

# Tarea 4) Métodos Cuantitativos

## 1) Modelo Original

$$\begin{array}{ll} \text{Max } Z = 8X_1 + 6X_2 \\ \text{s.a.} \end{array}$$

$$\begin{array}{l} 4X_1 + 2X_2 \leq 60 \\ X_{1,2} \geq 0 \end{array}$$

$$2X_1 + 4X_2 \leq 48$$

Var	$X_1$	$X_2$	$X_3$	$X_4$	Cant
Sol					
$X_1$	1	0	$\frac{1}{2}$	$\frac{1}{3}$	12
$X_2$	0	1	$\frac{1}{6}$	$\frac{1}{3}$	6
$Z$	0	0	$\frac{5}{3}$	$\frac{2}{3}$	134

A) Aumenta en 11 horas/semanas el vector  $b$  (60, 48)

2) Nuevo Modelo

$$\begin{array}{ll} \text{Max } Z = 8X_1 + 6X_2 \\ \text{s.a.} \end{array}$$

$$\begin{array}{l} 4X_1 + 2X_2 \leq 71 \\ X_{1,2} \geq 0 \end{array}$$

3) Nueva Solución

$$X_B = B^{-1}b = \begin{bmatrix} \frac{1}{3} & \frac{1}{6} \\ -\frac{1}{6} & \frac{1}{3} \end{bmatrix} \begin{bmatrix} 71 \\ 59 \end{bmatrix} = \begin{bmatrix} \frac{83}{6} \\ \frac{47}{6} \end{bmatrix}$$

Var	$X_1$	$X_2$	$X_3$	$X_4$	Cant
Sol	1	0	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{83}{6}$
$X_1$	1	0	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{83}{6}$
$X_2$	0	1	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{47}{6}$
$Z$	0	0	$\frac{5}{3}$	$\frac{2}{3}$	$\frac{473}{3}$

B) disminución de vector  $b$  hasta 56 y 25 horas

1) Nuevo Vector  $B$

$$b = \begin{bmatrix} 56 \\ 25 \end{bmatrix}$$

2) Nuevo Modelo

$$\begin{array}{ll} \text{Max } Z = 8X_1 + 6X_2 \\ \text{s.a.} \end{array}$$

$$\begin{array}{l} 4X_1 + 2X_2 \leq 56 \\ X_{1,2} \geq 0 \end{array}$$

$$2X_1 + 4X_2 \leq 25$$

3) Nueva Solución

$$112 - 25 = 87$$

$$X_B = B^{-1}b = \begin{bmatrix} \frac{1}{3} & -\frac{1}{6} \\ -\frac{1}{6} & \frac{1}{3} \end{bmatrix} \begin{bmatrix} 56 \\ 25 \end{bmatrix} = \begin{bmatrix} \frac{29}{2} \\ -1 \end{bmatrix}$$

Val	$x_1$	$x_2$	$x_3$	$x_4$	Cant
Sol	1	0	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{29}{2}$
$x_1$	1	0	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{29}{2}$
$x_2$	0	1	$-\frac{1}{6}$	$-\frac{1}{3}$	
$Z$	0	0	$\frac{5}{3}$	$\frac{11}{6}$	

Val	$x_1$	$x_2$	$x_3$	$x_4$	Cant
Sol	1	2	0	$\frac{5}{6}$	$\frac{25}{2}$
$x_1$	1	2	0	$\frac{5}{6}$	$\frac{25}{2}$
$x_3$	0	-6	1	-2	6
$Z$	0	-10	0	$\frac{20}{3}$	100

2º Modelo Original

$$\text{Max } Z = 3x_1 + 2x_2$$

s. a.

$$x_1 + 2x_2 \leq 6$$

$$2x_1 + x_2 \leq 8$$

$$x_1, x_2 \geq 0$$

$$-x_1 + x_2 \leq 1$$

$$x_2 \leq 2$$

Val

Sol

$x_1$

$x_2$

$x_3$

$x_4$

$x_5$

$x_6$

$x_7$

$x_8$

$x_9$

$x_{10}$

$x_{11}$

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$x_{221}$

$x_{222}$ </p



A) Disminución de los accesos  $b_1$  y  $b_3$  del 50%

1) Nuevo Vector b    2) Nuevo Modelo

$$b = \begin{bmatrix} 75 \\ 20 \\ 150 \end{bmatrix}$$

$$\text{Max: } Z = 50X_1 + 40X_2$$

S.A.

$$3X_1 + 5X_2 \leq 75$$

$$X_{1,2} \geq 0 \quad X_2 \leq 20$$

$$8X_1 + 5X_2 \leq 150$$

3) Nueva Solución

$$X_B = \begin{bmatrix} \frac{8}{25} & 0 & \frac{3}{25} \\ -\frac{3}{25} & 1 & \frac{8}{25} \\ -\frac{5}{25} & 0 & \frac{5}{25} \end{bmatrix} \cdot \begin{bmatrix} 75 \\ 20 \\ 150 \end{bmatrix} = \begin{bmatrix} 6 \\ 14 \\ 15 \end{bmatrix} = B^{-1}b$$

$$\begin{array}{cccccc} \text{Val} & & & \text{Cant} & & \\ \text{Sol} & X_1 & X_2 & X_3 & X_4 & X_5 & \text{Sol} \\ X_2 & 0 & 1 & \frac{8}{25} & 0 & \frac{3}{25} & 6 \end{array}$$

$$X_4 \quad 0 \quad 0 \quad \frac{9}{25} \quad 1 \quad \frac{3}{25} \quad 14$$

$$X_1 \quad 1 \quad 0 \quad \frac{5}{25} \quad 0 \quad \frac{5}{25} \quad 15$$

$$Z_j \quad 50 \quad 40 \quad \frac{14}{5} \quad 0 \quad \frac{26}{5} \quad 990$$

$$C_j - Z_j \quad 0 \quad 0 \quad \left[ \frac{14}{5} \right] \quad 0 \quad \left[ \frac{-26}{5} \right] \quad \boxed{\phantom{0}}$$

B) Cambio en la contribución unitaria a la utilidad para  $X_1$  del 40% menos

I) Nuevo Modelo

$$\text{Max: } Z = 30X_1 + 40X_2$$

S.A.

$$\begin{aligned} 3X_1 + 5X_2 &\leq 750 \\ X_{1,2} &\geq 0 \\ 8X_1 + 5X_2 &\leq 300 \end{aligned}$$

$$II_a - (C_1 + \Delta C_1) = \left[ \frac{14}{5} \quad 0 \quad \frac{-26}{5} \right] \quad 0 - 30$$

$$= -50 - 30 = -80 \quad \cancel{\text{X}}$$

$$\begin{array}{cccccc} \text{Val} & & & \text{Cant} & & \\ \text{Sol} & X_1 & X_2 & X_3 & X_4 & X_5 & \text{Sol} \\ X_2 & 0 & 1 & \frac{3}{25} & 0 & \frac{-3}{25} & 12 \end{array}$$

$$X_4 \quad 0 \quad 0 \quad \frac{9}{25} \quad 1 \quad \frac{3}{25} \quad 8$$

$$X_1 \quad 1 \quad 0 \quad \frac{-5}{25} \quad 0 \quad \frac{5}{25} \quad 20$$

$$Z_j - 30 \quad 40 \quad \frac{34}{5} \quad 0 \quad \frac{6}{5} \quad 1380 \quad \cancel{\text{X}}$$

$$C_j - Z_j \quad -80 \quad 0 \quad \frac{-30}{5} \quad 0 \quad \frac{-10}{5} \quad \boxed{\phantom{0}} \quad \cancel{\text{X}}$$

$$\begin{array}{l}
 \text{Max: } Z = 20X_1 + 40X_2 \\
 \text{s.t.} \\
 \begin{aligned}
 & X_1 + X_2 \leq 10 \\
 & 2X_1 + 3X_2 \leq 20 \\
 & 3X_1 + 2X_2 \leq 15 \\
 & X_1, X_2 \geq 0
 \end{aligned}
 \end{array}$$

(L)  $\Delta D$ 's marginalidad has tu los 20 dólares a la gaveta a la