CSCI 104L Final Review

ALGORITHMS:
- Recursion: Programming, and Analysis
- Graph search: BFS, DFS, Dijkstra, A*
- Hash functions

MATHEMATICAL ANALYSIS:
- Product/Subtraction/Division Rule
- Permutations and Combinations
- Binomial Theorem
- Distinguishable/Indistinguishable objects and boxes
- Conditional Probability/Independence/Bayes' Theorem
- Expectation/Linearity of Expectations
- The Geometric Distribution
- Euclidean Algorithm/Prime Numbers
- Cryptography

GRAPHS AND TREES:
- Undirected/directed/weighted
- Adjacency Lists, Adjacency Matrices
- Complete trees
- Binary Search Trees
- Backtracking

DATA STRUCTURES:
- for all of them: the functions they provide, how and where to use them, how they are implemented, how fast the operations are.
- Linked Lists
- Arrays and Lists
- Heaps
- Binary Search Trees/AVL Trees
- Splay Trees
- Hash Tables/Bloom Filters
- Tries/Compressed Tries/Suffix Trees
- ADTs: Lists, Queues, Stacks, Maps, Sets, Priority Queues

RUNTIME ANALYSIS:
- Definition of worst-case time
- Amortized worst-case runtime analysis: piggy-bank method
- How to provide upper and lower bounds
- How to perform calculations with big-O/Omega/Theta
- Setting up sums for loops, and recurrences for recursion
- Basic sums: arithmetic, geometric, harmonic

C++ PROGRAMMING:
- object-oriented design
- constructors and destructors, including shallow and deep copies
- rule of 3/dynamic memory allocation
- inheritance and polymorphism in C++: virtual functions, abstract classes, and scoping
- the const keyword, and how and why to use it.
- exceptions
- iterators/STL
- templates