superclass for other classes.
- 8) In an inheritance relationship, the subclass constructor always executes before the superclass constructor.
- 9) If two methods in the same class have the same name but different signatures, the second overrides the first.

- 10) Every class has a `toString` method and an `equals` method inherited from the `Object` class.
- 11) All methods in an abstract class must also be declared `abstract`.
- 12) When an interface variable references an object, you can use the interface variable to call any and all of the methods in the class implementing the interface.
- 13) A compiler error will result if an anonymous inner class tries to use a variable that is not `final`, or not effectively `final`.
- 14) A functional interface is simply an interface that has one abstract method.