

Midterm Examination II

CS 525, Semester II, 2000-2001

Wednesday March 7, 2001

If a problem has no solution or an infinite number of solutions, you must clearly state so and *justify* your claim. Each problem can be solved in 3 tableaus or less including the initial tableau.

1. (a) Solve:

$$\begin{array}{ll} \max & 3 - x_1 + 3x_3 \\ \text{subject to} & x_1 - x_3 \geq -1 \\ & x_2 \leq 2 \\ & x_1 + x_2 + x_3 = -1 \\ & x_1 \text{ free, } x_2 \geq 0, x_3 \geq 0 \end{array}$$

- (b) Is the optimal solution unique?

2. Consider the problem:

$$\begin{array}{ll} \min & x_1 + x_2 + x_3 \\ \text{subject to} & x_1 + 2x_2 \geq 1 \\ & x_1 - x_2 + x_3 \geq 2 \\ & x_1 \leq 1 \\ & x_1, x_2, x_3 \geq 0 \end{array}$$

- (a) Write down the dual of this problem and a feasible point for the dual problem.
- (b) Determine a lower bound on the objective value of the original problem without constructing any tableaus.
- (c) How would you generate an upper bound for the (optimal) objective value of the original problem?