CS 6311 – Programming Languages I – Fall 2006
Quiz #8 (20 pts)
Monday, 11/6/6

NAME: KEY

1. From what part(s) of memory does garbage collection free memory (code segment, data segment, stack, and/or heap)? (2 pts)

   Heap

2. Which method, the eager or lazy method, uses reference counting to help collect garbage? (1 pt)

   Eager

3. Explain why information hiding is such an important aspect of creating an abstract data type. (3 pts)

   Because it lessens the coupling that can occur when an object uses an abstract data type (ADT) allowing increased reliability and the flexibility of modifying the internals (underlying data) of the ADT without worrying about how it will affect objects that use the ADT. This is because the data underneath is prevented from being directly accessed by an outside object so the outside object cannot manipulate it unintended ways or make assumptions on how the underlying data is stored.

4. Describe a situation where an abstract class should include a concrete method? (4 pts)

   A method should be implemented as a concrete method in the abstract base class when the method has the same functionality (is implemented the same way) in any of the derived class. This prevents duplication of code, promoting code reuse.

Use the C# code snippets on the next page to answer the questions below.

5. Which of the two classes can be instantiated (Cat, SpottedCat, neither, or both)? (1 pt)

   SpottedCat

6. True or False. The virtual method PrintInfo must be implemented in the SpottedCat class. (2 pts)

   False.

7. True or False. The SpottedCat class can modify the Name and Age properties inherited from the Cat class. (2 pts)

   True.

8. What method(s) must the SpottedCat class implement as a result of being a derived from the Cat class? (2 pts)

   The Speak method.

9. Given the following code segment and the classes defined on the previous page:

```
public void PrintCat(Cat aCat)
{
    aCat.PrintInfo();
}
```

   What does the code below print out when it is called with the following code snippet? (3 pts)

```
Cat myCat = new SpottedCat("Garfield", 5, 150);
PrintCat(myCat);
```

   Name: Garfield Age: 5
   Spots: 150

10. What language would you prefer to do your final project in C# or Python?

Given the following C# code snippets answer the questions on the previous page:

```
abstract class Cat {
     private string name;
     private int age;

     public int Age {
         get { return age; }
         set { age = value; }
     }

     public string Name {
         get { return name; }
         set { name = value; }
     }

     public Cat() {
         Name = null;
         Age = 0;
     }

     public Cat(string name, int age) {
         Name = name;
         Age = age;
     }

     public virtual void PrintInfo() {
         Console.WriteLine("Name: {0} Age: {1}", Name, Age);
     }

     abstract public void Speak();
 }

 class SpottedCat : Cat {
     private int spots;

     public int Spots {
         get { return spots; }
         set { spots = value; }
     }

     public SpottedCat(int spots)        {
         Spots = spots;
     }

     public SpottedCat(string name, int age, int spots) : base(name, age) {
         Spots = spots;
     }

     public override void PrintInfo()
     {
         base.PrintInfo();
         Console.WriteLine("Spots: {0}", Spots);
     }
 }
```