Assignment 8 Solutions

1/ (a) D is minimise $2y_1 + 4y_2$

s.t. $2y_1 + y_2 \geq -1$

$y_1 + 4y_2 \geq 2$

$3y_1 + 2y_2 \geq -1$

$y_1, y_2 \geq 0$.

(b). The ~~second~~ first primal constraint is satisfied with inequality $\Rightarrow y_1^* = 0$.

$x_2^* > 0 \Rightarrow$ The second dual constraint is satisfied with equality $\Rightarrow y_2^* = \frac{1}{2}$.

$\therefore$ The optimal solution of D is $(y_1^*, y_2^*) = (0, \frac{1}{2})$ with $w = 2$

2/ D is minimise $4y_1 + 3y_2 + 5y_3 + y_4$

s.t. $y_1 + 4y_2 + 2y_3 + 3y_4 \geq 7$

$3y_1 + 2y_2 + 4y_3 + y_4 \geq 6$

$5y_1 - 2y_2 + 4y_3 + 2y_4 \geq 5$

$-2y_1 + y_2 - 2y_3 - y_4 \geq -2$

$2y_1 + y_2 + 5y_3 - 2y_4 \geq 3$

$y_1, y_2, y_3, y_4 \geq 0$.

With x^*, the third constraint is satisfied with inequality $\Rightarrow y_3^* = 0$

The second, third and fourth primal variables are positive $\Rightarrow$ the corresponding dual constraints must be satisfied with equality. $\therefore$

$3y_1^* + 2y_2^* + y_4^* = 6$

$5y_1^* - 2y_2^* + 2y_4^* = 5$

$-2y_1^* + y_2^* - y_4^* = -2$.

solution is $(y_1^*, y_2^*, y_4^*) = (1, 1, 1)$ but not $(y_1^*, y_2^*, y_3^*, y_4^*) = (1, 1, 0, 1)$

The dual solution satisfies constraints (1) & (5) so is not feasible.

$\therefore$ ~~The~~ The primal ~~and dual solutions are optimal. $z^* = w^* = 8$.~~ solution is not optimal.