$$\begin{cases} \max -7\,x_1 + x_2 \\ -3\,x_1 + 2\,x_2 \le 4 \quad ✓ \\ -x_1 - 3\,x_2 \le -6 \quad ✓ \\ x_2 \le 5 \quad ✓ \\ 3\,x_1 + 2\,x_2 \le 22 \\ x_1 \le 6 \\ 2\,x_1 - x_2 \le 16 \quad ✓ \end{cases}$$

(constraints numbered 1, 2, 3, 4, 5, 6)

| Vettore | Indici di base | Ammissibile (SI/NO) | Degenere (SI/NO) | Ottimo (SI/NO) |
|---|---|---|---|---|
| $x = (6,2)$ | 4, 5 | SI | NO | NO |
| $y = (0, -\tfrac{1}{3}, 0, 0, -\tfrac{22}{3}, 0)$ | 2, 5 | NO | NO | NO |

$$B = \{4,5\}$$
$$\overline{Y} = \left(0,0,0,\tfrac{1}{2}, -\tfrac{17}{2}, 0\right)$$

$$\begin{cases} \min\ 4y_1 - 6y_2 + 5y_3 + 22y_4 + 6y_5 + 16y_6 \\ -3y_1 - y_2 + 3y_4 + y_5 + 2y_6 = -7 \\ 2y_1 - 3y_2 + y_3 + 2y_4 - y_6 = 1 \\ y \ge 0 \end{cases}$$

$$\begin{cases} \min\ 3\,y_1 - 7\,y_2 + 5\,y_3 + 22\,y_4 + 14\,y_5 + 15\,y_6 \\ -y_1 - y_2 + 3\,y_4 + 2\,y_5 + 2\,y_6 = 2 \\ y_1 - 4\,y_2 + y_3 + 2\,y_4 + y_5 - 2\,y_6 = 1 \\ y \ge 0 \end{cases}$$

| Vettore | Indici di base | Ammissibile (SI/NO) | Degenere (SI/NO) | Ottimo (SI/NO) |
|---|---|---|---|---|
| $x =$ | 3, 4 | SI | NO | NO |
| $y =$ | 1, 5 | SI | SI | NO |

$$\begin{cases} \max\ 2X_1 + X_2 \\ -X_1 + X_2 \le 3 \\ -X_1 - 4X_2 \le -7 \\ 0 + X_2 \le 5 \\ +3X_1 + 2X_2 \le 22 \\ +2X_1 + X_2 \le 14 \\ +2X_1 - 2X_2 \le 15 \end{cases}$$

(constraints numbered 1, 2, 3, 4, 5, 6)

$$B = \{3,4\} \qquad \overline{X} = (4,5) \qquad 7,16$$
$$\overline{Y} = \left(0,0,-\tfrac{1}{3}, \tfrac{2}{3}, 0, 0\right) \qquad -0,33$$

$$B = \{1,5\} \qquad \overline{X} = \left(\tfrac{11}{3}, \tfrac{20}{3}\right)$$
$$\overline{Y} = (0,0,0,0,1,0)$$

## SIMPLESSO DUALE

$$B = \{4,6\} \qquad \overline{Y}\ \text{è AMM?}\ \ SI$$

$$\overline{Y} = \left(0,0,0, \tfrac{3}{5}, 0, \tfrac{1}{10}\right)$$

$$\overline{X} = \left(\tfrac{37}{5}, -\tfrac{1}{10}\right)$$

controlla il 1° vincolo violato → $\boxed{K = 5}$ da $\overline{X}$

ENTRA

$$A_B = \begin{pmatrix} 3 & 2 \\ 2 & -2 \end{pmatrix}$$

$$A_B^{-1} = -\tfrac{1}{10}\begin{pmatrix} -2 & -2 \\ -2 & 3 \end{pmatrix} = \begin{pmatrix} \tfrac{1}{5} & \tfrac{1}{5} \\ \tfrac{1}{5} & -\tfrac{3}{10} \end{pmatrix} \qquad W = \begin{pmatrix} -\tfrac{1}{5} & -\tfrac{1}{5} \\ -\tfrac{1}{5} & +\tfrac{3}{10} \end{pmatrix}$$

|  | passo 1 |
|---|---|
| Indici di base | 4, 6 |
| $y$ | |
| valore della funzione obiettivo | |
| $x$ | |
| $k$ (indice entrante) | |
| rapporti | |
| $h$ (indice uscente) | |

$$A_S W^4 = (2 \quad 1)\binom{-1/5}{-1/5} = -3/5$$

$$A_S W^6 = (2 \quad 1)\binom{-1/5}{3/10} = -1/10$$

$$h = \min\left\{\frac{-Y_i}{A_R W^h}, A_K W^h_{<0}\right\}$$

$$r_4 = \frac{-3/5}{-3/5} = 1 \qquad r_6 = \frac{-1/10}{-1/10} = 1 \qquad \boxed{h = 4} \ \text{ESCE}$$

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$$B = \{5, 6\} \qquad \bar{x} = \left(\frac{43}{6}, -\frac{1}{3}\right)$$

$$\widetilde{Y} = (0, 0, 0, 0, 1, 0)$$

$$\boxed{K = 2} \qquad A_B = \begin{pmatrix} 2 & 1 \\ 2 & -2 \end{pmatrix}$$

$$A_2 W^5 = (-1 \ -4)\binom{-1/3}{-1/3} = 5/3$$

$$A_B^{-1} = -\frac{1}{6}\begin{pmatrix} -2 & -1 \\ -2 & 2 \end{pmatrix} = \begin{pmatrix} 1/3 & 1/6 \\ 1/3 & -1/3 \end{pmatrix}$$

$$A_2 W^6 = (-1 \ -4)\binom{-1/6}{1/3} = -7/6$$

$$W = \begin{pmatrix} -1/3 & -1/6 \\ -1/3 & 1/3 \\ W^5 & W^6 \end{pmatrix}$$

$$\boxed{h = 6}$$

$$h = \min\left\{\frac{-Y_i}{A_K W^i}, A_K W^i < 0\right\}$$