COMP566

Homework 1 Due: Tues September 22, 2005

1. Given the final dictionary for a linear programming problem, explain how you would efficiently recover the *original* problem. (Assume variables are labelled in the usual way.) Illustrate your method to find the original problem that corresponds to the optimum dictionary:

$$x_3 = 3 + 5x_2 + 2x_4 - 3/2x_5$$

$$x_1 = 1 - 3x_2 - x_4 + 1/2x_5$$

$$z = 11 - 2x_2 - x_4 - 1/2x_5$$

2. A company must distribute its product from two warehouse locations to two retail outlets. Warehouse A has a total of 48 units and warehouse B has a total of 60 units. Forecasted demand is 36 units for retail outlet 1 and 72 units for retail outlet 2. The unit shipping costs from warehouse A are \$6 to outlet 1 and \$8 to outlet 2, and from warehouse B they are \$4 to outlet 1 and \$3 to outlet 2. Formulate this problem as a linear program and convert it to standard form. Solve the problem using lp_solve (see http://cgm.cs.mcgill.ca/~avis/courses/566/2005/announce.html).

3. Solve the following LP by hand using the simplex method and Bland's least subscript rule.

$$\max x_1 + 3x_2 - 2x_3$$

$$-2x_1 + x_2 + 3x_3 \leq 6$$

$$x_1 + x_2 + 4x_3 \leq 10$$

$$x_2 + 2x_3 \leq 6$$

$$-2x_1 + 2x_2 + 3x_3 \leq 12$$

$$x_1, x_2, x_3 \geq 0$$

Show the first three dictionaries and the final dictionary. For each pivot, list the entering and leaving variable. You may use maple or some other system to solve the systems of equations.

Policy on Late Assignments: -10% per day, including weekends. Assignments are due in class. Hand in late assignments to Conor Meagher, MC232.