COMP566 Discrete Optimization - I
Homework 1 Due: Tues September 23, 2003

1. Linear Programming, V. Chvatal, exercise 1.8 p.11. Formulate the problem and solve it using a package such as lp_solve or Maple.

2. We know that the simplex method using Dantzig's rule and by breaking ties arbitrarily can cycle. Show this happens on the following example found by Komei Fukuda. Hints: For the first pivot choose x_1 as the entering variable. Choose the second pivot so that you get essentially the starting dictionary back, only the variables have different indices. The cycle has length 6. Work the problem through by hand!

$$x_4 = -2x_1 + x_2 - x_3$$

$$x_5 = -3x_1 - x_2 - x_3$$

$$x_6 = 5x_1 - 3x_2 + 2x_3$$

$$z = x_1 - 2x_2 + x_3$$

3. Suppose you have an optimal dictionary where the corresponding basic feasible solution has the property that **each** basic variable is strictly positive. Does this imply that there is a unique optimum solution for the problem? If so, prove it. If not, give a counter-example and an additional condition which guarantees a unique optimal solution.

Policy on Late Assignments: -10% per day, including weekends. Assignments are due in class. Hand in late assignments to Bohdan Kaluzny, MC105.