

CSci 421
Introduction to Algorithms
Final Study Guide

Final Exam: Thursday Aug. 19, 2004

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- Everything on the Midterm Review Sheet
- Depth-first search. Tree-, cross-, forward-, back-edges; DFS numbering.
- Bi- and Strongly connected components. Definitions, exits, LOW function.
- Maximum Flow and matching. Capacity, flow, residual capacity/graph, augmentation, Max Flow/Min Cut Theorem. Integrality Theorem. Ford-Fulkerson and Edmonds-Karp algorithms. Bipartite matching; reduction to flow.
- NP-completeness. P, NP, verification/certificates/witnesses, non-determinism, reduction, completeness. Example problems: **SAT**, **3-SAT**, clique, vertex cover, 0-1 knapsack, partition, coloring, Hamilton cycle, TSP.
- Coping with NP-completeness. Restricted subproblems, exhaustive search or backtracking, heuristics, (branch-and-bound, guaranteed approximations).