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Turnin by:

Tutorials

Optimisation

2018

Exercise Sheet 8

Exercise 15:
Consider the following linear program:

$$\begin{array}{lrcrcrcl} \min & -3x_1 & - & 5x_2 & - & x_3 & & \\ s.t. & x_1 & + & 3x_2 & + & 2x_3 & \leq & 10 \\ & 2x_1 & + & 3x_2 & + & 2x_3 & \leq & 9 \\ & 2x_1 & + & 2x_2 & + & x_3 & \leq & 6 \\ & & & x_1, & x_2, & x_3 & \geq & 0 \end{array}$$

(a) Convert the problem into standard form and construct a basic feasible solution at which $(x_1, x_2, x_3) = (0, 0, 0)$.

(b) Carry out **two pivots** of the simplex method, starting at the basic feasible solution of part (a). Use Bland's rule to determine the pivot element.

Exercise 16:
Consider the following linear program:

$$\begin{array}{lrcrcrcrcr} \min & 10x_1 & + & 20x_2 & + & 12x_3 & + & 2x_4 & & \\ s.t. & & & 4x_2 & + & 4x_3 & + & 2x_4 & \geq & 1 \\ & x_1 & + & x_2 & + & 5x_3 & + & x_4 & = & -2 \\ & x_1 & + & x_2 & + & x_3 & & & \geq & -5 \\ & 4x_1 & + & 4x_2 & & & & & \geq & -8 \\ & & & & & & & x_1 & \leq & 0 \\ & & & & & & & x_2 & \leq & 0 \\ & & & & & & & x_4 & \geq & 0 \end{array}$$

(a) Construct the dual (D) of this LP.

(b) Verify that $x^* = (0, -2, -3, 15)$ is optimal, using complementary slackness.