Discrete Optimization - 308-566A

SECOND CLASS TEST No books, notes, calculators or cheating!

November 7, 2002 1:05 - 2:20pm

(5 pts) 1. Explain briefly how the dual simplex method differs from the primal simplex method. Describe situations in which the dual simplex method would be your method of choice.

(5 pts) 2. Given a directed graph and two of its vertices s and t, show how to determine by the **network simplex method** if the graph has a **directed path** from s to t (ie. there is a path from s to t where each edge is followed in its given direction). Formulate the problem as a transhipment problem, and show which termination condition proves the existence of a path, and which proves that no such path exists. Illustrate both cases on small examples.

3. (15 pts) Consider the network below, where the numbers on the edges are costs. The supply/demands for each node are: $b_1 = 4, b_2 = -3, b_3 = -4, b_4 = 3, b_5 = 0$. You are given the feasible solution: $x_{25} = 3,\ x_{34} = 4,\ x_{41} = 1,\ x_{51} = 3$.
(a) Starting from the given solution, find the optimum solution for the minimum cost transhipment problem using the network simplex method.
(b) Write out the problem in the matrix form: $\min cx,\ Ax = b,\ x \geq 0$. Using the above starting solution, perfom one iteration of the **revised simplex method,** showing the equivalence of each step in (b) with each step in (a).