Disponible a un clic de distancia y sin publicidad

Si este material te es útil, ayúdanos a mantenerlo online

Suscríbete

Comparte

Comenta

Este material está en línea porque creo que a alguien le puede ayudar.
Lo desarrollo y sostengo con recursos propios.
Ayúdame a continuar en mi locura de compartir el conocimiento.

Resuelva por método simplex, indicando claramente los desarrollos

1.1. Resolver también por método algebraico

$$Max\ Z = 30.000X_1 + 40.000X_2$$

S.A.

$$X_1 + 2X_2 \leq 400$$

$$3X_1 + 2X_2 \leq 600$$

$$X_1, X_2 \geq 0$$

1.2.

$$Max\ Z = 20X_1 + 25X_2$$

S.A.

$$2X_1 + 3X_2 \leq 480$$

$$X_1 \leq 150$$

$$X_2 \leq 100$$

$$X_1, X_2 \geq 0$$

1.3.

$$Min\ Z = 400Y_1 + 600Y_2$$

S.A.

$$Y_1 + 3Y_2 \geq 30.000$$

$$2Y_1 + 2Y_2 \geq 40.000$$

$$Y_1, Y_2 \geq 0$$

1.1. Max $Z = 30.000X_1 + 40.000X_2$

Sujeto a
$$X_1 + 2X_2 \leq 400$$
$$3X_1 + 2X_2 \leq 600$$
$$X_1, X_2 \geq 0$$

Forma estandar

Max $Z = 30000X_1 + 40000X_2 + 0S_1 + 0S_2 +$

$$X_1 + 2X_2 + S_1 = 400$$
$$3X_1 + 2X_2 + S_2 = 600$$

$$X_1, X_2, S_1, S_2 \geq 0$$

		X_1	X_2	S_1	S_2	
VB	C_j	30000	40000	0	0	
S_1	0	1	2	1	0	400
S_2	0	3	2	0	1	600
	Z_j	0	0	0	0	0
	$C_j - Z_j$	+30.000	+40.000	0	0	

$400 \div 2 = 200 \rightarrow$ min
$600 \div 2 = 300$

Entra X_2 Sale S_1

$F_2 = F_2 - 2F_1$ $F_1 = F_1/2$

		X_1	X_2	S_1	S_2	
VB	C_j	30000	40000	0	0	
X_2	40000	1/2	1	1/2	0	200
S_2	0	2	0	-1	1	200
	Z_j	20000	4000	20000	0	8000000
	$C_j - Z_j$	10.000	0	-20000	0	

$200 \div 1/2 = 400$
$200 \div 2 = 100 \rightarrow$ min

Entra X_1 Sale S_2.

$F_2 = F_2/2$ $F_1 = F_1 - 1/2\,F_2$

		X_1	X_2	S_1	S_2	
VB	C_j	30000	40000	0	0	
X_2	40000	0	1	3/4	-1/4	150
X_1	30000	1	0	-1/2	1/2	100
	Z_j	30000	40000	15000	5000	9000000
	$C_j - Z_j$	0	0	-15000	-5000	

Tablero óptimo. Solución

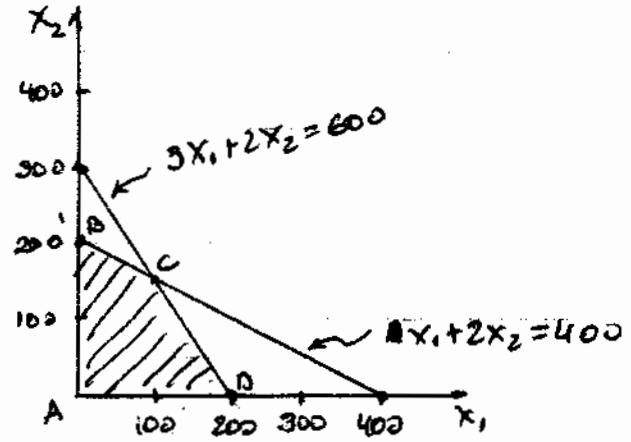
$X_1 = 100$ $X_2 = 150$ $Z = 9'000.000$

Método algebraico.

$$\text{Max } z = 30.000x_1 + 40000x_2$$
$$\text{S.A.} \quad x_1 + 2x_2 \leq 400$$
$$3x_1 + 2x_2 \leq 600$$
$$x_1, x_2 \geq 0$$

Para $x_1 + 2x_2 = 400$
Si $x_1 = 0 \quad x_2 = 200 \quad (0,200)$
Si $x_2 = 0 \quad x_1 = 400 \quad (400,0)$

Para $3x_1 + 2x_2 = 600$
Si: $x_1 = 0 \quad x_2 = 300 \quad (0,300)$
Si: $x_2 = 0 \quad x_1 = 200 \quad (200,0)$



Para encontrar C, corte entre las dos rectas.

$$(x_1 + 2x_2 = 400)(-3)$$
$$3x_1 + 2x_2 = 600$$

$$-3x_1 - 6x_2 = -1200$$
$$3x_1 + 2x_2 = 600$$
$$-4x_2 = -600$$

$$x_2 = 150.$$

$$x_1 = 400 - 2x_2 \qquad x_1 = 100$$

Punto	F.O
A(0,0)	$30000*0 + 40000*0 = 0$
B(0,200)	$30000*0 + 40000*200 = 8.000.000$
C(100,150)	$30000*100 + 40000*150 = 9'000.000$ → Máx
D(200,0)	$30000*200 + 40000*0 = 6.000.000$

La solución es óptima en $x_1 = 100 \quad x_2 = 150 \quad z = 9'000.000$

1.2 Max $Z = 20x_1 + 25x_2$

s.a
$$2x_1 + 3x_2 \leq 480$$
$$x_1 \leq 150$$
$$x_2 \leq 100$$
$$x_1, x_2 \geq 0$$

Forma estandar

Max $Z = 20x_1 + 25x_2 + 0s_1 + 0s_2 + 0s_3$

s.a
$$2x_1 + 3x_2 + s_1 = 480$$
$$x_1 + s_2 = 150$$
$$x_2 + s_3 = 100$$
$$x_1, x_2, s_1, s_2, s_3 \geq 0$$

		x_1	x_2	s_1	s_2	s_3	
VB	c_j	20	25	0	0	0	
s_1	0	2	3	1	0	0	480
s_2	0	1	0	0	1	0	150
s_3	0	0	1	0	0	1	100
	z_j	0	0	0	0	0	0
	$c_j - z_j$	20	25	0	0	0	

$480 \div 3 = 160$

$100 \div 1 = 100 \rightarrow$ min

Entra x_2 Sale s_3

$F_3 = F_3$ $\quad F_1 = F_1 - 3F_3$

		x_1	x_2	s_1	s_2	s_3	
VB	c_j	20	25	0	0	0	
s_1	0	2	0	1	0	-3	180
s_2	0	1	0	0	1	0	150
x_2	25	0	1	0	0	1	100
	z_j	0	25	0	0	25	2500
	$c_j - z_j$	20	0	0	0	-25	

$180 \div 2 = 90 \rightarrow$ min

$150 \div 1 = 150$

Entra x_1 Sale s_1 $\rightarrow F_1 = F_1/2$ $\quad F_2 = F_2 - F_1$

		x_1	x_2	s_1	s_2	s_3	
VB	c_j	20	25	0	0	0	
x_1	20	1	0	1/2	0	-3/2	90
s_2	0	0	0	-1/2	1	3/2	60
x_2	25	0	1	0	0	1	100
	z_j	20	25	10	0	-5	4300
	$c_j - z_j$	0	0	-10	0	5	

$60 \div 3/2 = 40$

$100 \div 1 = 100 \rightarrow$ min

Entra s_3 Sale s_2.

$F_2 = F_2 \div 3/2 \qquad F_1 = F_1 + 3/2\,F_2 \qquad F_3 = F_3 - F_2$

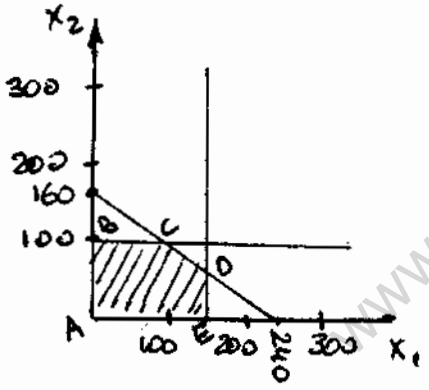
		x_1	x_2	S_1	S_2	S_3	
Y_B	C_j	20	25	0	0	0	
x_1	20	1	0	0	1	0	150
S_3	0	0	0	$-1/3$	$2/3$	1	40
x_2	25	0	1	$1/3$	$-2/3$	0	60
	z_j	20	25	$25/3$	$10/3$	0	4500
	$C_j - z_j$	0	0	$-25/3$	$-10/3$	0	

Tablero óptimo $x_1 = 150 \quad x_2 = 60 \quad S_1 = 0 \quad S_2 = 0 \quad S_3 = 40$.
$z = 4500$

Solución algebraica

$$\text{Max } z = 20x_1 + 25x_2$$
$$\text{s.a.} \quad 2x_1 + 3x_2 \leq 480$$
$$x_1 \leq 150$$
$$x_2 \leq 100$$

Para $2x_1 + 3x_2 = 480$
Si $x_1 = 0 \quad x_2 = 160 \quad (0,160)$
Si $x_2 = 0 \quad x_1 = 240 \quad (240,0)$



En $2x_1 + 3x_2 = 480$
Si $x_1 = 150 \quad x_2 = 60 \quad (150,60) \rightarrow D$
Si $x_2 = 100 \quad x_1 = 90 \quad (90,100) \rightarrow C$

Punto	Función
A(0,0)	$20 \cdot 0 + 25 \cdot 0 = 0$
B(0,100)	$20 \cdot 0 + 25 \cdot 100 = 2500$
C(90,100)	$20 \cdot 90 + 25 \cdot 100 = 4300$
D(150,60)	$20 \cdot 150 + 25 \cdot 60 = 4500$ → máximo.
E(150,0)	$20 \cdot 150 + 25 \cdot 0 = 3000$

Solución $x_1 = 150 \quad x_2 = 60 \quad z = 4500$

1.3 $\min \; z = 400Y_1 + 600Y_2$

s.a $Y_1 + 3Y_2 \geq 30.000$

$2Y_1 + 2Y_2 \geq 40.000$

$Y_1, Y_2 \geq 0$

Forma estandar

$\max \; z = -400Y_1 - 600Y_2 + 0S_1 + 0S_2 - 6000A_1 - 6000A_2$

s.a $Y_1 + 3Y_2 - S_1 + A_1 = 30000$

$2Y_1 + 2Y_2 - S_2 + A_2 = 40000$

$Y_1, Y_2, S_1, S_2, A_1, A_2 \geq 0$

		Y_1	Y_2	S_1	S_2	A_1	A_2	
VB	C_j	-400	-600	0	0	-6000	-6000	
A_1	-6000	1	3	-1	0	1	0	30000
A_2	-6000	2	2	0	-1	0	1	40000
	$Z_j =$	-18000	-30000	6000	6000	-6000	-6000	-42000000
	$C_j - Z_j$	17600	29400	-6000	-6000	0	0	

Entra Y_2 Sale A_1 $F_1 = F_1/3$ $F_2 = F_2 - 2F_1$

		Y_1	Y_2	S_1	S_2	A_1	A_2	
VB	C_j	-400	-600	0	0	-6000	-6000	
Y_2	-600	1/3	1	-1/3	0	1/3	0	10000
A_2	-6000	4/3	0	2/3	-1	-2/3	1	20000
	Z_j	-8200	-600	-3800	6000	3800	-6000	-126000000
	$C_j - Z_j$	7800	0	3800	-6000	-9800	0	

Entra Y_1 Sale A_2 $F_2 = F_2/(4/3)$ $F_1 = F_1 - 1/3 F_2$.

		Y_1	Y_2	S_1	S_2	A_1	A_2	
VB	C_j	-400	-600	0	0	-6000	-6000	
Y_2	-600	0	1	-1/2	1/4	1/2	-1/4	5000
Y_1	-400	1	0	1/2	-3/4	-1/2	3/4	15000
	Z_j	-400	-600	100	150	-100	-150	-9000.000
	$C_j - Z_j$	0	0	-100	-150	-5900	-5850	

El tablero es óptimo $Y_1 = 15.000$ $Y_2 = 5000$

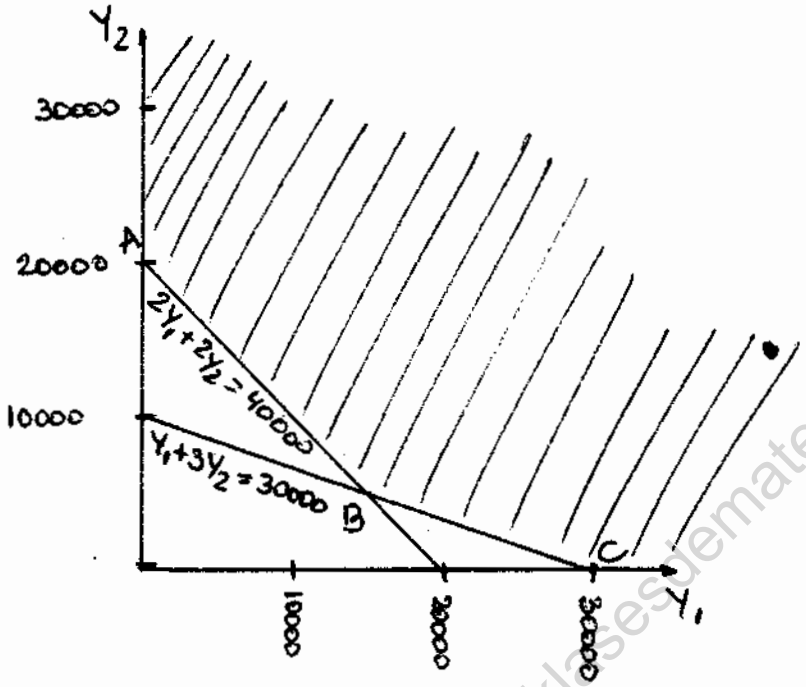
$z = 9'000.000.$

Método algebraico.

$$\text{Min } Z = 400Y_1 + 600Y_2$$
$$\text{s.a. } Y_1 + 3Y_2 \geq 30000$$
$$2Y_1 + 2Y_2 \geq 40000$$
$$Y_1, Y_2 \geq 0$$

Para $Y_1 + 3Y_2 = 30000$
Si $Y_1 = 0$ $Y_2 = 10000$ $(0, 10000)$
Si $Y_2 = 0$ $Y_1 = 30000$ $(30000, 0)$

Para $2Y_1 + 2Y_2 = 40000$
Si $Y_1 = 0$ $Y_2 = 20000$ $(0, 20000)$
Si $Y_2 = 0$ $Y_1 = 20000$ $(20000, 0)$



Para B → Corte entre las rectas.

$$(Y_1 + 3Y_2 = 30000)(-2)$$
$$2Y_1 + 2Y_2 = 40000$$

$$-2Y_1 - 6Y_2 = -60000$$
$$2Y_1 + 2Y_2 = 40000$$
$$-4Y_2 = -20000$$
$$Y_2 = 5000$$

$$Y_1 = 30000 - 3(5000)$$
$$Y_1 = 15000$$

Punto	F.O.
A (0, 20000)	$400 \times 0 + 400 \times 20000 = 12'000.000$
B (15.000, 5000)	$400 \times 15000 + 600 \times 5000 = 9'000.000$ → mínimo.
C (30000, 0)	$400 \times 30000 + 600 \times 0 = 12'000.000$

Solución óptima $Y_1 = 15000$ $Y_2 = 5000$ $Z = 9'000.000$