Final Exam Topics
Spring 2005

The final exam is Monday June 6 from 12:00 to 3:00 pm in the standard room. Like the midterms, it is a closed-book exam but you may have one 3-by-5 card of notes written in your own hand. Calculators will not be allowed.

You are responsible for chapters 1 through 9, 15, 16.1–16.3, 25.1–25.2, and 28.2 in the book¹ as well as appendices A and B. You are also responsible for understanding the induction, asymptotic notation, and branch and bound handouts on the class web page. The final will be comprehensive with a slight emphasis on the material covered since the second midterm. That material is listed below (see the midterm review sheets for a list of the other material). Good topics for long questions on the final include: induction, lower bounds, dynamic programming, and greedy algorithms. Questions relating to divide and conquer, backtracking and/or branch and bound, indicator variables, and the asymptotic notation are also likely.

Here are the topics we have covered in lecture since the second midterm.

1. Floyd-Warshall all pairs shortest paths
2. viewing solution space as tree of partial solutions
3. backtracking
4. branch and bound
5. greedy algorithms - proving correct
6. fooling greedy algorithms - showing that they do not always find optimal solutions

Here are a couple of practice problems on the later material. I will not have time to write up full solutions, but if you want to see how to solve a particular problem is solved I can outline the solution on WebCT.

1. Exercise 16.1-4
2. Exercise 16.2-4 on page 384 (picking gas stations)
3. A CNF (conjunctive normal form) is a boolean formula that is an "and" of "or"s. For example, if \(v_1, v_2, v_3\) are boolean variables and \(\bar{v}_i\) means "not \(v_i\) then \((\bar{v}_1) \land (v_1 \lor v_2 \lor v_3) \land (\bar{v}_2 \lor v_3)\) is a CNF formula. Use backtracking to find a settings of the variables that make the formula true. Continue your search to find all settings of the variables that make the formula true.
4. Draw a small (say 3- or 4-node) directed graph with costs on the edges and run the Floyd Warshall algorithm to solve the all-pairs shortest path problem.

¹Chapter 5 is less important as long as you understand indicator random variables and the average case analysis of Quicksort, and much of chapters 6-8 should be review of material from CMPS 101.