

## • Duale su FS

$$\text{win } 7x_1 + 2x_2 - 5x_3 - x_4$$

$$4x_1 + 3x_2 + 2x_4 \geq 2$$

$$-5x_1 - 3x_2 + x_3 - x_4 \leq 1$$

$$x_i \geq 0 \quad i=1, \dots, 4$$

→ Prima di portarlo in FS lo metto nella canonica del minimo! ( $\geq$ )

↓ (FS)

$$\text{win } 7x_1 + 2x_2 - 5x_3 - x_4$$

$$4x_1 + 3x_2 + 2x_4 - x_5 = 2$$

$$(P) \quad 5x_1 + 3x_2 - x_3 + x_4 - x_6 = -1$$

$$x_i \geq 0 \quad i=1, \dots, 6$$

→ (D)

$$\text{wor } 2y_1 - y_2$$

$$4y_1 + 5y_2 \leq 7$$

$$3y_1 + 3y_2 \leq 2$$

$$-y_2 \leq -5$$

$$2y_1 + y_2 \leq -1$$

$$-y_1 \leq 0$$

$$-y_2 \leq 0$$

$$\left. \begin{array}{l} -y_1 \leq 0 \\ -y_2 \leq 0 \end{array} \right\} y_1, y_2 \geq 0$$

( $y_1, y_2$  dovrebbero essere libere  
ma ho i vincoli dati  
dal minimo.)

$$A = \begin{pmatrix} 4 & 3 & 0 & 2 & -1 & 0 \\ 5 & 3 & -1 & 1 & 0 & -1 \end{pmatrix} \quad b^T = (2 \quad -1)$$

$$c^T = (7 \quad 2 \quad -5 \quad -1 \quad 0 \quad 0)$$

## • Duale, scarti complementari

$$\text{win } 3x_1 + 4x_2 + 2x_3$$

$$2x_1 - 2x_2 - x_3 = -1$$

$$(P) \quad 3x_1 + x_2 - x_3 \geq 1$$

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

→ (D)

$$\text{wor } -y_1 + y_2$$

$$2y_1 + 3y_2 \leq 3$$

$$-2y_1 + y_2 \leq 4$$

$$-y_1 - y_2 \leq 2$$

$$\bullet y_1 \text{ libera, } y_2 \geq 0$$

$$A = \begin{pmatrix} 2 & -2 & -1 \\ 3 & 1 & -1 \end{pmatrix} \quad b^T = (-1 \quad 1)$$

$$c^T = (3 \quad 4 \quad 2)$$

$$B = \left(-\frac{9}{8}, \frac{7}{4}\right) = \bar{y}$$

$$y^T(Ax - b) = 0 \quad \rightarrow \quad y \neq 0$$

$$(c - A^T \bar{y})^T x = 0 \rightarrow \begin{array}{l} x_1(3 - 2\bar{y}_1 - 3\bar{y}_2) = 0 \rightarrow x_1 \cdot 0 = 0 \\ x_2(4 + 2\bar{y}_1 - \bar{y}_2) = 0 \rightarrow x_2 \cdot 0 = 0 \\ x_3(2 + \bar{y}_1 + \bar{y}_2) = 0 \rightarrow x_3 \cdot \frac{23}{8} = 0 \rightarrow x_3 = 0 \end{array}$$

$$\begin{cases} 3x_1 + x_2 - x_3 = 1 \\ 2x_1 - 2x_2 - x_3 = -1 \\ x_3 = 0 \end{cases} \rightarrow \begin{cases} x_1 = 1/8 \\ x_2 = 5/8 \end{cases} \rightarrow c^T \bar{x} = c^T \bar{y} \rightarrow \frac{23}{8} = \frac{23}{8}$$

