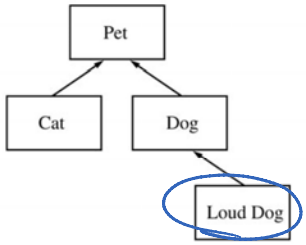
2004 Free Response #2

Tuesday, March 05, 2013
7:41 AM

2004 AP® COMPUTER SCIENCE A FREE-RESPONSE QUESTIONS

2. Consider the hierarchy of classes shown in the following diagram.



Note that a `Cat` "is-a" `Pet`, a `Dog` "is-a" `Pet`, and a `LoudDog` "is-a" `Dog`.

The class `Pet` is specified as an abstract class as shown in the following declaration. Each `Pet` has a name that is specified when it is constructed.

```
public abstract class Pet
{
  private String myName;

  public Pet(String name)
  {  myName = name;  }

  public String getName()
  {  return myName;  }

  public abstract String speak();
}
```

The subclass `Dog` has the partial class declaration shown below.

```
public class Dog extends Pet
{
  public Dog(String name)
  {  /* implementation not shown */  }

  public String speak()
  {  /* implementation not shown */  }
}
```

a) public class Cat extends Pet {

public Cat(String n) {
super(n);
}

public String speak() {
return "Meow";
}
}

b) public class LoudDog extends Dog {

public LoudDog(String n) {
super(n);
}

public String speak() {
return super.speak() + super.speak();
}
}

(a) Given the class hierarchy shown above, write a complete class declaration for the class `Cat`, including implementations of its constructor and method(s). The `Cat` method `speak` returns `"meow"` when it is invoked.

(b) Assume that class `Dog` has been declared as shown at the beginning of the question. If the `String` *dog-sound* is returned by the `Dog` method `speak`, then the `LoudDog` method `speak` returns a `String` containing *dog-sound* repeated two times.

Given the class hierarchy shown previously, write a complete class declaration for the class `LoudDog`, including implementations of its constructor and method(s).

(c) Consider the following partial declaration of class `Kennel`.

```
public class Kennel
{
  private ArrayList petList;     // all elements are references
                                 // to Pet objects

  // postcondition: for each Pet in the kennel, its name followed
  //                by the result of a call to its speak method
  //                has been printed, one line per Pet
  public void allSpeak()
  { /* to be implemented in this part */ }

  // ... constructor and other methods not shown
}
```

Write the `Kennel` method `allSpeak`. For each `Pet` in the kennel, `allSpeak` prints a line with the name of the `Pet` followed by the result of a call to its `speak` method.

In writing `allSpeak`, you may use any of the methods defined for any of the classes specified for this problem. Assume that these methods work as specified, regardless of what you wrote in parts (a) and (b). Solutions that reimplement functionality provided by these methods, rather than invoking these methods, will not receive full credit.

Complete method `allSpeak` below.

```
// postcondition: for each Pet in the kennel, its name followed
//                by the result of a call to its speak method
//                has been printed, one line per Pet
public void allSpeak()
```