Sistema de ecuaciones lineales

Un videoclub está especializado en películas de tres tipos:

- Infantiles
- Oeste americano
- Terror

Se sabe que:

El 60% de las películas infantiles más el 50% de las del oeste, representan el 30% del total de las películas. El 20% de las infantiles, más el 60% de las del oeste, más del 60% de las de terror representan la mitad del total de las películas. Hay 100 películas más del oeste que de infantiles.

Infantiles	x	60%	20%	
Oeste americano	y	50%	60%	100
Terror	z	70%	60%	
	T.I	30%	1/2	

60% Infantiles + 50% Oeste = 30% del total

20% Infantiles + 60% oeste + 60% Terror = 1/2 del total

Oeste: 100 + infantiles

$$60x + 50y + 70z = 30$$

$$20x + 60y + 60z = 1/2$$

$$1x + 100y + 1z = 0$$

$$\frac{6\cancel{0}}{10\cancel{0}}x + \frac{5\cancel{0}}{10\cancel{0}}y = \frac{3\cancel{0}}{10\cancel{0}}(x+y+z)$$

$$6x + 5y = -(3x + 3y + 3z)$$

$$\boxed{3x + 2y - 3z = 0} \quad (1)$$

$$\frac{2\cancel{0}}{10\cancel{0}}x + \frac{6\cancel{0}}{10\cancel{0}}y + \frac{6\cancel{0}}{10\cancel{0}}z = -\left(\frac{5\cancel{0}}{10\cancel{0}}x + \frac{5\cancel{0}}{10\cancel{0}}y + \frac{5\cancel{0}}{10\cancel{0}}z\right)$$

$$2x + 6y + 6z = -(5x + 5y + 5z)$$

$$\boxed{-3x + y + z = 0} \quad (2)$$

$$\boxed{y = x + 100} \rightarrow \quad X = 1 \quad y = 1 \quad z = 1 \quad T.I = 100$$

$$\boxed{x + y + z = 100} \quad (3)$$

$$\begin{cases} 3x + 2y - 3z = 0 \\ -3x + y + z = 0 \\ x + y + z = 100 \end{cases}$$

$$\left[\begin{array}{ccc|c} 3 & 2 & -3 & 0 \\ -3 & 1 & 1 & 0 \\ 1 & 1 & 1 & 100 \end{array}\right]$$

$F_1/(3) = F_1$

$\boxed{3/3} \to 1 \quad \boxed{2/3} \to 2/3 \quad \boxed{-3/3} \to -1 \quad \boxed{0/3} \to 0$

$$\left[\begin{array}{ccc|c} 1 & 2/3 & -1 & 0 \\ -3 & 1 & 1 & 0 \\ 1 & 1 & 1 & 100 \end{array}\right]$$

$F_2 - (-3) \times F_1 = F_2$

$\boxed{-3-(-3)\times 1} \to 0 \quad \boxed{1-(-3)\times 2/3} \to 3 \quad \boxed{1-(-3)\times(-1)} \to -2 \quad \boxed{0-(-3)\times 0} \to 0$

$$\left[\begin{array}{ccc|c} 1 & 2/3 & -1 & 0 \\ 0 & 3 & -2 & 0 \\ 1 & 1 & 1 & 100 \end{array}\right]$$

$F_3 - 1 \times F_1 = F_3$

$\boxed{1-1\times 1} \to 0 \quad \boxed{1-1\times 2/3} \to 1/3 \quad \boxed{1-1\times -1} \to 2 \quad \boxed{100-1\times 0} \to 100$

$$\left[\begin{array}{ccc|c} 1 & 2/3 & -1 & 0 \\ 0 & 3 & -2 & 0 \\ 0 & 1/3 & 2 & 100 \end{array}\right]$$

$F_2/3 = F_2$

$\boxed{0/3} \to 0 \quad \boxed{3/3} \to 1 \quad \boxed{-2/3} \to -2/3 \quad \boxed{0/3} \to 0$

$$\left[\begin{array}{ccc|c} 1 & 2/3 & -1 & 0 \\ 0 & 1 & -2/3 & 0 \\ 0 & 1/3 & 2 & 100 \end{array}\right]$$

$F_3 - (1/3) \times F_2 = F_3$

$\boxed{0-(1/3)\times 0} \to 0 \quad \boxed{1/3-(1/3)\times 1} \to 0 \quad \boxed{2-(1/3)\times(-2/3)} \to 20/9 \quad \boxed{100-(1/3)\times 0} \to 100$

$$\left[\begin{array}{ccc|c} 1 & 2/3 & -1 & 0 \\ 0 & 1 & -2/3 & 0 \\ 0 & 0 & 20/9 & 100 \end{array}\right]$$

$F_3/(20/9) = F_3$

$\boxed{0/(20/9)} \to 0 \quad \boxed{0/(20/9)} \to 0 \quad \boxed{(20/9)/(20/9)} \to 1 \quad \boxed{100/(20/9)} \to \boxed{900/20}$

45 4

$$\left[\begin{array}{ccc|c} 1 & 2/3 & -1 & 0 \\ 0 & 1 & -2/3 & 0 \\ 0 & 0 & 1 & 45 \end{array}\right]$$

$F_2 - (-2/3) \times F_3 = F_2$

$\boxed{0-(-2/3)\times 0} \rightarrow 0$ $\quad \boxed{1-(-2/3)\times 0} \rightarrow 1$ $\quad \boxed{-2/3-(-2/3)\times 1} \rightarrow 0$ $\quad \boxed{0-(-2/3)\times 45} \rightarrow 30$

$$\left[\begin{array}{ccc|c} 1 & 2/3 & -1 & 0 \\ 0 & 1 & 0 & 30 \\ 0 & 0 & 1 & 45 \end{array}\right]$$

$F_1 - (-1) \times F_3 = F_1$

$\boxed{1-(-1)\times 0} \rightarrow 1$ $\quad \boxed{2/3-(-1)\times 0} \rightarrow 2/3$ $\quad \boxed{-1-(-1)\times 1} \rightarrow 0$ $\quad \boxed{0-(-1)\times 45} \rightarrow 45$

$$\left[\begin{array}{ccc|c} 1 & 2/3 & 0 & 45 \\ 0 & 1 & 0 & 30 \\ 0 & 0 & 1 & 45 \end{array}\right]$$

$F_1 - (2/3) \times F_2 = F_1$

$\boxed{1-(2/3)\times 0} \rightarrow 1$ $\quad \boxed{(2/3)-(2/3)\times 1} \rightarrow 0$ $\quad \boxed{0-(2/3)\times 0} \rightarrow 0$ $\quad \boxed{45-(2/3)\times 30} \rightarrow 105$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 105 \\ 0 & 1 & 0 & 30 \\ 0 & 0 & 1 & 45 \end{array}\right]$$

$x = 105 \quad y = 30 \quad z = 45$