

## A Comparison of the Workshop (Primal) LP and the Takeover (Dual) LP

The objective functions are ‘opposites.’

<b>maximize</b>	$3x_1 + 2x_2 + 4x_3$	<b>minimize</b>	$200y_1 + 200y_2 + 40y_3$
subject to	(Workshop)	subject to	(Takeover)
	$2x_1 + x_2 + x_3 \leq 200$		$2y_1 + y_2 + y_3 \geq 3$
	$x_1 + x_2 + 2x_3 \leq 200$		$y_1 + y_2 \geq 2$
	$x_1 \leq 40$		$y_1 + 2y_2 \geq 4$
	$x_1, x_2, x_3 \geq 0$		$y_1, y_2, y_3 \geq 0$

Each variable  $(x_1, x_2, x_3)$  in the primal problem has a constraint in the dual

maximize	$3x_1 + 2x_2 + 4x_3$	minimize	$200y_1 + 200y_2 + 40y_3$
subject to	(Workshop)	subject to	(Takeover)
	$2x_1 + x_2 + x_3 \leq 200$		$2y_1 + y_2 + y_3 \geq 3$
	$x_1 + x_2 + 2x_3 \leq 200$		$y_1 + y_2 \geq 2$
	$x_1 \leq 40$		$y_1 + 2y_2 \geq 4$
	$x_1, x_2, x_3 \geq 0$		$y_1, y_2, y_3 \geq 0$

Each constraint in the primal (Small Bricks, Big Bricks, Tee Limit) has a variable in the dual.

maximize  $3x_1 + 2x_2 + 4x_3$   
subject to (Workshop)

$$2x_1 + x_2 + x_3 \leq 200$$

$$x_1 + x_2 + 2x_3 \leq 200$$

$$x_1 \leq 40$$

$$x_1, x_2, x_3 \geq 0$$

minimize  $200y_1 + 200y_2 + 40y_3$   
subject to (Takeover)

$$2y_1 + y_2 + y_3 \geq 3$$

$$y_1 + y_2 \geq 2$$

$$y_1 + 2y_2 \geq 4$$

$$y_1, y_2, y_3 \geq 0$$