

CSE 421
Introduction to Algorithms
Review Topics for Midterm

Winter 1999

Handout 9

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- Growth rates of functions: O , Ω and Θ notation.
- Divide-and-Conquer algorithms. Mergesort, integer multiplication, closest pair problem, Strassen's matrix multiplication algorithm.
- Divide-and-conquer recurrence $T(n) = aT(\frac{n}{b}) + n^d$. If $d < \log_b(a)$ then $T(n) = \Theta(n^{\log_b(a)})$; if $d = \log_b(a)$ then $T(n) = \Theta(n^d \log(n))$; if $d > \log_b(a)$ then $T(n) = \Theta(n^d)$.
- Dynamic Programming. Postage stamps/making change. Matrix chain products. Longest common subsequence. Minimum edit distance. (0 – 1 knapsack.)
- Examples where greedy algorithms may fail: 0 – 1 knapsack problem, making change.
- Greedy algorithms for fractional knapsack problem, and optimal prefix codes (Huffman codes).
- Minimum spanning tree problem. Graph definitions: path, simple path, cycle, simple cycle, connected graph, tree, spanning tree, cut.
- 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 a MST.
- Graph Algorithms. All pairs shortest paths; Floyd-Warshall algorithm. Transitive Closure. Single source shortest paths; Dijkstra algorithm.

Midterm Review/Study Session Tuesday ???
