CSE 373 Foundations of Computer Science: Honors

Lecture 1

Course Topics

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1 Course Topics

There are some topics that I'll to cover. Some of the topics at the end in probability theory and number theory, we'll only get to cover if we're lucky.

- Course introduction and objectives
- How to be an A student
- Review of logs and other functions
- Summing geometric and arithmetic series
- Order notation
- Deathbed formulae
- Divide and conquer
- Sorting (bubble sort, insertion sort, merge sort)
- Solving recurrences (several different approaches)
- Recurrences for (searching on a binary tree, computing a^n , binary search)
- Repeated doubling
- Matrix multiplication (iterative, divide-and-conquer, improvements such as Strassen)
- Finding a loop in a linked list
- Using induction to prove that we have the correct solution to a recurrences
- More mathematical preparation for linear-time selection
- Quick sort
- Linear-time selection
- Balanced search trees (2-3 trees, 2-4 trees)
- Amortization (how it helps hashing, weight-balanced search trees)
- Computing for cache-and I/O-efficiency
- Dynamic programming (knapsack problem, edit distance, edit distance with small space, finding line breaks in a document, etc)
- Shortest Paths (in a dag, singlesource, all pairs)
- Minimum spanning trees (Prims, Kruskalls, Borovka)
- NP-completeness and hardness
- Reductions