

Ejercicio #1

$$\max z = 2x + 9y$$

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

$$VE = y \quad RM \quad \frac{5}{2} = 2,5 \quad \frac{4}{1} = 4 \quad VS = H1$$

Pivote Dividiendo todo entre 2

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

H2	Z
$x = 1 - (1 \cdot \frac{1}{2}) = \frac{1}{2}$	$x = -2 - (-9 \cdot \frac{1}{2}) = 0$
$y = 1 - (1 \cdot 1) = 0$	$y = -9 - (-9 \cdot 1) = 0$
$H1 = 0 - (1 \cdot \frac{1}{2}) = -\frac{1}{2}$	$H1 = 0 - (-9 \cdot \frac{1}{2}) = 2$
$H2 = 1 - (1 \cdot 0) = 1$	$H2 = 0 - (-9 \cdot 0) = 0$
$VS = 4 - (1 \cdot \frac{5}{2}) = \frac{3}{2}$	$VS = 0 - (-9 \cdot \frac{5}{2}) = 10$

T #2

Base	Variables Decision		Variables Holgura		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

$H1 = \text{Positivo}$, no itera mas

$H2 = 0$, esta en la base

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

Tipo de caso; Solución única

Ejercicio #2

$$\max z = 6,5x + 7y$$

Sujeto a:

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

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

$$2x + y \leq 900 \text{ (H3)}$$

$$x, y \geq 0$$

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	900
z	-6,5	-7	0	0	0	0

$$VE = y \quad R.M \quad \frac{600}{3} = 200 \quad \frac{500}{1} = 500 \quad \frac{900}{1} = 900$$

$$VS = H1$$

Pivote Dividiendo todo entre 3

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

H2	H3	Z
$X = 1 - (1 \cdot \frac{2}{3}) = \frac{1}{3}$	$X = 2 - (1 \cdot \frac{2}{3}) = \frac{4}{3}$	$X = -6.5 + 7 \cdot \frac{2}{3} = \frac{-11}{6}$
$Y = 1 - (1 \cdot 1) = 0$	$Y = 1 - (1 \cdot 1) = 0$	$Y = -7 + 7 \cdot 1 = 0$
$H1 = 0 - (1 \cdot \frac{1}{3}) = -\frac{1}{3}$	$H1 = 0 - (1 \cdot \frac{1}{3}) = -\frac{1}{3}$	$H1 = 0 + 7 \cdot \frac{1}{3} = \frac{7}{3}$
$H2 = 1 - (1 \cdot 0) = 1$	$H2 = 0 - (1 \cdot 0) = 0$	$H2 = 0 + 7 \cdot 0 = 0$
$H3 = 0 - (1 \cdot 0) = 0$	$H3 = 1 - (1 \cdot 0) = 1$	$H3 = 0 + 7 \cdot 0 = 0$
$VS = 500 - (1 \cdot 200) = 300$	$VS = 900 - (1 \cdot 200) = 200$	$VS = 0 + 7 \cdot 200 = 1400$

T # 2

Base	Variables Decision		Variables Holgura			VS
	X	Y	H1	H2	H3	
Y	$\frac{2}{3}$	1	$\frac{1}{3}$	0	0	200
H2	$\frac{1}{3}$	0	$-\frac{1}{3}$	1	0	300
H3	$\frac{4}{3}$	0	$-\frac{1}{3}$	0	1	200
Z	$\frac{-11}{6}$	0	$\frac{7}{3}$	0	0	1400

Como Z sigue negativo, se itera de nuevo

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

$$VS = H3$$

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

Base	Variables Decision		Variables Holgura			VS
	X	Y	H1	H2	H3	
H3 → X	1	0	$-\frac{1}{4}$	0	$\frac{3}{4}$	150

Y	H2	Z
$X = \frac{2}{3} - (\frac{2}{3} \cdot 1) = 0$	$X = \frac{7}{3} - (\frac{7}{3} \cdot 1) = 0$	$X = \frac{-11}{6} + (\frac{11}{6} \cdot 1) = 0$
$Y = 1 - (\frac{2}{3} \cdot 0) = 1$	$Y = 0 - (\frac{7}{3} \cdot 0) = 0$	$Y = 0 + (\frac{11}{6} \cdot 0) = 0$
$H1 = \frac{7}{3} - (\frac{2}{3} \cdot \frac{-1}{4}) = \frac{7}{2}$	$H1 = \frac{-7}{3} - (\frac{7}{3} \cdot \frac{-1}{4}) = \frac{-1}{4}$	$H1 = \frac{7}{3} + (\frac{11}{6} \cdot \frac{-1}{4}) = \frac{15}{8}$
$H2 = 0 - (\frac{2}{3} \cdot 0) = 0$	$H2 = 1 - (\frac{7}{3} \cdot 0) = 1$	$H2 = 0 + (\frac{11}{6} \cdot 0) = 0$
$H3 = 0 - (\frac{2}{3} \cdot \frac{3}{4}) = \frac{-1}{2}$	$H3 = 0 - (\frac{7}{3} \cdot \frac{3}{4}) = \frac{-7}{4}$	$H3 = 0 + (\frac{11}{6} \cdot \frac{3}{4}) = \frac{11}{8}$
$VS = 200 - (\frac{2}{3} \cdot 150) = 100$	$VS = 300 - (\frac{7}{3} \cdot 250) = 250$	$VS = 1900 + (\frac{11}{6} \cdot 150) = 1675$

T #3

Base	Variables Decision		Variables Holgura			VS
	X	Y	H1	H2	H3	
Y	0	1	$\frac{7}{2}$	0	$\frac{-1}{2}$	100
H2	0	0	$\frac{-1}{4}$	1	$\frac{-7}{4}$	250
X	1	0	$\frac{-1}{4}$	0	$\frac{3}{4}$	150
Z	0	0	$\frac{15}{8}$	0	$\frac{11}{8}$	1675

Punto (150, 100)

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

Fila Z

$X=0$, no itera mas

$Y=0$, Esta en la base

$H1 = \text{Positivo}$, no itera mas

$H2=0$, esta en la base

$H3 = \text{Positivo}$, no se itera mas

No existen negativos en Z, entonces no se itera mas

Tipo de caso: Solucion unica