$$\max \quad -4x_1 + 3x_2 - x_3$$
$$x_1 + 3x_2 \geq 10$$
$$x_1 - x_2 + 4x_3 \geq 8$$
$$x_1 \geq 0,\ x_2 \leq 0,\ x_3 \geq 0$$

$\Downarrow$ STD

$$\min \quad 4x_1 + 3\bar{x}_2 - x_3$$
$$x_1 - 3\bar{x}_2 - x_4 = 10$$
$$x_1 + \bar{x}_2 + 4x_3 - x_5 = 8$$
$$x_1, x_2, x_3, x_4, x_5 \geq 0$$

$\Downarrow$ DUALE

$$\max \quad 10y_1 + 8y_2$$
$$y_1 + y_2 \leq 4$$
$$-3y_1 + y_2 \leq 3$$
$$4y_2 \leq -1$$
$$-y_1 \leq 0$$
$$-y_2 \leq 0$$
$$y_1, y_2 \in \mathbb{R}$$

è ammissibile

$y^{(0)} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$

$$y_1(x_1 - 3\bar{x}_2 - x_4 - 10) = 0$$

$$y_2(x_1 + \bar{x}_2 + 4x_3 - x_5 - 8) = 0$$

$\swarrow [0,0]$

$x_1 (y_1 + y_2 - 4) = 0 \Rightarrow -4x_1 = 0$ ok

$x_2 (-3y_1 - y_2 - 3) = 0 \Rightarrow -3x_2 = 0$ ok

$x_3 (4y + 1) = 0 \Rightarrow x_3 = 0 \Rightarrow$ ok

$x_4 (-y_1) = 0 \Rightarrow 0 x_4 = 0$ no

$x_5 (-y_2) = 0 \Rightarrow 0 x_5 = 0$ no

$x_1 = 0,\ x_2 = 0,\ x_3 = 0$

$$\begin{pmatrix} 0 \\ 0 \\ 0 \\ x_4 \\ x_5 \end{pmatrix}$$

Primale stretto

$$\min\ a_1 + a_2$$
$$-x_4 + a_1 = 10$$
$$-x_5 + a_2 = 8$$
$$x_1, x_2, x_3, x_4, x_5 \geq 0$$

	b	x_4	x_5	a_1	a_2
z	-18	-1	-1	0	0
x_4	10	-1	0	1	0
x_5	8	0	-1	0	1

$z = 0 \Rightarrow$ simplesso

$z \neq 0 \Rightarrow y^0$ non è ammissibile $\rightarrow y^1$

$y^1 = y^0 + \theta\pi$

π è la soluzione del duale stretto

DUALE STRETTO

$$\min\ a_1 + a_2$$
$$-x_4 + a_1 = 10$$
$$-x_5 + a_2 = 8$$
$$x_1, x_2, x_3, x_4, x_5 \geq 0$$

$\Rightarrow$

$$\max\ 10\pi_1 + 8\pi_2$$
$$x_4 \quad -\pi_1 \leq 0$$
$$x_5 \quad -\pi_2 \leq 0$$
$$a_1 \quad \pi_1 \leq 1$$
$$a_2 \quad \pi_2 \leq 1$$

$$\pi = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$y' = \begin{pmatrix} 0 \\ 0 \end{pmatrix} + \theta \begin{pmatrix} 1 \\ 1 \end{pmatrix} = \begin{pmatrix} \theta \\ \theta \end{pmatrix} = \begin{pmatrix} y_1 \\ y_2 \end{pmatrix}$$

$$\max\ 10\theta + 8\theta$$

$$\theta + \theta \leq 4 \Rightarrow \theta \leq 2$$
$$-3\theta + \theta \leq 3 \Rightarrow \theta \geq -\frac{3}{2} \qquad \theta \leq 0 \leq \frac{1}{4}$$
$$4\theta \leq -1 \Rightarrow \theta \leq \frac{1}{4}$$
$$-\theta \leq 0 \Rightarrow \theta \geq 0$$
$$-\theta \leq 0 \Rightarrow \theta \geq 0$$

$$\theta, \theta \in \mathbb{R}$$

$$\theta = \begin{pmatrix} \frac{1}{4} \\ \frac{1}{4} \end{pmatrix} \Rightarrow y^{(1)} = \begin{pmatrix} \frac{1}{4} \\ \frac{1}{4} \\ \frac{1}{4} \end{pmatrix}$$

ripeti finché $\theta \neq 0$