Computer Methods in Operations Research - I

Homework 4 Due: October 27, 1998 (5pm, hard deadline!)

Consider the following LP:

$$\max z = 15x_1 + 8x_2 + 10x_3 + 12x_4$$
subject to:
$$x_1 + 2x_2 + x_4 \le 20$$
$$x_1 + x_2 + x_3 + x_4 \le 54$$
$$2x_1 + x_3 + x_4 \le 36$$
$$x_1, x_2, x_3, x_4 \ge 0$$

(a) You are told the optimum solution is $x_2 = 10$ and $x_3 = 36$ with $x_1 = x_4 = 0$. Compute the optimum dual solution, and verify optimality by the complementary slackness theorem.

(b) Suppose the coefficient of x_4 in the objective function changes from 12 to 16, use sensitivity analysis to compute the new optimal solution.

(c) Add the constraint

$$3x_1 + 2x_2 + 2x_3 + x_4 \le 80$$

to the **original** problem, and reoptimize using sensitivity analysis.

(d) Suppose a new variable is added to the **original** problem with objective coefficient 16 and coefficients 1, 2, and 1 respectively in each of the three constraints. Use sensitivity analysis to compute the new optimal solution.

Class test on Thursday October 29. Solutions will be posted on the web site ftp://mutt.cs.mcgill.ca/pub/courses/566 on Wednesday morning.

Hand in assignment in class or in my mailbox, MC318 before deadline.