

Latex code for writing an LP problem and a dictionary

Michael Floater

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Here is an LP problem:

$$\begin{aligned} & \text{maximize} && 6x_1 + 8x_2 + 5x_3 + 9x_4 \\ & \text{subject to} && 2x_1 + x_2 + x_3 + 3x_4 \leq 5, \\ & && x_1 + 3x_2 + x_3 + 2x_4 \leq 3, \\ & && x_1, x_2, x_3, x_4 \geq 0. \end{aligned}$$

We introduce the slack variables

$$\begin{aligned} w_1 &= 5 - 2x_1 - x_2 - x_3 - 3x_4, \\ w_2 &= 3 - x_1 - 3x_2 - x_3 - 2x_4, \end{aligned}$$

and then the initial dictionary is

$$\begin{array}{rcccccccc} \eta & = & & 6x_1 & + & 8x_2 & + & 5x_3 & + & 9x_4 \\ \hline w_1 & = & 5 & - & 2x_1 & - & x_2 & - & x_3 & - & 3x_4 \\ w_2 & = & 3 & - & x_1 & - & 3x_2 & - & x_3 & - & 2x_4 \end{array}$$