

$$\min -20a - 30c$$

$$\begin{aligned} \text{s.a. } a &\leq 60 \\ a + c &\geq 70 \\ a + 2c &\leq 120 \end{aligned}$$

$$a, c \geq 0$$

$$T_B' = \{x_1, x_4, x_3\}$$

$$\min -20a - 30c$$

$$\begin{aligned} \text{s.a. } a + x_1 &= 60 \\ a + c + x_4 - x_2 &= 70 \\ a + 2c + x_3 &= 120 \end{aligned}$$

$$a, c \geq 0$$

problema auxiliar

	a	c	x ₁	x ₂	x ₃	x ₄	
a	1	0	1	0	0	0	60
b	1	1	0	-1	0	1	70
c	1	2	0	0	1	0	120
d	0	0	0	0	0	1	0
e	-1	-1	0	1	0	0	-70

$$\{0, 1, 0\}$$

$$\textcircled{a} \min \left\{ \frac{60}{1}, \frac{70}{1}, \frac{120}{1} \right\} = 60 \quad \{1, 0, 0\}$$

$$\textcircled{c} \min \left\{ \frac{60}{0}, \frac{70}{1}, \frac{120}{2} \right\} = 60 \quad \{0, 0, 1\}$$

Escollim a \rightarrow Entra a
surt x₁

a	c	x ₁	x ₂	x ₃	x ₄	
a	1	0	1	0	0	60
b	1	1	0	-1	0	70
c	1	2	0	0	1	120
	-1	-1	0	1	0	-70

a	c	x ₁	x ₂	x ₃	x ₄	
a	1	0	1	0	0	60
	0	1	-1	-1	0	10
	0	2	-1	0	1	60
	-1	-1	0	1	0	-70

a	c	x ₁	x ₂	x ₃	x ₄	
a	1	0	1	0	0	60
	0	1	-1	-1	0	10
	0	2	-1	0	1	60
	0	-1	1	1	0	-10

$$\textcircled{c} \min \left\{ \frac{60}{0}, \frac{10}{1}, \frac{60}{2} \right\} = 10 \quad \{0, 1, 0\}$$

Escollim c \rightarrow Entra c
surt x₁

a	c	x ₁	x ₂	x ₃	x ₄	
a	1	0	1	0	0	60
	0	1	-1	-1	0	10
	0	2	-1	0	1	60
	0	-1	1	1	0	-10

a	c	x ₁	x ₂	x ₃	x ₄	
a	1	0	1	0	0	60
	0	1	-1	-1	0	10
	0	0	1	2	1	40
	0	-1	1	1	0	-10

a	c	x ₁	x ₂	x ₃	x ₄	
a	1	0	1	0	0	60
	0	1	-1	-1	0	10
	0	0	1	2	1	40
	0	0	0	0	1	0

\hookrightarrow Base òptima per al prob. artificial \rightarrow base factible para p

a	c	x ₁	x ₂	x ₃		a	c	x ₁	x ₂	x ₃		a	c	x ₁	x ₂	x ₃	
1	0	1	0	0	60	1	0	1	0	0	60	1	0	1	0	0	60
0	1	-1	-1	0	10	0	1	-1	-1	0	10	0	1	-1	-1	0	10
0	0	1	2	1	40	0	0	1	2	1	40	0	0	1	2	1	40
-20	-30	0	0	0	0	0	-30	20	0	0	1200	0	0	-10	-30	0	1500

$\Gamma_B = \{a, c, x_3\}$

⑦ $\min \left\{ \frac{40}{2} \right\} = 20 \leadsto (0, 0, 1) \leadsto$ Entra x_2
Surt x_3

a	c	x ₁	x ₂	x ₃		a	c	x ₁	x ₂	x ₃		a	c	x ₁	x ₂	x ₃		a	c	x ₁	x ₂	x ₃	
1	0	1	0	0	60	1	0	1	0	0	60	1	0	1	0	0	60	1	0	1	0	0	60
0	1	-1	-1	0	10	0	1	-1	-1	0	10	0	1	-1/2	0	1/2	30	0	1	-1/2	0	1/2	30
0	0	1	2	1	40	0	0	1/2	1	1/2	20	0	0	1/2	1	1/2	20	0	0	1/2	1	1/2	20
0	0	-10	-30	0	1500	0	0	-10	-30	0	1500	0	0	-10	-30	0	1500	0	0	5	0	15	2100

① s.b.p inicial

a	c	x ₁	x ₂	x ₃	
1	0	1	0	0	60
0	1	-1	-1	0	10
0	0	1	2	1	40
-20	-30	0	0	0	0

$$\min -20a - 30c$$

$$\text{s.a. } a + x_1 = 60$$

$$a + c + x_4 - x_2 = 10$$

$$a + 2c + x_3 = 40$$

$$a, c \geq 0$$

$$k=0$$

$$I_{B_k} = I_{B_0} = \{a, c, x_3\}, \quad I_N = \{x_1, x_2\}$$

$$B_k = B_0 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 2 & 1 \end{pmatrix}$$

$$B_k^{-1} = B_0^{-1} = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 1 & -2 & 1 \end{pmatrix}$$

$$x_{B_0} = B_k^{-1} \cdot b = B_0^{-1} \cdot b = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 1 & -2 & 1 \end{pmatrix} \begin{pmatrix} 60 \\ 10 \\ 40 \end{pmatrix} = \begin{pmatrix} 60 \\ 10 \\ 40 \end{pmatrix}$$

②

$$\text{Calcular } \lambda = B^{-T} \cdot c_B$$

función objetivo

$$\hookrightarrow \text{cortes } I_{B_0} \hookrightarrow \{c_a, c_c, c_{x_3}\}$$

$$\begin{pmatrix} -20 \\ -30 \\ 0 \end{pmatrix}$$

$$\lambda = \underbrace{\begin{pmatrix} 1 & -1 & 1 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{pmatrix}}_{B_0^{-T}} \underbrace{\begin{pmatrix} -20 \\ -30 \\ 0 \end{pmatrix}}_{c_{B_0}} = \underbrace{\begin{pmatrix} 10 \\ -30 \\ 0 \end{pmatrix}}_{\lambda_{B_0}}$$

③

$$I_B \hookrightarrow r \quad I_N = \{x_1, x_2\}$$

$$r_a = c_a - a^T \lambda \quad \text{que signi } < 0$$

$$r_{x_1} = 0 - \begin{pmatrix} 1 & 0 & 0 \end{pmatrix} \begin{pmatrix} 10 \\ -30 \\ 0 \end{pmatrix} = -10 < 0$$

④

$$y_q = B_0^{-1} \cdot a$$

$$y_{x_1} = B_0^{-1} \cdot a_{x_1} = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 1 & -2 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} = \begin{pmatrix} 1 \\ -2 \\ 1 \end{pmatrix} \leftarrow y_{t_0}$$

⑤

$$I_{j_q}^+ = \{j \in E \mid y_{t_q} > 0\}$$

$$\text{index de Fila que sea por divisiones} \hookrightarrow I_{j_{x_1}}^+ = \{1, 3\}$$

⑥

Mínimos de toda la vida

$$\min \left\{ \frac{y_{t_0}}{y_{t_q}} \right\}$$

$$\hat{x}_q = \min \left\{ \frac{60}{1}, \frac{40}{1} \right\} = 40$$

Entrar x_1
Salir x_3

⑥ Cambio de Base.

$$\underline{6.1} \quad \eta = \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{pmatrix}$$

$$\underline{6.2} \quad B_{k+1}^{-1} = \eta^{-1} \cdot B_k^{-1}$$

$$B_1^{-1} = \eta^{-1} \cdot B_0^{-1}$$

$$= \begin{pmatrix} 0 & 2 & -1 \\ 0 & -1 & 1 \\ 1 & 2 & 1 \end{pmatrix}$$

$$\underline{6.3} \quad x_{B_{k+1}} = \eta^{-1} \cdot x_{B_k}$$

$$x_{B_1} = \eta^{-1} \cdot x_{B_0} = \begin{pmatrix} 20 \\ 60 \\ 40 \end{pmatrix}$$

$$\underline{6.4} \quad z_{0,k+1} = z_{0,k} + r_q \cdot \hat{x}_{j_q}$$

$$z_{0,2} = z_{0,0} + r_{x_1} \cdot \hat{x}_{x_1}$$

$$z_0 = c_B^T x_{B_0} + r_{x_1} \cdot \hat{x}_{x_1}$$

$$z_0 = (-20 \ -30 \ 0) \begin{pmatrix} 60 \\ 10 \\ 40 \end{pmatrix} + -10 \cdot 40$$

$$= \underbrace{z_{0,0}}_{-1500} - 10 \cdot 40 = -1900$$