Montgomery College, CMSC 203
Worksheet 1
Module 16

<u>**Objectives**</u>
- Inheritance
- Superclass constructor
- Overriding methods

<u>**Concept Questions**</u>
1) The relationship between a superclass and an inherited class is called an _____ relationship

2) If a class inherits from another class it inherits:

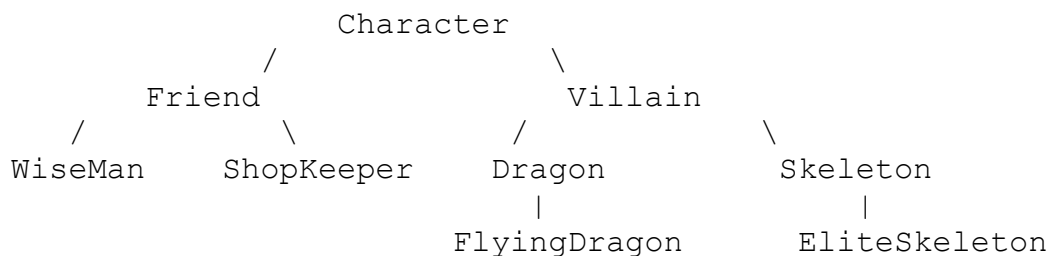   A) Methods
      B) Variables
      C) Both A and B
      D) None of the above

3) A _____ is a general class, and a _____ is a more specialized class which inherits from the general class.

4) Write a header of a class `Circle` which inherits a superclass `Shape`.

5) If a superclass method has this access modifier it CANNOT be accessed by a child class:
      A) `private`
      B) `public`
      C) `protected`
      D) Both B and C

6) Consider the following inheritance hierarchy that is used in a video game.

```
                    Character
             /                  \
        Friend                  Villain
      /        \              /           \
 WiseMan    ShopKeeper    Dragon          Skeleton
                            |                |
                        FlyingDragon     EliteSkeleton
```

Which of the following declarations and initializations will NOT cause a compiler error?

```
A) Character c = new FlyingDragon();
B) FlyingDragon f = new Character();
C) Dragon d = new Villain();
D) Villain v = new Skeleton();
E) Dragon d = new ShopKeeper();
```

7) Suppose that `Horse` is a subclass of `Animal`, and neither class is abstract. Which of the following is an invalid declaration and initialization?

```
A) Horse h = new Horse();
B) Horse h = new Animal();
C) Animal a = new Animal();
D) Animal a = new Horse();
```
E) all of the above are valid

8) Let Dog be a subclass of Animal, and suppose Animal has a method called speak() that is overridden in the Dog class. Consider the following code.

```
Animal spot = new Dog();
spot.speak();
```

Which of the following is true?

A) This code will result in a compile-time error.
B) This code will result in a run-time error.
C) The speak method defined in the Animal class will be called.
D) The speak method defined in the Dog class will be called.
E) The speak method will not be called at all.

9) When a subclass is instantiated, the superclass default constructor is executed first (TRUE/FALSE)

10) If the superclass does not contain a default constructor:
    A) That class cannot be a superclass
    B) A default constructor is created for you
    C) A runtime error will occur
    D) A parameterized constructor call must be the first statement in the   subclass

11) To override a method of a superclass a subclass needs have:
      A) An `@override` annotation
      B) The same method signature as the superclass method
      C) Same method name as the superclass method
      D) You cannot override methods in Java

12) In order to prevent a superclass method from being overridden by a subclass method use keyword
_____ in the method signature.

Programming Question:
1.
Create an `Animal` class with the following fields and methods:
        Fields: `name, age, weight.`
        Methods:
           o Getters and setters
           o Parameterized constructor which will take `name, age, weight as an argument`
           o `makeSound()` method which will return a string: "Sound"
           o `toString()` method which will return information about the animal
Create the following `Dog` class:
        Dog has to extend the `Animal` class
        Create a parametrized constructor which will take `name, age, weight as an argument`
        Override the `makeSound()` method so that it returns "Bark"
Create the following `Cow class:`
        `Cow has to extend Animal class`
        Create a parametrized constructor which will take `name, age, weight as an argument`
        `Override the makeSound()` method so that it returns "Moo"

Create a driver class and call it `Main`.
In the driver class create an `ArrayList` which will hold all the animals.
Add a cow to the list with the following parameters:
     `name="Sally", age = 2, weight = 400`
`Add a dog to the list with the following parameters:`
     `name="Bob", age = 1, weight = 50`
`Add an Animal to the list with the following parameters:`
     `name="Joe the Cat", age = 2, weight = 10`

Iterate through the list of animals and print the sound they make as well as the information about the animal.