

620-261 Introduction to Operations Research

ASSIGNMENT 8

Post in boxes by 3.00 pm on Monday 12th May 2008

1. The primal LP,

Maximise

$$z = -x_1 + 2x_2 - x_3, \quad (1)$$

such that

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

$$x_1 + 4x_2 + 2x_3 \leq 4$$

and x_1 , x_2 and x_3 are all non-negative, has optimal solution $x_1^* = x_3^* = 0$, $x_2^* = 1$ and $z^* = 2$.

(a) Write down D , the dual of P .

(b) Use the complementary slackness theorem to find the optimal solution of D .

2. Consider the LP

Maximise

$$z = 7x_1 + 6x_2 + 5x_3 - 2x_4 + 3x_5, \quad (2)$$

such that

$$x_1 + 3x_2 + 5x_3 - 2x_4 + 2x_5 \leq 4$$

$$4x_1 + 2x_2 - 2x_3 + x_4 + x_5 \leq 3$$

$$2x_1 + 4x_2 + 4x_3 - 2x_4 + 5x_5 \leq 5$$

$$3x_1 + x_2 + 2x_3 - x_4 - 2x_5 \leq 1$$

and x_1 , x_2 , x_3 , x_4 and x_5 are all non-negative. A proposed solution is $\mathbf{x}^* = (0, 4/3, 2/3, 5/3, 0)$. Use the complementary slackness theorem to test whether it is optimal. You will have to write out the dual.