Computer Science 245
Test 1. Algorithms; OO concepts.

Algorithms and analysis

- Given an algorithm with a loop, write a reasonable and useful invariant that describes what the loop is holding constant.
- Given an algorithm, analyze it to find a worst-case and best-case running time with a big-oh category.
  - Expect a problem where the worst case and best case have different big-oh categories.
  - You'll need to know Gauss's formula for an arithmetic series ($\sum_{i=1}^{n} = \frac{(n+1)n}{2}$), but nothing beyond that about summations.

Java (OO features)

- Know these features, and be able to use them
  - static
  - final
  - abstract
  - subclassing (extension)
  - overriding
  - super
- Explain what each feature does; be able to write a short (proof-of-concept) class or set of classes using some of these; identify appropriate times to use them.

OO concepts

- UML
- Reuse: extension and composition
- Coupling and cohesion
- Know how to draw the UML diagram elements from the handout.
- Given a program specification, be able to sketch a solution (in terms of class/type hierarchies and interactions) using a UML diagram.
- Given the description of a system and a UML diagram (like in the handout), critique the design (in terms of being tightly coupled, containing redundant code, or being difficult to extend) and suggest an improvement (with a UML diagram).