CS 362, Review

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Midterm

- 5 questions
- There will be some time pressure, so make sure you can solve problems both quickly and correctly.
- I expect a class mean between 55 :(and 70 :) points

Topics Covered

- Probability and Randomized Algorithms: Linearity of Expectation, Union Bounds, Markov's inequality. Randomized Quicksort.
- Recurrence Relations and Induction (Chapter 3 and 4 in text) : Definitionss of big-O and friends, recursion trees, Master method, annihilators and change of variables; Proof by induction!
- Dynamic Programming: String Alignment, Matrix Multiplication, Longest Common Subsequence (Chapter 15)
- Greedy Algorithms: Activity selection, fractional knapsack, MST, proof via exchange property (Chapter 16)
- Amortized Analysis: Aggregate Method, Accounting Method, Potential Method (Chapter 17)

Example Problem - Short Answer

Collection of true/false questions, matching and short answer questions. Some examples:

- Short Answer, $\Theta()$ notation
- Multiple Choice e.g. I give you some "real world" problems and ask you which algorithm we've studied in class that you would use to solve each of them; I give you some problems and ask you how fast they can be solved, etc.
- Know the resource bounds for all algorithms covered.

Problem - Induction/Recursion

Possibilities:

- Proof by Induction
- Recursion/Recurrences

Problem - Dynamic Programming/Greedy

- Key focus will be on getting the correct recurrence relation
- Probably related to some problem we did in class and/or homework
- Practice solving a big problem by using solutions to sub-problems
- Greedy: Show greedy algorithm for the problem fails and/or give correct greedy algorithm for a variant of the problem

Problem - Probability

- Use Linearity of Expectation, Union Bounds, Markov's inequality to solve problems
- Remember: LOE and Union Bounds work even without independence or random variables/events.

Problem – A Harder Problem

- Uses tools from class
- May need to apply them in a new/clever way
- Requires lots of thinking, little writing.