

1) Maximizar

$$Z = 2x_1 + 5x_2 + 3x_3 + 4x_4 + x_5$$

$$\begin{aligned} x_1 + 3x_2 + 2x_3 + 3x_4 + x_5 &\leq 8 \\ 4x_1 + 6x_2 + 5x_3 + 7x_4 + x_5 &\leq 15 \end{aligned}$$

$$y \quad x_j \geq 0, \text{ para } j = 1, 2, 3, 4, 5$$

2) Maximizar $Z = -x_1 - 2x_2 - x_3$

y minimizar

$$x_1 + x_2 + 2x_3 \leq 12$$

$$x_1 + x_2 - x_3 \leq 1$$

$$y \quad x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$$

3) Maximizar $Z = 2x_1 + x_2 + x_3$ y minimizar

$$3x_1 - 2x_2 + 2x_3 \leq 15$$

$$-x_1 + x_2 + x_3 \leq 3$$

$$x_1 - x_2 + x_3 \leq 4$$

1) Max $Z = 2x_1 + 5x_2 + 3x_3 + 4x_4 + x_5 + 0s_1 + 0s_2 =$

	x_1	x_2	x_3	x_4	x_5	s_1	s_2	R
s_1	1	3	2	3	1	1	0	8
s_2	4	6	5	7	1	0	1	15
Z	-2	-5	-3	-4	-1	0	0	0

	x_1	x_2	x_3	x_4	x_5	s_1	s_2	R
x_2	1/3	1	2/3	1	1/3	1/3	0	2
s_2	0	0	1	1	-1	-2	1	3
Z	-1/3	0	1/3	1	2/3	5/3	0	10

	x_1	x_2	x_3	x_4	x_5	s_1	s_2
x_2	0	1	1/2	5/6	1/2	2/3	1/6
x_1	1	0	1/2	1/2	-1/2	-1	1/2
Z	0	0	1/2	7/6	1/2	4/3	1/6

Solución óptima

$$Z = 21/2$$

$$x_1 = 1/2$$

$$x_2 = 1/6$$

2) función objetivo

$$\text{Max } Z = -1x_1 - 2x_2 - 1x_3 + 0s_1 + 0s_2$$

$$x_1 + x_2 + 2x_3 + s_1 + 0s_2 = 12$$

$$x_1 + x_2 + x_3 + 0s_1 + 1s_2 = 1$$

	x_1	x_2	x_3	s_1	s_2	R
s_1	1	1	2	1	0	12
s_2	1	1	-1	0	1	1
Z	1	2	1	0	0	0

Solución óptima
Maximización

$$Z = 0$$

$$s_1 = 12$$

$$s_2 = 1$$

Minimizar

	x_1	x_2	x_3	s_1	s_2	
s_1	1	1	2	1	0	12
s_2	1	①	-1	0	1	1
z	1	2	1	0	0	0

	x_1	x_2	x_3	s_1	s_2	
s_1	0	0	③	-1	-1	11
x_2	1	1	-1	0	1	1
z	-1	0	3	0	-2	-2

	x_1	x_2	x_3	s_1	s_2	
x_3	0	0	1	1/3	-1/3	11/3
x_2	1	1	0	1/3	2/3	14/3
z	-1	0	0	-1	-1	-13

Solución óptima

$$z = -13$$

$$x_2 = 14/3 \quad x_3 = 11/3$$

$$x_1 = 0$$

3.

función objetivo

$$\bullet \text{ Max } z = 2x_1 + 1x_2 + 1x_3 + 0s_1 + 0s_2 + 0s_3$$

	x_1	x_2	x_3	s_1	s_2	s_3	
s_1	-3	-2	2	1	0	0	15
s_2	-1	1	1	0	1	0	3
s_3	①	-1	1	0	0	1	4
z	-2	-1	-1	0	0	0	0

	x_1	x_2	x_3	s_1	s_2	s_3	
s_1	0	①	-1	1	0	-3	3
s_2	0	0	2	0	1	1	7
x_1	1	-1	1	0	0	1	4
z	0	-3	1	0	0	2	8

	x_1	x_2	x_3	s_1	s_2	s_3	
x_2	0	1	-1	1	0	-3	3
s_2	0	0	2	0	1	①	7
x_1	1	0	0	1	0	-2	7
z	0	0	-2	3	0	-7	17

	x_1	x_2	x_3	s_1	s_2	s_3	
x_2	0	1	5	1	3	0	24
s_3	0	0	2	0	1	1	7
x_1	1	0	4	1	2	0	21
z	0	0	12	3	7	0	66

solución óptima

$$z = 66$$

$$x_2 = 24$$

$$x_1 = 21$$

$$s_3 = 7 \quad s_2 = 0$$

$$x_3 = 0$$

$$s_1 = 0$$

$$\bullet \text{ Min } z = 2x_1 + 1x_2 + 1x_3 + 0s_1 + 0s_2 + 0s_3$$

	x_1	x_2	x_3	s_1	s_2	s_3	
s_1	3	-2	2	1	0	0	15
s_2	-1	1	1	0	1	0	3
s_3	1	-1	1	0	0	1	4
z	-2	-1	-1	0	0	0	0

Solución óptima

$$z = 0$$

$$s_1 = 15$$

$$s_2 = 3$$

$$s_3 = 4$$

$$x_1 = 0$$

$$x_2 = 0$$

$$x_3 = 0$$