- Problema PL, simplesso

$$\max \; 3x_1 + 2x_2 - 5x_3$$
$$4x_1 - 2x_2 + 2x_3 \le 4$$
$$-2x_1 + x_2 - x_3 \ge -1$$
$$x_1, x_2, x_3 \ge 0$$

$\xrightarrow{FS}$

$$\min \; -3x_1 - 2x_2 + 5x_3$$
$$4x_1 - 2x_2 + 2x_3 + x_4 = 4$$
$$2x_1 - x_2 + x_3 + x_5 = 1$$
$$x_i \ge 0 \quad i = 1, \dots, 5$$

$$A = \begin{array}{c} \\ \\ \end{array} \underbrace{\begin{array}{ccc} x_1 & x_2 & x_3 \\ 4 & -2 & 2 \\ 2 & -1 & 1 \end{array}}_{N_1} \underbrace{\begin{array}{cc} x_4 & x_5 \\ 1 & 0 \\ 0 & 1 \end{array}}_{B_1} \qquad c^T = (\underbrace{-3 \;\; -2 \;\; 5}_{N_1} \;\; \underbrace{0 \;\; 0}_{B_1}) \qquad b = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$$

- $\gamma_1 = c^T_{N_1} - c^T_{B_1} B^{-1} N = (-3 \;\; -2 \;\; 5)$
  - Criterio ottimalità non soddisfatto
  - Soddisfatto criterio illimitatezza

$\gamma_2 < 0 \rightarrow \Pi_2 \le 0_m \Rightarrow$ illimitato inferiormente

- Simplesso

$$\min \; -x_1 - 3x_2 + x_3$$
$$2x_1 + x_2 \le 3$$
$$x_1 + x_2 + 3x_3 \le 6$$
$$2x_1 + x_2 + 3x_3 \le 8$$
$$x_1, x_2, x_3 \ge 0$$

$\xrightarrow{FS}$

$$\min \; -x_1 - 3x_2 + x_3$$
$$2x_1 + x_2 + x_4 = 3$$
$$x_1 + x_2 + 3x_3 + x_5 = 6$$
$$2x_1 + x_2 + 3x_3 + x_6 = 8$$
$$x_i \ge 0 \quad i = 1, \dots, 6$$

$$A_1 = \underbrace{\begin{array}{ccc} x_1 & x_2 & x_3 \\ 2 & 1 & 0 \\ 1 & 1 & 3 \\ 2 & 1 & 3 \end{array}}_{N_1} \underbrace{\begin{array}{ccc} x_4 & x_5 & x_6 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{array}}_{B_1} \qquad b^T = (3 \;\; 6 \;\; 8) \qquad c_1^T = (\underbrace{-1 \;\; -3 \;\; 1}_{N_1} \;\; \underbrace{0 \;\; 0 \;\; 0}_{B_1})$$

- $\gamma_1 = c^T_N - c^T_B B^{-1} N = (-1 \;\; -3 \;\; 1)$
  - Ottimalità non soddisfatto
  - illimitatezza non soddisfatto

- Cambio base

$h = 1 \rightarrow x_1$ entrante

- Scelgo k, criterio rapporto minimo

$$\min \left\{ \frac{(B^{-1}b)_i}{(\Pi_h)_i} \right\} = \min \left\{ \frac{3}{2} \;\; \frac{6}{1} \;\; \frac{8}{2} \right\} \Rightarrow k = 1 \rightarrow x_4 \text{ uscente}$$

$$k=1 \rightarrow \quad M = \left(\begin{array}{c|ccc|c} \Pi_h & e_k & \Pi_2 & \Pi_3 & B^{-1}b \\ 2 & 1 & 1 & 0 & 3 \\ 1 & 0 & 1 & 3 & 6 \\ 2 & 0 & 1 & 3 & 8 \end{array} \right) = \left(\begin{array}{c|ccc|c} 1 & 1/2 & 1/2 & 0 & 3/2 \\ 0 & -1/2 & 1/2 & 3 & 9/2 \\ 0 & -1 & 0 & 3 & 5 \end{array} \right)$$

$$\qquad\qquad B_2^{-1} N_2 \qquad\qquad B_2^{-1} b$$