

22000 Algorithms, Summer 2004, CCNY CUNY

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Practice problems for Final Exam

1. Be ready to present illustrations and fields' values (like π , d , etc.) of sortings produced by the studied algorithms:
 - Matrix-chain multiplications (Section 15.2)
 - Longest Common subsequence (Section 15.4)
 - Greedy Activity Selector (section 16.1)
 - Huffman codes (Section 16.3)
 - Elementary Graph algorithms (BFS, DFS, Topological sort, Strongly connected components sort)
 - Minimum spanning trees algorithms
 - Single-Source Shortest Paths algorithms
2. Give an algorithm that determines whether or not a given undirected graph $G = (V, E)$ contains a cycle. Your algorithm should run in $O(V)$ time, independent of $|E|$. (this is problem 22.4-3 from the book). You can write a pseudocode or you can simply describe the operation of the algorithm in your own words.
3. Let's consider directed graphs and their strongly connected components. Given a directed graph $G = (V, E)$ explain how to create another graph $G' = (V, E')$ such that
 - a) G' has the same strongly connected components as G
 - b) G' has the same component graph (G'^{SCC}) as G (i.e. $G'^{SCC} = G^{SCC}$)
 - c) E' is as small as possible
4. Give a simple example of a directed graph with negative-weight edges for which Dijkstra's algorithm produced incorrect answers.
5. Look through the proof of Lemma 26.2 (new book) or Lemma 27.2 (old book).
6. Look through the homeworks for Chapters 13, 15, 16, 23, 24 (new book) or for Chapters 14, 16, 24, 25 (old book) since problems from these chapters are not presented here.