CSci 421
Introduction to Algorithms

Midterm Study Guide

Midterm: Friday, Feb 13, 2004

Winter 2004
Handout 5

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- Growth rates of functions: o, O, Ω and Θ notation; definitions, limit test.

- Induction and examples of designing algorithms by induction: Horner's rule, maximal induced subgraph, 1-1 mappings, skyline, max consecutive subsequence, max increasing subsequence.

- Dynamic Programming. Postage stamps/making change. Matrix chain products. Minimum edit distance/string alignment. 0-1 knapsack.

- Examples where greedy algorithms may fail: 0-1 knapsack problem, stamps/making change.

- Greedy algorithms for fractional knapsack problem, and optimal prefix codes (Huffman codes).

- Graph definitions: directed-, undirected-, weighted-graph; path, simple path, cycle, simple cycle, connected graph, tree, spanning tree, cut.

- Minimum spanning tree problem.

  - Characterization of MST in case all edge weights are distinct: the MST is unique; an edge is in the MST iff it is the lightest edge in some cut; an edge is in the MST iff it is not the heaviest edge in any simple cycle.

  - Algorithms for computing MST (Kruskal and Prim).

- Other Graph Algorithms. Breadth-first search. Depth-first search. Articulation points and biconnected components.