• **Simplesso** ?

$$\max \; x_1 - 2x_2 + 3x_3 \qquad\qquad \min \; -x_1 + 2x_2 - 3x_3$$

$$\begin{cases} x_1 - 2x_2 + x_3 \le 2 \\ 3x_1 - x_2 - 2x_3 \le 6 \\ x_1, x_2, x_3 \ge 0 \end{cases} \longrightarrow \begin{cases} x_1 - 2x_2 + x_3 + x_4 = 2 \\ 3x_1 - x_2 - 2x_3 + x_5 = 6 \\ x_i \ge 0 \quad i = 1, \dots, 5 \end{cases}$$

$$A_0 = \begin{array}{c} \begin{matrix} x_1 & x_2 & x_3 & x_4 & x_5 \end{matrix} \\ \begin{pmatrix} 1 & -2 & 1 & 1 & 0 \\ 3 & -1 & -2 & 0 & 1 \end{pmatrix} \\ \underbrace{\hphantom{1 \; -2 \; -2}}_{N_0} \; \underbrace{\hphantom{0 \; 1}}_{B_0} \end{array} \qquad b^T = (2 \quad 6) \qquad c_1^T = \begin{array}{c} \begin{matrix} x_1 & x_2 & x_3 & x_4 & x_5 \end{matrix} \\ (\underbrace{-1 \quad 2 \quad -3}_{N_0} \quad \underbrace{0 \quad 0}_{B_0}) \end{array}$$

• $\gamma_0 = c_{N_0}^T - c_{B_0}^T B_0^{-1} N_0 = (-1 \quad 2 \quad -3)$

• ottimalità non soddisfatta
• devo avere $\gamma_i < 0$ e $\pi_i \le 0$ per l'illimitatezza
$\downarrow$
Non soddisfatto

• Cambio base

$h = 1 \rightarrow x_1$ entrante (Bland)

- scelgo k (criterio rapporto minimo)

$$\min \left\{ \frac{(B_0^{-1} b)_i}{(\pi_h)_i} \right\} = \min \left\{ \frac{2}{1} \quad \frac{6}{3} \right\} \rightarrow k = 1 \rightarrow x_4 \text{ esce}$$

(scelgo l'indice minore a parità di minimo)

$$A_1 = \begin{array}{c} \begin{matrix} x_4 & x_2 & x_3 & x_1 & x_5 \end{matrix} \\ \begin{pmatrix} 1 & -2 & 1 & 1 & 0 \\ 0 & -1 & -2 & 3 & 1 \end{pmatrix} \\ \underbrace{\hphantom{1 \; -2 \; -2}}_{N_1} \; \underbrace{\hphantom{3 \; 1}}_{B_1} \end{array} \qquad c_1^T = (\underbrace{x_4 \quad x_2 \quad x_3}_{N_1} \quad \underbrace{x_1 \quad x_5}_{B_1})$$

$$\begin{array}{c} \\ k=1 \rightarrow \\ M = \end{array} \begin{array}{c} \begin{matrix} \pi_h & e_k & \pi_2 & \pi_3 & B_0^{-1} b \end{matrix} \\ \left(\begin{array}{c|ccc|c} 1 & 1 & -2 & 1 & 2 \\ 3 & 0 & -1 & -2 & 6 \end{array} \right) \end{array} = \left(\begin{array}{c|ccc|c} 1 & 1 & -2 & 1 & 2 \\ 0 & -3 & 5 & -5 & 0 \end{array} \right)$$

$$B_1^{-1} N_1 \qquad B_1^{-1} b$$

• $\gamma_1 = c_{N_1}^T - c_{B_1}^T B_1^{-1} N_1 = (0 \quad 2 \quad -3) - (-1 \quad 0) \begin{pmatrix} 1 & -2 & 1 \\ -3 & 5 & -5 \end{pmatrix} =$

$= (0 \quad 2 \quad -3) - (-1 \quad 2 \quad -1) = (1 \quad 0 \quad -2)$

• ottimalità non soddisfatta
• illimitatezza non soddisfatta