

Resuelve el siguiente ejercicio por el método de las dos fases:

$$\begin{aligned} \text{c) } \min z &= 40x_1 + 10x_2 + 7x_5 + 14x_6 \\ x_1 - x_2 + 2x_5 &= 0 \\ -2x_1 + x_2 - 2x_5 &= 0 \\ x_1 + x_3 + x_5 - x_6 &= 3 \\ 2x_2 + x_3 + x_4 + 2x_5 + x_6 &= 4 \\ x_1, x_2, x_3, x_4, x_5, x_6 &\geq 0 \end{aligned}$$

Modelo Ampliado:

$$\min z = 40x_1 + 10x_2 + 7x_5 + 14x_6$$

s.a.

$$x_1 - x_2 + 2x_5 + a_1 = 0$$

$$-2x_1 + x_2 - 2x_5 + a_2 = 0$$

$$x_1 + x_3 + x_5 - x_6 + a_3 = 3$$

$$2x_2 + x_3 + x_4 + 2x_5 + x_6 + a_4 = 4$$

Fase 1:

$$\min w = a_1 + a_2 + a_3 + a_4$$

	x1	x2	x3	x4	x5	x6	a1	a2	a3	a4	sol
wj-cj	0	0	0	0	0	0	0	-1	-1	-1	0
a1	1	-1	0	0	0	2	0	1	0	0	0
a2	-2	1	0	0	0	-2	0	0	1	0	0
a3	1	0	1	0	0	1	-1	0	0	1	0
a4	0	2	1	1	1	2	1	0	0	0	1

	x1	x2	x3	x4	x5	x6	a1	a2	a3	a4	sol
wj-cj	0	2	2	1	3	0	0	0	0	0	7
a1	1	-1	0	0	2	0	0	1	0	0	0
a2	-2	1	0	0	-2	0	0	0	1	0	0
a3	1	0	1	0	1	-1	0	0	0	1	3
a4	0	2	1	1	2	1	0	0	0	1	4

	x1	x2	x3	x4	x5	x6	a1	a2	a3	a4	sol
wj-cj	-3	3 1/2	2	1	0	0	0	1 1/2	0	0	7
a1	-1	0	0	0	0	0	1	1	0	0	0
x5	1	- 1/2	0	0	1	0	0	- 1/2	0	0	0
a3	0	1/2	1	0	0	-1	0	1/2	1	0	3
a4	-2	3	1	1	0	1	0	1	0	1	4

	x1	x2	x3	x4	x5	x6	a1	a2	a3	a4	sol
wj-cj	- 2/3	0	5/6	- 1/6	0	-11/6	0	1/3	0	-1 1/6	2 1/3
a1	-1	0	0	0	0	0	1	1	0	0	0
x5	2/3	0	1/6	1/6	1	1/6	0	- 1/3	0	1/6	2/3
a3	1/3	0	5/6	- 1/6	0	-11/6	0	1/3	1	- 1/6	2 1/3
x2	- 2/3	1	1/3	1/3	0	1/3	0	1/3	0	1/3	1 1/3

	x1	x2	x3	x4	x5	x6	a1	a2	a3	a4	sol
wj-cj	-0	0	5/6	- 1/6	0	-11/6	- 2/3	- 1/3	0	-1 1/6	2 1/3
x1	1	0	0	0	0	0	-1	-1	0	0	0
x5	0	0	1/6	1/6	1	1/6	2/3	1/3	0	1/6	2/3
a3	0	0	5/6	- 1/6	0	-11/6	1/3	2/3	1	- 1/6	2 1/3
x2	0	1	1/3	1/3	0	1/3	- 2/3	- 1/3	0	1/3	1 1/3

	x1	x2	x3	x4	x5	x6	a1	a2	a3	a4	sol
wj-cj	0	0	0	0	0	0	-1	-1	-1	-1	0
x1	1	0	0	0	0	0	-1	-1	0	0	0
x5	0	0	0	1/5	1	2/5	3/5	1/5	- 1/5	1/5	1/5
x3	0	0	1	- 1/5	0	-12/5	2/5	4/5	11/5	- 1/5	2 4/5
x2	0	1	0	2/5	0	4/5	- 4/5	- 3/5	- 2/5	2/5	2/5

Fase 2:

Incorporaremos la f.o. original y volveremos vectores unitarios las variables básicas:

	x1	x2	x3	x4	x5	x6	sol
zj-cj	-40	10	0	0	7	14	0
x1	1	0	0	0	0	0	0
x5	0	0	0	1/5	1	2/5	1/5
x3	0	0	1	- 1/5	0	-1 2/5	2 4/5
x2	0	1	0	2/5	0	4/5	2/5

	x1	x2	x3	x4	x5	x6	sol
zj-cj	0	10	0	0	7	14	0
x1	1	0	0	0	0	0	0
x5	0	0	0	1/5	1	2/5	1/5
x3	0	0	1	- 1/5	0	-1 2/5	2 4/5
x2	0	1	0	2/5	0	4/5	2/5

	x1	x2	x3	x4	x5	x6	sol
zj-cj	-0	10	0	-1 2/5	0	11 1/5	-1 2/5
x1	1	0	0	0	0	0	0
x5	0	0	0	1/5	1	2/5	1/5
x3	0	0	1	- 1/5	0	-1 2/5	2 4/5
x2	0	1	0	2/5	0	4/5	2/5

Usaremos el M. Simplex para resolver el modelo:

	x1	x2	x3	x4	x5	x6	sol
zj-cj	-0	0	0	-5 2/5	0	3 1/5	-5 2/5
x1	1	0	0	0	0	0	0
x5	0	0	0	1/5	1	2/5	1/5
x3	0	0	1	-1/5	0	-1 2/5	2 4/5
x2	0	1	0	2/5	0	4/5	2/5

	x1	x2	x3	x4	x5	x6	sol
zj-cj	-0	-4	0	-7	0	-0	-7
x1	1	0	0	0	0	0	0
x5	0	-1/2	0	0	1	0	0
x3	0	1 3/4	1	1/2	0	-0	3 1/2
x2	0	1 1/4	0	1/2	0	1	1/2

Sol

$$x_1 = x_4 = x_5 = x_6 = 0 \quad x_2 = \frac{1}{2} \quad x_3 = \frac{7}{2}$$

Z=-7

$$x_1 = x_4 = x_5 = x_6 = 0 \quad x_2 = \frac{1}{2} \quad x_3 = \frac{7}{2}$$