

Ejercicio #1

$$\text{Max } Z = 2x + 9y$$

Sujeto a:

$$x + 2y \leq 5 \quad (H_1)$$

$$x + y \leq 4 \quad (H_2)$$

$$x, y \geq 0$$

T #1

Base	Variables Decision		Variables Holgura		VS
	x	y	H1	H2	
H1	1	2	1	0	5
H2	1	1	0	1	4
Z	-2	-9	0	0	0

$$VE = Y \quad RM \quad \frac{5}{2} = 2,5 \quad \frac{9}{2} = 4,5 \quad VS = H_1$$

Pivote Dividiendo todo entre 2

Base	Variables Decision		Variables Holgura		VS
	x	y	H1	H2	
$H_1 \rightarrow Y$	$\frac{1}{2}$	1	$\frac{1}{2}$	0	$\frac{5}{2}$

H_2	Z
$x = 1 - (1 \cdot \frac{1}{2}) = \frac{1}{2}$	$x = -2 - (-4 \cdot \frac{1}{2}) = 0$
$y = 1 - (1 \cdot 1) = 0$	$y = -9 - (-4 \cdot 1) = 0$
$H_1 = 0 - (1 \cdot \frac{1}{2}) = -\frac{1}{2}$	$H_1 = 0 - (-4 \cdot \frac{1}{2}) = 2$
$H_2 = 1 - (1 \cdot 0) = 1$	$H_2 = 0 - (-4 \cdot 0) = 0$
$VS = 4 - (1 \cdot \frac{5}{2}) = \frac{3}{2}$	$VS = 0 - (-4 \cdot \frac{5}{2}) = 10$

T # 2

Base	Variables Decision	Variables Marginal	VS		
	X	Y	H1	H2	
Y	$\frac{1}{2}$	1	$\frac{1}{2}$	0	$\frac{5}{2}$
H2	$\frac{1}{2}$	0	$-\frac{1}{2}$	1	$\frac{3}{2}$
Z	0	0	2	0	10

Punto $(0, 2.5)$ $\leftarrow \frac{5}{2}$

$$\text{Max } Z = 2x + 4y$$

$$2 \cdot 0 + 4 \cdot 2.5 = 10$$

Fila Z

$x=0$, no itera mas

$y=0$, Esta en la base

$H_1 = \text{positivo}$ no itera mas

$H_2 = 0$, esta en la base

No existen valores negativos en la fila Z por lo tanto no se itera mas y se obtiene la solucion optima

Tipo de caso: Solucion unica

Ejercicio #2

$$\text{Max } z = 6.5x + 7y$$

Sujeto a:

$$2x + 3y \leq 600 \quad (\text{H1})$$

$$x + y \leq 500 \quad (\text{H2})$$

$$2x + y \leq 700 \quad (\text{H3})$$

$$x, y \geq 0$$

T #3

Base	Variables Decision		Variables Holgura			VS
	x	y	H1	H2	H3	
H1	2	3	1	0	0	600
H2	1	1	0	1	0	500
H3	2	1	0	0	1	700
z	-6.5	-7	0	0	0	0

$$VE = y \quad RM = \frac{600}{3} = 200 \quad \frac{500}{1} = 500 \quad \frac{700}{2} = 700$$

$$VS = H1$$

Pivote Dividiendo todo entre 3

Base	Variables Decision		Variables Holgura			VS
	x	y	H1	H2	H3	
$H_1 \rightarrow y$	$\frac{2}{3}$	1	$\frac{1}{3}$	0	0	200

H_2	H_3	Z
$X = 1 - (1 \cdot \frac{2}{3}) = \frac{1}{3}$	$X = 2 - (1 \cdot \frac{2}{3}) = \frac{4}{3}$	$X = -6,5 + 7 \cdot \frac{2}{3} = \frac{-22}{6}$
$Y = 1 - (1 \cdot 1) = 0$	$Y = 1 - (1 \cdot 1) = 0$	$Y = -7 + 7 \cdot 1 = 0$
$H_1 = 0 - (1 \cdot \frac{1}{3}) = -\frac{1}{3}$	$H_1 = 0 - (1 \cdot \frac{1}{3}) = -\frac{1}{3}$	$H_1 = 0 + 7 \cdot \frac{1}{3} = \frac{7}{3}$
$H_2 = 1 - (1 \cdot 0) = 1$	$H_2 = 0 - (1 \cdot 0) = 0$	$H_2 = 0 + 7 \cdot 0 = 0$
$H_3 = 0 - (1 \cdot 0) = 0$	$H_3 = 1 - (1 \cdot 0) = 1$	$H_3 = 0 + 7 \cdot 0 = 0$
$VS = 500 - (1 \cdot 200) = 300$	$VS = 700 - (1 \cdot 200) = 200$	$VS = 0 + 7 \cdot 200 = 1400$

T # 2

Base	Variables Decision			Variables Holgura		
	X	Y	H_1	H_2	H_3	
Y	$\frac{2}{3}$	1	$\frac{1}{3}$	0	0	200
H_2	$\frac{1}{3}$	0	$-\frac{1}{3}$	1	0	300
H_3	$\frac{4}{3}$	0	$-\frac{1}{3}$	0	1	200
Z	$-\frac{22}{6}$	0	$\frac{7}{3}$	0	0	1400

Como Z sigue negativo, se iterá de nuevo

$$VE = X \quad RM \quad \frac{200}{\frac{2}{3}} = 300 \quad \frac{300}{\frac{1}{3}} = 900 \quad \frac{200}{\frac{4}{3}} = 150$$

$$VS = H_3$$

Pivote multiplicando todo por $\frac{3}{4}$

Base	Variables Decision			Variables Holgura		
	X	Y	H_1	H_2	H_3	
$H_3 \rightarrow X$	1	0	$-\frac{1}{4}$	0	$\frac{3}{4}$	150

γ	H_2	Z
$X = \frac{2}{3} - (\frac{2}{3} \cdot 1) = 0$	$X = \frac{2}{3} - (\frac{1}{3} \cdot 1) = 0$	$X = \frac{-7}{6} + (\frac{11}{6} \cdot 1) = 0$
$\gamma = 1 - (\frac{2}{3} \cdot 0) = 1$	$\gamma = 0 - (\frac{1}{3} \cdot 0) = 0$	$\gamma = 0 + (\frac{11}{6} \cdot 0) = 0$
$H_1 = \frac{1}{3} - (\frac{2}{3} \cdot -\frac{1}{4}) = \frac{7}{2}$	$H_1 = \frac{-1}{3} - (\frac{1}{3} \cdot -\frac{1}{4}) = -\frac{1}{4}$	$H_1 = \frac{7}{3} + (\frac{11}{6} \cdot -\frac{1}{4}) = \frac{75}{8}$
$H_2 = 0 - (\frac{2}{3} \cdot 0) = 0$	$H_2 = 1 - (\frac{1}{3} \cdot 0) = 1$	$H_2 = 0 + (\frac{11}{6} \cdot 0) = 0$
$H_3 = 0 - (\frac{2}{3} \cdot \frac{3}{4}) = -\frac{1}{2}$	$H_3 = 0 - (\frac{1}{3} \cdot \frac{3}{4}) = -\frac{1}{4}$	$H_3 = 0 + (\frac{11}{6} \cdot \frac{3}{4}) = \frac{77}{8}$
$VS = 200 - (\frac{2}{3} \cdot 150) = 100$	$VS = 300 - (\frac{1}{3} \cdot 250) = 250$	$VS = 7900 + (\frac{11}{6} \cdot 750) = 1675$

T #3

Base	Variables Decision			Variables Marginal		
	X	γ	H_1	H_2	H_3	
γ	0	1	$\frac{7}{2}$	0	$-\frac{1}{2}$	100
H_2	0	0	$-\frac{1}{4}$	1	$-\frac{1}{4}$	250
X	1	0	$-\frac{1}{4}$	0	$\frac{3}{4}$	150
Z	0	0	$\frac{75}{8}$	0	$\frac{77}{8}$	1675

Punto (150, 100)

$$\begin{aligned} \text{Max } Z &= 6.5X + 7\gamma \\ &= 6.5 \cdot 150 + 7 \cdot 100 \\ &= 1675 \end{aligned}$$

Fila 2

$X = 0$, no itera mas

$\gamma = 0$, Esta en la base

$H_1 = \text{positivo}$, no itera mas

$H_2 = 0$, esta en la base

$H_3 = \text{positivo}$, no se itera mas

No existen negativos en Z , entonces no se itera mas

Tipo de caso: Solucion unica