**Data Structures Review**
**Professor Blank**
**Fall 2010**

*Categories of Topics*

1) **Data Structures**
   - Linked List
   - Dictionary (Hash, Hash Table, Associative List)
   - Tree
   - Graph: directed, acyclic, cyclic
       1) Vertices, Nodes, and States
       2) Fringe Unseen, and Adjacency Vertices
   - Stack, First-in, Last-out (FILO)
   - Queue, First-in, First-out (FIFO)
   - Abstract Data Type
2) **Object Oriented Programming**
   - Inheritance/Subclass
   - Multiple Inheritance vs. Interface
   - overriding methods
   - extend class
   - Derived vs. Base Class
   - Instance vs. Class
   - Constructor
3) **Algorithms, and Analysis of Algorithms**
   - Big O notation
   - Sorting and Searching
   - Sort algorithms: slow, bubble, merge, and quick
   - Divide and Conquer Algorithms
   - Breadth First Search
   - Depth First Search
   - Orders of Complexity: constant, linear, quadratic, exponential
4) **Recursion**
   - Base case
   - Examples: length of linked list, insert into binary tree, search, etc.
   - Recursive algorithms
   - Recursive data structures
5) **Python**
   - Review: expressions, variables, defining functions, boolean expressions, control blocks (if, else, elif, while, for), assignment, strings, integers, floating point numbers, modules/libraries, calling methods and functions
   - Differences between Python 2 and Python 3
   - File manipulation
   - Defining Classes
   - Defining Methods

- Special "magic" methods: \_\_len\_\_, \_\_init\_\_, \_\_getitem\_\_, \_\_setitem\_\_, etc.
- self
- Using * with list of arguments
- List Comprehension

6) **Assignments**
- Prime numbers
- Unique words in a text
- Common words in a text
- Class of friends
- Linked List
- Binary Tree
- 20 Questions
- Interactive Fiction

*What's next?*

Parallel Programming
High Performance Computing
Compilers
Artificial Intelligence
C, Java, C#, Perl, Lisp, etc.
Hardware
Analysis of Algorithms
Theory of Computation
Logic
Cognitive Science
Emergence
Computational Linguistics
Web Design
Databases
Game Theory
Graphics
Information and Coding Theory
Computer Organization
Programming Languages
Computational Models