Min $Z = x + y$

s.a.

$$x + 3y \geq 6$$
$$2x + y \geq 7$$
$$x, y \geq 0$$

$\Rightarrow$

Min $Z = x + y$

s.a.

$$x + 3y - e_1 + A_1 = 6$$
$$2x + y - e_2 + A_2 = 7$$
$$x, y, e_1, e_2, A_1, A_2 \geq 0$$

Iteración 0

$$Z - x - y - MA_1 - MA_2 = 0$$
$$x + 3y - e_1 + A_1 = 6$$
$$2x + y - e_2 + A_2 = 7$$

V. básicas: Z, A_1, A_2

La ecuación 0 tiene 3 variables básicas, y solo debe tener 1.

$$Z - x - y - MA_1 - MA_2 = 0$$
$$+Mx + 3My - Me_1 + MA_1 = +6M$$
$$2Mx + My - Me_2 + MA_2 = 7M$$
$$Z + (3M-1)x + (4M-1)y - Me_1 - Me_2 = 13M$$

Al reescribir

Sol. $x=0, y=0, e_1=0, e_2=0$
$A_1=6, A_2=7 \quad Z=13M$

$(-\frac{4}{3}M+\frac{1}{3})x \quad -(4M-1)y \quad -(\frac{4}{3}M+\frac{1}{3}) \quad -(-\frac{4}{3}M+\frac{1}{3})A_1 \quad -8M+2$

E_0: $Z + (3M-1)x + (4M-1)y - Me_1 - Me_2 = 13M \qquad \bar{E}_0 = E_0 - (4M-1)\bar{E}_1$

E_1: $x + 3y - e_1 + A_1 = 6 \qquad \bar{E}_1 = \frac{1}{3}E_1$

E_2: $2x + y - e_2 + A_2 = 7 \qquad \bar{E}_2 = E_2 - \bar{E}_1$

V. básicas: Z, A_1, A_2

El coeficiente más positivo lo tiene y, por lo que es la variable que entra

De E_1, $A_1 = 6 - 3y \geq 0$ de E_2 $A_2 = 7 - y \geq 0 \Rightarrow y \leq \frac{6}{3} = 2$ y $y \leq 7$ $\quad y \leq \min\{2,7\} = 7$

La variable que sale es A_1

$x=0, y=2, e_1=0, e_2=0, A_1=0, A_2=5, Z=5M+2.$

$(-\frac{5}{3}M+\frac{2}{3})x \quad (-\frac{M}{3}+\frac{1}{15})e_1 + (M-\frac{2}{5})e_2 + (\frac{1}{3}M-\frac{2}{15})A_1 + (-M+\frac{2}{5})A_2 = -5M+2$

E_0: $Z + (\frac{5}{3}M - \frac{2}{3})x + (\frac{M}{3}-\frac{1}{3})e_1 - Me_2 - (\frac{4}{3}M - \frac{1}{3})A_1 = 5M+2 \qquad \dot{\bar{E}}_1 = \bar{E}_1 - (\frac{5}{3}M - \frac{2}{3})\dot{\bar{E}}_2$

E_1: $\frac{1}{3}x + y - \frac{1}{3}e_1 + \frac{1}{3}A_1 = 2 \qquad \dot{\bar{E}}_1 = \bar{E}_1 - \frac{1}{3}\dot{\bar{E}}_2$

E_2: $\frac{5}{3}x + \frac{1}{3}e_1 - e_2 - \frac{1}{3}A_1 + A_2 = 5 \qquad \dot{\bar{E}}_2 = \frac{3}{5}\bar{E}_2$

$-\frac{1}{3}x \quad -\frac{1}{15}e_1 \quad +\frac{1}{5}e_2 \quad +\frac{1}{15}A_1 \quad -\frac{1}{5}A_2 \quad -1$

V. básicas: Z, y, A_2

El coeficiente más positivo lo tiene x, por lo que es la variable que entra

De $\bar{E}_1$, $y = 2 - \frac{1}{3}x \geq 0 \Rightarrow x \leq 6$ de $\bar{E}_2$ $A_2 = 5 - \frac{5}{3}x \geq 0 \Rightarrow x \leq 3 \Rightarrow x \leq \min\{6,3\} = 3.$

La variable que sale es A_2

$\ddot{E}_0$: $Z - \frac{1}{5}e_1 - \frac{2}{5}e_2 - (M-\frac{1}{5})A_1 - (M-\frac{2}{5})A_2 = 4$

$\ddot{E}_1$: $y - \frac{2}{5}e_1 + \frac{1}{5}e_2 + \frac{2}{5}A_1 - \frac{1}{5}A_2 = 1$

$\ddot{E}_2$: $x + \frac{1}{5}e_1 - \frac{3}{5}e_2 - \frac{1}{5}A_1 + \frac{3}{5}A_2 = 3$

V. básicas: Z, y, x

No hay positivos la solución es óptima.

$x = 3, y = 1, e_1 = e_2 = A_1 = A_2 = 0 \quad Z = 4$

Min $Z = x + y$

s.a

$$\begin{aligned} x + 3y &\geq 6 \\ 2x + y &\geq 7 \\ x, y &\geq 0 \end{aligned} \Rightarrow$$

Min $Z = x + y$

s.a.

$$\begin{aligned} x + 3y - e_1 \quad + A_1 \quad &= 6 \\ 2x + y \quad - e_2 \quad + A_2 &= 7 \\ x, y, e_1, e_2, A_1, A_2 &\geq 0 \end{aligned}$$

Iteración 0

	V básicas
$Z - x - y \qquad - MA_1 - MA_2 = 0$	Z
$x + 3y - e_1 \qquad + A_1 \qquad = 6$	A_1
$2x + y \qquad - e_2 \qquad + A_2 = 7$	A_2

La ecuación 0 tiene 3 variables básicos, y solo debe tener 1.

$$\begin{aligned} Z - x - y \qquad\qquad &- MA_1 - MA_2 = 0 \\ + Mx + 3My - Me_1 \qquad &+ MA_1 \qquad\qquad = 6M \\ 2Mx + My \qquad - Me_2 \qquad &+ MA_2 \qquad = 7M \\ \hline Z + (3M-1)x + (4M-1)y - Me_1 - Me_2 \qquad &= 13M \end{aligned}$$

Al reescribir

Sol. $x = 0, y = 0, e_1 = 0, e_2 = 0$
$A_1 = 6, A_2 = 7 \quad Z = 13M$

$(-\frac{4}{3}M + \frac{1}{3})x \quad -(4M-1)y \quad -(-\frac{4}{3}M + \frac{1}{3}) \qquad -(-\frac{4}{3}M + \frac{1}{3})A_1 \qquad -8M + 2$

			V. básicas
E_0	$Z + (3M-1)x + (4M-1)y - Me_1 - Me_2 = 13M$	$\bar{E}_0 = E_0 - (4M-1)\bar{E}_1$	Z
E_1	$x + 3y - e_1 \qquad + A_1 = 6$	$\bar{E}_1 = \frac{1}{3}E_1$	A_1
E_2	$2x + y \qquad - e_2 \qquad + A_2 = 7$	$\bar{E}_2 = E_2 - \bar{E}_1$	A_2

El coeficiente más positivo lo tiene y, por lo que es la variable que entra

De E_1, $A_1 = 6 - 3y \geq 0$ de E_2 $A_2 = 7 - y \geq 0 \Rightarrow y \leq \frac{6}{3} = 2$ y $y \leq 7$ $y \leq \min\{2, 7\} = 7$

$x = 0, y = 2, e_1 = 0, e_2 = 0, A_1 = 0, A_2 = 5, Z = 5M + 2.$

La variable que sale es A_1

$(-\frac{5}{3}M + \frac{2}{3})x \qquad (-\frac{M}{3} + \frac{2}{15})e_1 + (M - \frac{2}{5})e_2 + (\frac{1}{3}M - \frac{2}{15})A_1 + (-M + \frac{2}{5})A_2 = -5M + 2$

			V. básicas
$\bar{E}_0$	$Z + (\frac{5}{3}M - \frac{2}{3})x \qquad + (\frac{M}{3} - \frac{1}{3})e_1 - Me_2 - (\frac{4}{3}M - \frac{1}{3})A_1 = 5M + 2$	$\hat{E}_1 = \bar{E}_1 - (\frac{5}{3}M - \frac{2}{3})\hat{E}_2$	Z
$\bar{E}_1$	$\frac{1}{3}x + y - \frac{1}{3}e_1 \qquad + \frac{1}{3}A_1 = 2$	$\hat{E}_1 = \bar{E}_1 - \frac{1}{3}\hat{E}_2$	y
$\bar{E}_2$	$\frac{5}{3}x \qquad \frac{1}{3}e_1 \quad - e_2 \quad - \frac{1}{3}A_1 + A_2 = 5$	$\hat{E}_2 = \frac{3}{5}\bar{E}_2$	A_2

$-\frac{1}{3}x \qquad -\frac{1}{15}e_1 \quad + \frac{1}{5}e_2 \quad + \frac{1}{15}A_1 \quad - \frac{1}{5}A_2 \quad -1$

El coeficiente más positivo lo tiene x, por lo que es la variable que entra

De $\bar{E}_1$, $y = 2 - \frac{1}{3}x \geq 0 \Rightarrow x \leq 6$ de $\bar{E}_2$ $A_2 = 5 - \frac{5}{3}x \geq 0 \Rightarrow x \leq 3 \Rightarrow x \leq \min\{6, 3\} = 3.$

La variable que sale es A_2

		V. básicas
$\hat{E}_0$	$Z \qquad -\frac{1}{5}e_1 - \frac{2}{5}e_2 - (M - \frac{1}{5})A_1 - (M - \frac{2}{5})A_2 = 4$	Z
$\hat{E}_1$	$y \qquad - \frac{2}{5}e_1 + \frac{1}{5}e_2 + \frac{2}{5}A_1 - \frac{1}{5}A_2 = 1$	y
$\hat{E}_2$	$x \qquad + \frac{1}{5}e_1 - \frac{3}{5}e_2 - \frac{1}{5}A_1 + \frac{3}{5}A_2 = 3$	x

No hay positivos la solución es óptima.

$x = 3, y = 1, e_1 = e_2 = A_1 = A_2 = 0 \qquad Z = 4$