Midterm Examination I

CS 525, Semester II, 2000-2001

Monday March 5, 2001

If a problem has no solution or an infinite number of solutions, you must clearly state so and *justify* your claim. Linear dependence relationships should be explicitly stated if they are present.

Each problem can be solved in 3 tableaus or less including the initial tableau.

1. Solve $Ax = b$ where

$$A = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & -1 & 3 & 0 \\ -1 & -2 & -6 & -3 \end{bmatrix}, \quad b = \begin{bmatrix} 1 \\ 2 \\ -5 \end{bmatrix}$$

   What happens if b_3 changes from -5 to -4?

2. Find a solution to the system of inequalities (hint: Phase I):

$$\begin{array}{rcl} 2x_1 - x_2 - 3x_3 & \leq & -1 \\ x_1 + 2x_2 + x_3 & \leq & 4 \\ x_1 + 2x_2 - x_3 & \geq & 3 \\ x_1, x_2, x_3 & \geq & 0 \end{array}$$

   How many solutions are there?