COMP566 Discrete Optimization I

Homework 3 Due: Friday, November 5 , 2005

Page numbers refer to Linear Programming, V. Chvatal

Hand in by 4pm to Conor (McConnell 232) or put in my mailbox (McConnell 318).

1. Using the **dual simplex method** solve the problem:

$$\min 5x_1 + 9x_2 + 23x_3$$

$$20x_1 + 35x_2 + 95x_3 \geq 319$$

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

Use the dictionary method as described in Chvatal pp 148-153.

You can stop after generating 5 cutting planes.

2. Solve the LP in problem 1 as an integer program using cutting planes. Start with the optimum dictionary you obtained in solving problem 1. Introduce cutting planes as described in the class handout until you obtain an integer solution. Show the derivation of each cut.

3. Let $c_1, \cdots, c_4$ be any four integers. Prove that the LP relaxation of the integer program

$$\max z = c_1x_1 + c_2x_2 + c_3x_3 + c_4x_4$$

$$x_1 + x_2 \leq 1$$

$$x_3 + x_4 \leq 1$$

$$x_1 + x_3 \leq 1$$

$$x_2 + x_4 \leq 1$$

$$x_1, \cdots, x_4 \geq 0 \text{ and } integer.$$

always has an integer optimum solution.