Suppose a linear program has ith matrix constraint

$$\begin{aligned} \mathbf{a_i}\,\mathbf{x} &\leq\ b_i \text{ or} \\ \mathbf{a_i}\,\mathbf{x} &\geq\ b_i \text{ or} \\ \mathbf{a_i}\,\mathbf{x} &=\ b_i \end{aligned}$$

and jth variable constraint

$$x_j \leq 0 \text{ or}$$
$$x_j \geq 0 \text{ or}$$
$$x_j \text{ free (unrestricted).}$$

Let $\mathbf{A}$ be the matrix with ith row $\mathbf{a_i}$, and let $\mathbf{A_j}$ be the jth column of $\mathbf{A}$. Then

If the LP is a **minimization** problem, then

the matrix constraint	$\mathbf{a_i x} \geq b_i$	dualizes to	the variable constraint	$y_i \geq 0$
	$\mathbf{a_i x} \leq b_i$			$y_i \leq 0$
	$\mathbf{a_i x} = b_i$			y_i free

the variable constraint	$x_j \geq 0$	dualizes to	the matrix constraint	$\mathbf{y^T A_j} \leq c_j$
	$x_j \leq 0$			$\mathbf{y^T A_j} \geq c_j$
	x_j free			$\mathbf{y^T A_j} = c_j$

If the LP is a **maximization** problem, then

the matrix constraint	$\mathbf{a_i x} \geq b_i$	dualizes to	the variable constraint	$y_i \leq 0$
	$\mathbf{a_i x} \leq b_i$			$y_i \geq 0$
	$\mathbf{a_i x} = b_i$			y_i free

the variable constraint	$x_j \geq 0$	dualizes to	the matrix constraint	$\mathbf{y^T A_j} \geq c_j$
	$x_j \leq 0$			$\mathbf{y^T A_j} \leq c_j$
	x_j free			$\mathbf{y^T A_j} = c_j$