

Tarea 3

10-a) $(1, 0), (-1, 6), (2, 0)$

$$0 = a_0 + a_1(1)^1 + a_2(1)^2 \rightarrow 0 = a_0 + a_1 + a_2$$

$$6 = a_0 + a_1(-1)^1 + a_2(-1)^2 \rightarrow 6 = a_0 - a_1 - a_2$$

$$0 = a_0 + a_1(2)^1 + a_2(2)^2 \rightarrow 0 = a_0 + 2a_1 + 4a_2$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 1 & -1 & -1 & 6 \\ 1 & 2 & 4 & 0 \end{array} \right] \xrightarrow{\begin{array}{l} R_2 - R_1 \\ R_3 - R_1 \end{array}} \left[\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 0 & -2 & -2 & 6 \\ 0 & 1 & 3 & 0 \end{array} \right] \xrightarrow{\begin{array}{l} R_2 + R_3 \\ R_3 \cdot 2 \end{array}} \left[\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 0 & 0 & 4 & 6 \end{array} \right]$$

$$= \left[\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 0 & 0 & 4 & 6 \end{array} \right] \xrightarrow{\begin{array}{l} R_1 - R_3 \\ R_2 - 3R_3 \\ R_3 \cdot \frac{1}{4} \end{array}} \left[\begin{array}{ccc|c} 1 & 1 & 0 & -\frac{3}{2} \\ 0 & 1 & 0 & -\frac{9}{2} \\ 0 & 0 & 1 & \frac{3}{2} \end{array} \right]$$

$$\xrightarrow{\begin{array}{l} R_1 - R_2 \\ R_2 - R_3 \end{array}} \left[\begin{array}{ccc|c} 1 & 0 & 0 & -3 \\ 0 & 1 & 0 & -\frac{3}{2} \\ 0 & 0 & 1 & \frac{3}{2} \end{array} \right] \quad y = 3 - \frac{9}{2}x + \frac{3}{2}x^2$$

b) $(1, 14), (2, 22), (3, 32)$

$$14 = a_0 + a_1(1)^1 + a_2(1)^2 \rightarrow 14 = a_0 + a_1 + a_2$$

$$22 = a_0 + a_1(2)^1 + a_2(2)^2 \rightarrow 22 = a_0 + 2a_1 + 4a_2$$

$$32 = a_0 + a_1(3)^1 + a_2(3)^2 \rightarrow 32 = a_0 + 3a_1 + 9a_2$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 14 \\ 1 & 2 & 4 & 22 \\ 1 & 3 & 27 & 38 \end{array} \right] \rightarrow R_2 - R_1 \left[\begin{array}{ccc|c} 1 & 1 & 1 & 14 \\ 0 & 1 & 3 & 8 \\ 1 & 3 & 27 & 38 \end{array} \right] \rightarrow R_3 - R_1 \left[\begin{array}{ccc|c} 1 & 1 & 1 & 14 \\ 0 & 1 & 3 & 8 \\ 0 & 2 & 26 & 18 \end{array} \right]$$

$$R_3 - 2R_2 \left[\begin{array}{ccc|c} 1 & 1 & 1 & 14 \\ 0 & 1 & 3 & 8 \\ 0 & 0 & 20 & 2 \end{array} \right] \rightarrow R_2 - 3R_3 \left[\begin{array}{ccc|c} 1 & 1 & 1 & 14 \\ 0 & 1 & 0 & \frac{22}{10} \\ 0 & 0 & 1 & \frac{1}{10} \end{array} \right]$$

$$R_1 - R_3 \left[\begin{array}{ccc|c} 1 & 0 & 0 & \frac{31}{5} \\ 0 & 1 & 0 & \frac{22}{10} \\ 0 & 0 & 1 & \frac{1}{10} \end{array} \right]$$

$$y = \frac{31}{5} + \frac{22}{10}x + \frac{1}{10}x^2$$

(2, 8) (3, 9) P(1, 1)



$$\text{Fe} = x_1 = 2x_3 \longrightarrow x_1 - 2x_3 = 0$$

$$\text{S} = 2x_1 = x_4 \longrightarrow 2x_1 - x_4 = 0$$

$$\text{O} = 2x_2 = 3x_3 + 2x_4 \longrightarrow 2x_2 - 3x_3 - 2x_4 = 0$$

$$\left[\begin{array}{cccc|c} 1 & 0 & -2 & 0 & 0 \\ 2 & 0 & 0 & -1 & 0 \\ 0 & 2 & -3 & -2 & 0 \end{array} \right] \rightarrow R_2 - 2R_1 \left[\begin{array}{cccc|c} 1 & 0 & -2 & 0 & 0 \\ 0 & 0 & 4 & -1 & 0 \\ 0 & 2 & -3 & -2 & 0 \end{array} \right]$$

$$R_2 \leftrightarrow R_3 \left[\begin{array}{cccc|c} 1 & 0 & -2 & 0 & 0 \\ 0 & 2 & -3 & -2 & 0 \\ 0 & 0 & 4 & -1 & 0 \end{array} \right] \left(\frac{1}{2} \right) \rightarrow \left[\begin{array}{cccc|c} 1 & 0 & -2 & 0 & 0 \\ 0 & 1 & -\frac{3}{2} & -1 & 0 \\ 0 & 0 & 4 & -1 & 0 \end{array} \right]$$

$$R_1 + 2R_3 \left[\begin{array}{cccc|c} 1 & 0 & 0 & -\frac{1}{2} & 0 \\ 0 & 1 & 0 & -\frac{5}{2} & 0 \\ 0 & 0 & 1 & -\frac{1}{4} & 0 \end{array} \right] \rightarrow x_1 - \frac{1}{2}x_4 = 0 \rightarrow x_1 = \frac{1}{2}x_4$$

$$x_2 - \frac{5}{2}x_4 = 0 \rightarrow x_2 = \frac{5}{2}x_4$$

$$x_3 - \frac{1}{4}x_4 = 0 \rightarrow x_3 = \frac{1}{4}x_4$$

$$x_4 = 8$$

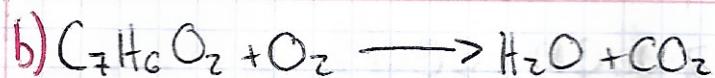
$$x_1 = \frac{1}{2}(8) = 4$$

$$x_4 = 8$$

$$x_2 = \frac{5}{2}(8) = 5$$

$$x_3 = \frac{1}{4}(8) = 2$$





$$C = 7x_1 = x_4 \rightarrow 7x_1 - x_4 = 0$$

$$H = 6x_1 = 2x_3 \rightarrow 6x_1 - 2x_3 = 0$$

$$O = 2x_1 + 2x_2 = x_3 + 2x_4 \rightarrow 2x_1 + 2x_2 - x_3 - 2x_4 = 0$$

$$\left[\begin{array}{cccc|c} 7 & 0 & 0 & -1 & 0 \\ 6 & 0 & -2 & 0 & 0 \\ -2 & 2 & -1 & -2 & 0 \end{array} \right]$$

$$R_1 \cdot \frac{1}{7} \rightarrow \left[\begin{array}{cccc|c} 1 & 0 & 0 & -\frac{1}{7} & 0 \\ 6 & 0 & -2 & 0 & 0 \\ -2 & 2 & -1 & -2 & 0 \end{array} \right]$$

$$R_2 - 6R_1 \rightarrow \left[\begin{array}{cccc|c} 1 & 0 & 0 & -\frac{1}{7} & 0 \\ 0 & 0 & -2 & \frac{6}{7} & 0 \\ -2 & 2 & -1 & -2 & 0 \end{array} \right]$$

$$R_3 - 2R_1 \rightarrow \left[\begin{array}{cccc|c} 1 & 0 & 0 & -\frac{1}{7} & 0 \\ 0 & 0 & -2 & \frac{6}{7} & 0 \\ 0 & 2 & -1 & -2 & 0 \end{array} \right]$$

$R_2 \leftrightarrow R_3$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & -\frac{1}{7} & 0 \\ 0 & 2 & -1 & \frac{6}{7} & 0 \\ 0 & 0 & -2 & \frac{6}{7} & 0 \end{array} \right] \rightarrow \left[\begin{array}{cccc|c} 1 & 0 & 0 & -\frac{1}{7} & 0 \\ 0 & 1 & -\frac{1}{2} & \frac{3}{7} & 0 \\ 0 & 0 & 1 & -\frac{3}{14} & 0 \end{array} \right]$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & -\frac{1}{7} & 0 \\ 0 & 1 & 0 & -\frac{15}{14} & 0 \\ 0 & 0 & 1 & -\frac{3}{7} & 0 \end{array} \right]$$

$$\begin{aligned} x_1 - \frac{1}{7} &= 0 \rightarrow x_1 = \frac{1}{7}x_4 \\ x_2 - \frac{15}{14} &= 0 \rightarrow x_2 = \frac{15}{14}x_4 \\ x_3 - \frac{3}{7} &= 0 \rightarrow x_3 = \frac{3}{7}x_4 \\ x_4 &= x_4 \end{aligned}$$

$$x_4 = 14$$

$$x_1 = \frac{1}{7}(14) \rightarrow x_1 = 2$$

$$x_2 = \frac{15}{14}(14) \rightarrow x_2 = 15 = \underline{2(C_7H_6O_2 + 15O_2 \rightarrow 6H_2O + 14CO_2)}$$

$$x_3 = \frac{3}{7}(14) \rightarrow x_3 = 6$$



$$\text{Na} = 2x_1 + x_4 \rightarrow 2x_1 - x_4 = 0$$

$$\text{C} = x_1 + x_2 = x_4 + x_5 \rightarrow x_1 + x_2 - x_4 - x_5 = 0$$

$$\text{O} = 3x_1 = x_5 \rightarrow 3x_1 - x_5 = 0$$

$$\text{N} = 2x_3 = x_4 \rightarrow 2x_3 - x_4 = 0$$

$$\left[\begin{array}{cccc|c} 2 & 0 & 0 & -1 & 0 & 0 \\ 1 & 1 & 0 & -1 & -1 & 0 \\ 3 & 0 & 0 & 0 & -1 & 0 \\ 0 & 0 & 2 & -1 & 0 & 0 \end{array} \right] \xrightarrow{\begin{array}{l} R_1 \leftrightarrow R_4 \\ R_2 - R_1 \\ R_3 - 3R_1 \\ R_4 - 3R_1 \end{array}} \left[\begin{array}{cccc|c} 0 & 1 & 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & -1 & -1 & 0 \\ 0 & 0 & 0 & 2 & -4 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 \end{array} \right]$$

$$\xrightarrow{\begin{array}{l} R_3 - \frac{1}{2}R_4 \\ R_4 - 3R_1 \end{array}} \left[\begin{array}{cccc|c} 1 & 0 & 0 & -1 & 0 & 0 \\ 0 & 1 & 0 & -1 & -1 & 0 \\ 0 & 0 & 1 & -\frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & \frac{3}{2} & -1 & 0 \end{array} \right] \xrightarrow{\left(\frac{2}{3} \right)} \left[\begin{array}{cccc|c} 1 & 0 & 0 & -1 & 0 & 0 \\ 0 & 1 & 0 & -1 & -1 & 0 \\ 0 & 0 & 1 & -\frac{1}{3} & 0 & 0 \\ 0 & 0 & 0 & 1 & -\frac{2}{3} & 0 \end{array} \right]$$

$$\xrightarrow{\begin{array}{l} R_1 + \frac{1}{2}R_3 \\ R_2 + \frac{1}{2}R_3 \\ R_3 + \frac{1}{2}R_4 \end{array}} \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -\frac{1}{3} & 0 \\ 0 & 1 & 0 & 0 & -\frac{1}{3} & 0 \\ 0 & 0 & 1 & 0 & -\frac{1}{3} & 0 \\ 0 & 0 & 0 & 1 & -\frac{2}{3} & 0 \end{array} \right] \quad \begin{array}{l} x_1 - \frac{1}{3}x_5 = 0 \rightarrow x_1 = \frac{1}{3}x_5 \\ x_2 - \frac{1}{3}x_5 = 0 \rightarrow x_2 = \frac{1}{3}x_5 \\ x_3 - \frac{1}{3}x_5 = 0 \rightarrow x_3 = \frac{1}{3}x_5 \\ x_4 - \frac{2}{3}x_5 = 0 \rightarrow x_4 = \frac{2}{3}x_5 \end{array}$$

$$x_5 = 3$$

$$x_4 = \frac{2}{3}(3) = 2$$



$$x_2 = \frac{1}{3}(3) = 1$$

$$x_1 = \frac{1}{3}(3) = 1$$

n-a) Nodo A $100 = f_1 + f_2 \rightarrow f_1 + f_2 = 100$ (nodo - E)
 Nodo B $f_2 + f_3 = 150 + f_4 \rightarrow f_2 + f_3 - f_4 = 150$ (nodo)
 Nodo C $f_3 + f_4 = 150 \rightarrow f_3 + f_4 = 150$ (nodo)
 Nodo D $f_4 + 200 = f_3 + f_5 \rightarrow f_4 - f_3 - f_5 = -200$ (nodo)

$$\begin{bmatrix} 1 & 1 & 0 & 0 & 0 & | & 100 \\ 0 & 1 & 1 & -1 & 0 & | & 150 \\ 0 & 0 & 0 & 1 & 1 & | & 150 \\ -1 & 0 & -1 & 0 & 1 & | & -200 \end{bmatrix} \xrightarrow{R_4 - R_1} \begin{bmatrix} 1 & 1 & 0 & 0 & 0 & | & 100 \\ 0 & 1 & 1 & -1 & 0 & | & 150 \\ 0 & 0 & 0 & 1 & 1 & | & 150 \\ 0 & -1 & 0 & 1 & -1 & | & -300 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 0 & 0 & 0 & | & 100 \\ 0 & 1 & 1 & -1 & 0 & | & 150 \\ 0 & 0 & 0 & 1 & 1 & | & 150 \\ R_1 + R_2 & 0 & 0 & 1 & -1 & | & 150 \end{bmatrix} \xrightarrow{R_3 + R_2} \begin{bmatrix} 1 & 1 & 0 & 0 & 0 & | & 100 \\ 0 & 1 & 1 & -1 & 0 & | & 150 \\ 0 & 0 & 0 & 1 & 0 & | & 150 \\ 0 & 0 & 0 & 0 & 0 & | & 0 \end{bmatrix}$$

$$\begin{array}{l} R_1 - R_2 \quad | \quad 0 & -1 & 0 & -1 & -1 & | & -200 \\ R_2 + R_3 \quad | \quad 0 & 1 & 1 & 0 & 1 & | & 300 \\ 0 & 0 & 0 & 1 & 1 & | & 150 \\ -0 & 0 & 0 & 0 & 0 & | & 0 \end{array} \quad \begin{array}{l} f_1 = -200 + f_3 + f_5 \\ f_2 = 300 - f_3 - f_5 \\ f_3 = f_5 \\ f_4 = 150 - f_5 \\ f_5 = f_5 \end{array}$$

Consistente

Sol. Gen ($-200 + f_3 + f_5, 300 - f_3 - f_5, f_3, 150 - f_5, f_5$)

b) $200 \leq f_3 + f_5 \leq 300, 0 \leq f_1 \leq 100 \quad 0 \leq f_2 \leq 100$: (0)

$$50 \leq f_3 \leq 300 \quad 0 \leq f_4 \leq 150 \quad 0 \leq f_5 \leq 300$$

c) $f_5 = 0$: (0)

$$\begin{aligned} f_1 &= -200 + f_3 + f_5 \\ f_3 &= f_1 + 200 + f_5 \\ f_3 &= 100 + 200 \end{aligned} \rightarrow \underline{\underline{f_3 = 300}} \quad \text{Jb}$$

13.- Nodo A $f_1 + f_2 = 10 + 10$
 Nodo B $f_1 + f_3 = 20 + 5$
 Nodo C $f_3 + f_4 = 30 + 15$
 Nodo D $10 + 15 = f_2 + f_4$

$f_1 + f_2 = 20$
 $f_1 + f_3 = 25$
 $f_3 + f_4 = 30$
 $f_2 + f_4 = 25$

$$\left[\begin{array}{ccccc} 1 & 1 & 0 & 0 & 20 \\ 1 & 0 & 1 & 0 & 25 \\ 0 & 0 & 1 & 1 & 30 \\ 0 & 0 & 0 & 1 & 25 \end{array} \right]$$

$$R_2 - R_1$$

$$R_4 - R_2$$

$$\left[\begin{array}{ccccc} 1 & 1 & 0 & 0 & 20 \\ 0 & 1 & -1 & 0 & -5 \\ 0 & 0 & 1 & 1 & 30 \\ 0 & 0 & 1 & 1 & 25 \end{array} \right] \rightarrow (1)$$

$$\left[\begin{array}{ccccc} 1 & 1 & 0 & 0 & 20 \\ 0 & 1 & -1 & 0 & -5 \\ 0 & 0 & 1 & 1 & 30 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right]$$

$$R_1 - R_2$$

$$R_4 - R_3$$

$$\left[\begin{array}{ccccc} 1 & 1 & 0 & 0 & 20 \\ 0 & 1 & 0 & 1 & 25 \\ 0 & 0 & 1 & 1 & 30 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right]$$

$$\begin{aligned}
 f_1 - f_2 &= 5 \rightarrow f_1 = 5 + f_2 \\
 f_2 + f_4 &= 25 \rightarrow f_2 = 25 - f_4 \\
 f_3 + f_4 &= 30 \rightarrow f_3 = 30 - f_4 \\
 f_4 &= f_4 \rightarrow f_4 = f_4
 \end{aligned}$$

Consistente

Sol. Gencl $(-5 + f_4, 25 - f_4, 30 - f_4, f_4)$

b) $f_4 = 10$

(A) $f_1 = -5 + 10 = 5 \cancel{\text{X}}$ (C) $f_3 = 30 - 10 = 20 \cancel{\text{X}}$
 (B) $f_2 = 25 - 10 = 15 \cancel{\text{X}}$

c) $5 \leq f_4 \leq 30$

$0 \leq f_3 \leq 25$

$0 \leq f_2 \leq 20$

$0 \leq f_1 \leq 25$

d) Sería el mismo

Scritta

$$14 - \frac{x-1}{(x+1)(x^2+1)(x^2+4)} = \frac{A}{x+1} + \frac{Bx+C}{x^2+1} + \frac{Dx+E}{x^2+4}$$

$$A(x+1)(x^2+4) + Bx+C(x+1)(x^2+4) + Dx+E(x+1)(x^2+1)$$

$$\cancel{A} + \cancel{5Ax^3} + \cancel{4A} + \cancel{Bx^2} + \cancel{Cx} + \cancel{4Bx^2} + \cancel{4Cx} + \cancel{Bx^3} + \cancel{Cx^2} + \cancel{4Bx} + \cancel{4C} + \cancel{Dx^4} \dots$$

$$+ \cancel{Ex^3} + \cancel{Dx^2} + \cancel{Ex} + \cancel{Dx^3} + \cancel{Ex^2} + \cancel{Dx} + \cancel{E}$$

$$(A+B+D)x^4 \quad (5A+4B+C+D+E)x^2 \quad (4A+4C+E)$$

$$(B+C+D+E)x^3 \quad (9B+4C+E+D)x$$

$$2A+B+D=0$$

$$B+C+D+E=0$$

$$5A+4B+C+D+E=0$$

$$4B+4C+E+D=1$$

$$4A+4C+E=1$$

$$\left[\begin{array}{ccccc|c} 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 5 & 4 & 1 & 1 & 1 & 0 \\ 0 & 4 & 1 & 1 & 0 & 1 \\ 4 & 0 & 4 & 0 & 1 & 1 \end{array} \right]$$

$$\begin{array}{l} R_3 - 5R_1 \\ R_5 - 4R_1 \end{array} \left[\begin{array}{ccccc|c} 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & -1 & 1 & -4 & 1 & 0 \\ 0 & 4 & 1 & 1 & 0 & 1 \\ 0 & -4 & 4 & -4 & 1 & 1 \end{array} \right] \rightarrow \begin{array}{l} R_3 - R_2 \\ R_4 - 4R_2 \\ R_5 + R_2 \end{array} \left[\begin{array}{ccccc|c} 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 2 & -3 & 2 & 0 \\ 0 & 0 & -3 & -3 & -4 & 1 \\ 0 & 0 & 8 & 0 & 5 & 1 \end{array} \right] \left(\frac{1}{2} \right)$$

$$\begin{array}{l} R_4 + R_3 \\ R_5 - 8R_3 \end{array} \left[\begin{array}{ccccc|c} 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & -\frac{1}{2} & 1 & 0 \\ 0 & 0 & 0 & -\frac{15}{2} & -1 & 1 \\ 1000 & 12 & -3 & 1 & 1 \end{array} \right] \rightarrow \begin{array}{l} R_2 - R_5 \\ R_3 - R_5 \end{array} \left[\begin{array}{ccccc|c} 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & \frac{13}{23} \\ 0 & 0 & 1 & -\frac{1}{2} & 0 & \frac{3}{23} \\ 0 & 0 & 0 & 1 & 0 & -\frac{4}{69} \\ 0 & 0 & 0 & 0 & 1 & -\frac{1}{23} \end{array} \right] \left(-\frac{2}{23} \right)$$

$$\begin{array}{l} R_4 - R_1 \\ R_5 - R_2 \end{array} \left[\begin{array}{ccccc|c} 1 & 0 & 0 & 0 & 0 & -\frac{2}{23} \\ 0 & 1 & 0 & 0 & 0 & \frac{10}{69} \\ 0 & 0 & 1 & 0 & 0 & \frac{11}{23} \\ 0 & 0 & 0 & 1 & 0 & -\frac{4}{69} \\ 0 & 0 & 0 & 0 & 1 & -\frac{13}{23} \end{array} \right] \text{ Sol Única, } \left(-\frac{2}{23}, \frac{10}{69}, \frac{11}{23}, -\frac{4}{69}, -\frac{13}{23} \right)$$

$$15 - \frac{6x^2 - 15x + 22}{(x+3)(x^2+2)^2} = \frac{A}{x+3} + \frac{Bx+C}{x^2+2} + \frac{Dx+E}{(x^2+2)^2}$$

$$= \cancel{Ax^4 + 4Ax^3 + 11Ax^2 + Bx^3 + Cx^2 + Dx^3} + \cancel{Cx^3 + 2Bx^2 + 2Cx^2 + 3Dx^2 + 3Cx + 3Dx + 6Bx + 6C} \dots$$

$$+ (A+B)x^3 + (4A+2B+3C+D)x^2 + (4A+6C+3E)x$$

$$(3B+C)x^3 + (6B+7C+3D+E)x$$

$$A+B=0$$

$$-3B+C=0$$

$$4A+2B+3C+D=6$$

$$6B+7C+3D+E=-15$$

$$4A+6C+3E=22$$

$$\left[\begin{array}{ccccc|c} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 3 & 1 & 0 & 0 & 0 \\ 4 & 2 & 3 & 1 & 0 & 6 \\ 0 & 6 & 2 & 3 & 1 & -15 \\ 4 & 0 & 6 & 0 & 3 & 22 \end{array} \right]$$

$$\begin{array}{l} R_2 \cdot \frac{1}{3} \\ R_3 - 2R_1 \\ R_5 - 4R_1 \\ R_5 + 4R_2 \end{array} \left[\begin{array}{ccccc|c} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & \frac{1}{3} & 0 & 0 & 0 \\ 0 & -1 & 3 & -1 & 0 & 6 \\ 0 & 6 & 2 & 3 & 1 & -15 \\ 0 & -4 & 6 & 0 & 3 & 22 \end{array} \right] \rightarrow \begin{array}{l} R_3 + 2R_2 \\ R_4 - 6R_2 \\ R_5 + 4R_2 \end{array} \left[\begin{array}{ccccc|c} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & \frac{1}{3} & 0 & 0 & 0 \\ 0 & 0 & 3 & 1 & 0 & 6 \\ 0 & 0 & 6 & 3 & 1 & -15 \\ 0 & 0 & \frac{22}{3} & 0 & 3 & 22 \end{array} \right] \quad (3/11)$$

$$\begin{array}{l} R_1 - R_2 \\ R_2 \cdot \frac{1}{3} \\ R_3 - \frac{3}{11}R_2 \\ R_5 - \frac{72}{3}R_2 \end{array} \left[\begin{array}{ccccc|c} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & \frac{1}{3} & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{3}{11} & 0 & \frac{18}{11} \\ 0 & 0 & 0 & 1 & \frac{1}{3} & -5 \\ 0 & 0 & 0 & -\frac{2}{3} & 3 & \frac{10}{11} \end{array} \right] \rightarrow \begin{array}{l} R_1 - R_2 \\ R_2 \cdot \frac{1}{3} \\ R_3 - \frac{3}{11}R_2 \\ R_5 + 2R_4 \end{array} \left[\begin{array}{ccccc|c} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & -5 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{array} \right] \quad (3/11)$$

$$\left[\begin{array}{ccccc|c} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 & 0 & 3 \\ 0 & 0 & 0 & 1 & 0 & -5 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{array} \right]$$

Sol Única

$$(1, -1, 3, -5, 0)$$

$$16- \quad x_1 + x_2 + x_3 + x_4 = 234,000$$

t = años que quedan para el vigésimo primer cumpleaños de la mayor

$$x_1 = 234(\frac{1}{3})(\frac{1}{4}) + 3t = 39 + 3t$$

$$x_1 - 3t = 39$$

$$x_2 = 234(\frac{1}{3})(\frac{1}{4}) + 3(t+3) = 48 + 3t + 9$$

$$x_2 - 3t = 48$$

$$x_3 = 234(\frac{1}{3})(\frac{1}{4}) + 3(t+6) = 57 + 3t$$

$$x_3 - 3t = 57$$

$$x_4 = 234(\frac{1}{3})(\frac{1}{4}) + 3(t+9) = 66 + 3t$$

$$x_4 - 3t = 66$$

$$\left[\begin{array}{ccccc|c} 1 & 1 & 1 & 1 & 0 & 234 \\ 1 & 0 & 0 & 0 & -3 & 39 \\ 0 & 1 & 0 & 0 & -3 & 48 \\ 0 & 0 & 1 & 0 & -3 & 57 \\ 0 & 0 & 0 & 1 & -3 & 66 \end{array} \right] \xrightarrow{R_2-R_1} \left[\begin{array}{ccccc|c} 1 & 1 & 1 & 1 & 0 & 234 \\ 0 & -1 & -1 & -1 & -3 & -195 \\ 0 & 1 & 0 & 0 & -3 & 48 \\ 0 & 0 & 1 & 0 & -3 & 57 \\ 0 & 0 & 0 & 1 & -3 & 66 \end{array} \right] (-1)$$

$$\left[\begin{array}{ccccc|c} 1 & 1 & 1 & 1 & 0 & 234 \\ 0 & 1 & 1 & 1 & 3 & 195 \\ 0 & 0 & -1 & -1 & -6 & -147 \\ 0 & 0 & 1 & 0 & -3 & 57 \\ 0 & 0 & 0 & 1 & -3 & 66 \end{array} \right] \xrightarrow{R_3+R_1} \left[\begin{array}{ccccc|c} 1 & 1 & 1 & 1 & 0 & 234 \\ 0 & 1 & 1 & 1 & 3 & 195 \\ 0 & 0 & 1 & 1 & 6 & 147 \\ 0 & 0 & 0 & -1 & -9 & 590 \\ 0 & 0 & 0 & 1 & -3 & 66 \end{array} \right] (-1)$$

$$\left[\begin{array}{ccccc|c} 1 & 1 & 1 & 1 & 0 & 234 \\ 0 & 1 & 1 & 1 & 3 & 195 \\ 0 & 0 & 1 & 1 & 6 & 147 \\ 0 & 0 & 0 & 1 & 4 & -60 \\ 0 & 0 & 0 & 0 & 1 & 2 \end{array} \right] \xrightarrow{\begin{matrix} R_1-R_2 \\ R_3-R_2 \\ R_4-R_2 \end{matrix}} \left[\begin{array}{ccccc|c} 1 & 1 & 1 & 1 & 0 & 234 \\ 0 & 1 & 1 & 1 & 0 & 189 \\ 0 & 0 & 1 & 1 & 0 & 135 \\ 0 & 0 & 0 & 1 & 0 & 72 \\ 0 & 0 & 0 & 0 & 1 & 2 \end{array} \right]$$

$$\left[\begin{array}{ccccc|c} 1 & 1 & 1 & 0 & 0 & 162 \\ 0 & 1 & 1 & 0 & 0 & 117 \\ 0 & 0 & 1 & 0 & 0 & 63 \\ 0 & 0 & 0 & 1 & 0 & 72 \\ 0 & 0 & 0 & 0 & 1 & 2 \end{array} \right] \xrightarrow{\begin{matrix} R_1-R_2 \\ R_2-R_3 \\ R_3-R_4 \end{matrix}} \left[\begin{array}{ccccc|c} 1 & 0 & 0 & 0 & 0 & 45 \\ 0 & 1 & 0 & 0 & 0 & 54 \\ 0 & 0 & 1 & 0 & 0 & 63 \\ 0 & 0 & 0 & 1 & 0 & 72 \\ 0 & 0 & 0 & 0 & 1 & 2 \end{array} \right]$$

$$SOLÚCION (x_1, x_2, x_3, x_4, t) \quad x_1 = 19 \quad x_2 = 16 \quad x_3 = 13 \quad x_4 = 10$$

Quedan 2 años para que la mayor cumpla 21. \therefore Edades:

17- $x_1 = \text{yenes}$ $x_2 = \text{francos}$ $x_3 = \text{macros}$

1ra vez = $2400 = \frac{1}{100}x_1 + \frac{1}{1.5}x_2 + \frac{1}{1.2}x_3$

2da vez = $2350 = \frac{1}{100}x_1 + \frac{1}{1.2}x_2 + \frac{1}{1.5}x_3$

3ra vez = $2390 = \frac{1}{125}x_1 + \frac{1}{1.2}x_2 + \frac{1}{1.2}x_3$

$$\left[\begin{array}{ccc|c} 1 & 1/100 & 1/1.5 & 2400 \\ 0 & 1 & 1/1.2 & 2350 \\ 0 & 1/125 & 1/1.2 & 2390 \end{array} \right] \xrightarrow{\text{R1} - R2} \left[\begin{array}{ccc|c} 1 & 20/3 & 25/3 & 400000 \\ 0 & 1 & 1/6 & -50 \\ 0 & 3/10 & 1/6 & 470 \end{array} \right]$$

$$\left[\begin{array}{ccc|c} 1 & 20/3 & 25/3 & 400000 \\ 0 & 1 & -1 & -300 \\ 0 & 0 & 7/10 & 560 \end{array} \right] \xrightarrow{\begin{array}{l} R_2 - \frac{1}{6}R_1 \\ R_3 - \frac{2}{7}R_2 \end{array}} \left[\begin{array}{ccc|c} 1 & 20/3 & 0 & 140000 \\ 0 & 1 & 0 & 900 \\ 0 & 0 & 1 & 1200 \end{array} \right]$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 80000 \\ 0 & 1 & 0 & 900 \\ 0 & 0 & 1 & 1200 \end{array} \right] \quad \begin{aligned} x_1 &= 80,000 \\ x_2 &= 900 \\ x_3 &= 1200 \end{aligned}$$

SolÚnica $(80,000, 900, 1200)$
 yenes francos macros

185 x_1 = aves x_2 = bestias

$$x_1 + x_2 = 60 \quad [1 \ 1 \mid 60]$$

$$2x_1 + 4x_2 = 200 \quad [2 \ 4 \mid 200]$$

$$\begin{bmatrix} 1 & 1 & | & 60 \\ 0 & 2 & | & 80 \end{bmatrix} \xrightarrow{\begin{array}{l} R_1 - R_2 \\ R_2 \cdot \frac{1}{2} \end{array}} \begin{bmatrix} 1 & 0 & | & 20 \\ 0 & 1 & | & 40 \end{bmatrix}$$

$$x_1 = 20$$

$$x_2 = 40$$

Sol Única (20, 40)
aves bestias

19.-

L = libros C = cajas

$$7C + 1 = L \rightarrow 7C - L = 1$$

$$[7 \ -1 \mid 1]$$

$$8C - 7 = L \quad 8C - L = 7$$

$$[8 \ -1 \mid 7]$$

$$\begin{array}{l} R_1 \cdot \frac{1}{7} \\ R_2 - 8R_1 \end{array} \begin{bmatrix} 1 & -1/7 & | & -1/7 \\ 0 & 1/7 & | & 5/7 \end{bmatrix} \rightarrow \begin{array}{l} R_2 \cdot 7 \\ R_2 + R_1 \end{array} \begin{bmatrix} 1 & 0 & | & 8 \\ 0 & 1 & | & 57 \end{bmatrix}$$

$$C = 8$$

L = 57 Sol Única (8, 57)
cajas libros

- 20- x_1 = aviones de combate
 x_2 = aviones bombarderos

$$x_1 + x_2 = 60$$

$$6x_1 + 7x_2 = 250$$

$$-2x_1 + x_2 = 0$$

$$\left[\begin{array}{cc|c} 1 & 1 & 60 \\ 6 & 7 & 250 \\ -2 & 1 & 0 \end{array} \right]$$

$$\begin{array}{l} R_2 - 6R_1 \\ R_3 + 2R_1 \end{array} \left[\begin{array}{cc|c} 1 & 1 & 60 \\ 0 & -4 & -110 \\ 0 & 3 & 120 \end{array} \right] \rightarrow R_2 - \frac{1}{4}R_1 \left[\begin{array}{cc|c} 1 & 1 & 60 \\ 0 & 1 & \frac{55}{2} \\ 0 & 0 & \frac{75}{2} \end{array} \right]$$

Es inconsistente