

Page 165. For each given primal problem, find the dual problem.

PRIMAL PROBLEM

DUAL PROBLEM

2(2).

Min  $z = 6x + 6y + 8u + 9v$

with

$r: x + 2y + u + v \geq 3$

$s: 2x + y + 4u + v \leq 8$

$x, y, u, v \geq 0$

with

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4(2).

Max  $z = 2x + y + 3u + 4v$

with

$r: 4x + 2y + 5u + 5v \leq 10$

$s: 4x - 2y - 5u - 5v \geq 5$

$t: 3x - 5y - 4u - v \geq 8$

$p: 3x + 5y + 4u + v \leq 15$

$q: x + y + u + v = 20$

$x, y, u, v \geq 0$

with

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6(2). You change the sign for a two-phase problem, but not for a dual problem.

Min  $z = 5x + 2y + 6u$

with

$r: 4x + 2y + u \geq 12$

$s: -3x - 2y - 3u \leq -6$

$x, y \geq 0, u$  unrestricted

with

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New(2). Give an example of a standard problem whose dual problem has one constraint and two variables and a unique optimal solution. Hint, the dual of a dual problem is a primal problem.