Final Exam Winter 2010

Name: Student number:

1. [40%] Provide a clear definition and coding example for each of the following 8 object-oriented programming concepts:

   1) Abstract classes and abstract methods
   2) Interfaces
   3) Delegation (as used in various patterns, but which ones?)
   4) Wrappers and collection classes
   5) Recursive data structures compared to recursive methods
   6) Shadowing (of variables versus methods)
   7) Casting within a class hierarchy (either up or down)
   8) Casting between class instance an interface (either direction)

You can combine several concepts within one coding example, if you wish, but be sure to provide a clear written explanation for each term, its usage, importance, restrictions, and any special issues associated with each. Comment all code to assist your explanation.

2. [60%] Describe each of the following design patterns:

   1) The Visitor Pattern
   2) The State Pattern
   3) The Observer Pattern
   4) The Decorator Pattern
   5) The Strategy Pattern
   6) The Iterator Pattern

For each design pattern, provide a concise description, including in your answer:

a) The **goal(s)** or **benefits** typically gained by using the pattern.
b) The **limitations** or problems with using the pattern
c) With a **UML class diagram** show the structure of the pattern
d) Provide a typical **coding** example (just enough java to illustrate).
e) Show the mechanics of its execution with a **UML sequence diagram**.

3. [0%] What is your favorite color?