ASSIGNMENT #11
ENGR/MATH 510
[due 12/3/07]

1. Consider the following problem:

$$\text{minimize} \quad -x_1 - x_2$$

subject to:

$$2x_1 + x_2 \le 4$$
$$x_1, x_2 \ge 0$$

(a) Solve this linear programming problem graphically.
(b) Starting with the initial solution $\mathbf{x}^T = (0.1, 0.1)$, solve this problem by the affine scaling algorithm (perform 3 iterations only).
(c) Illustrate the progress of the algorithm on the graph of part (a).
(d) Write the dual of this problem, sketch the feasible region of the dual (note: feasible region is just 1-dimensional), and find the dual solution graphically. Illustrate on this graph that the sequence of **w**'s generated in the affine scaling algorithm are converging to the optimal dual solution.

2. Consider the following problem:

$$\text{minimize} \quad -x_1 - x_2$$

subject to:

$$2x_1 + x_2 + x_3 = 1$$
$$x_1, x_2, x_3 \ge 0$$

(a) Set up the Phase I problem formulated by Karmarkar for finding an initial strictly positive solution.
(b) Apply the affine scaling algorithm to the Phase I problem to find an initial strictly positive feasible solution.