

$$72a. x^4 - 50x^2 + 49 = 0 ; x^2 = t \Rightarrow t^2 - 50t + 49 = 0$$

$$t = \frac{50 \pm \sqrt{2304}}{2} = \frac{50 \pm 48}{2} = \begin{cases} \rightarrow 49 \\ \rightarrow 1 \end{cases}$$

$$t = 49 \Rightarrow x^2 = 49 \Rightarrow x = \pm \sqrt{49} = \begin{cases} \rightarrow +7 \\ \rightarrow -7 \end{cases}$$

$$t = 1 \Rightarrow x^2 = 1 \Rightarrow x = \pm \sqrt{1} = \begin{cases} \rightarrow +1 \\ \rightarrow -1 \end{cases}$$

$$74d. x^6 + x^4 = 2x^5 + 2x^3 \Rightarrow x^6 - 2x^5 + x^4 - 2x^3 = 0$$

Resolvemos por factorización:

$$x^6 - 2x^5 + x^4 - 2x^3 = 0 \Rightarrow x^3(x^3 - 2x^2 + x - 2) = 0$$

$$\begin{array}{c|cccc} & 1 & -2 & 1 & -2 \\ 2 & & 2 & 0 & 2 \\ \hline & 1 & 0 & 1 & 0 \end{array} \quad x^2 + 1 = 0 \Rightarrow \text{NO SOL.}$$

Ecuación factorizada: $x^3(x-2)(x^2+1) = 0$

Soluciones: $x^3 = 0 \Rightarrow x = \sqrt[3]{0} \Rightarrow \boxed{x_1 = 0}$

$x - 2 = 0 \Rightarrow \boxed{x_2 = 2}$

79b.

$$2x - \frac{12}{2-x} = 7 + \frac{11x+11}{9} \Rightarrow \frac{9(2-x)2x}{9(2-x)} - \frac{9 \cdot 12}{9(2-x)} = \frac{9(2-x)7}{9(2-x)} + \frac{(2-x)(11x+11)}{9(2-x)}$$

$$\Rightarrow 9(2-x) \cdot 2x - 9 \cdot 12 = 9(2-x)7 + (2-x)(11x+11) \Rightarrow$$

$$\Rightarrow 18x(2-x) - 108 = 63(2-x) + (22x - 11x^2 + 22 - 11x) \Rightarrow$$

$$\Rightarrow 36x - 18x^2 - 108 = 126 - 63x + 22x - 11x^2 + 22 - 11x \Rightarrow$$

$$\Rightarrow 36x - 18x^2 - 108 - 126 + 63x - 22x + 11x^2 - 22 + 11x = 0 \Rightarrow -7x^2 + 88x - 256 = 0$$

$$\Rightarrow x = \frac{-88 \pm \sqrt{576}}{-14} = \frac{-88 \pm 24}{-14} = \begin{cases} \rightarrow \underline{8} \text{ si VALE} \\ \rightarrow \frac{64}{14} = \frac{32}{7} \text{ si VALE} \end{cases}$$

COMPROBAMOS:

$$x = 8 \Rightarrow 16 - \frac{12}{-6} = 7 + \frac{99}{9} \Rightarrow 16 + 2 = 7 + 11 \Rightarrow 18 = 18$$

$$2 \cdot \frac{32}{7} - \frac{12}{2 - \frac{32}{7}} = 7 + \frac{11 \cdot \frac{32}{7} + 11}{9} \Rightarrow$$

$$\Rightarrow \frac{64}{7} - \frac{12}{-\frac{18}{7}} = 7 + \frac{\frac{352}{7} + 11}{9} \Rightarrow \frac{64}{7} + \frac{84}{18} = 7 + \frac{\frac{429}{7}}{9}$$

$$\Rightarrow \frac{64}{7} + \frac{84}{18} = 7 + \frac{429}{63} \Rightarrow \frac{1152}{126} + \frac{588}{126} = \frac{882}{126} + \frac{858}{126}$$

$$\Rightarrow 1740 = 1740$$

82 d. $3\sqrt{3x-1} = 2\sqrt{3(2x-1)}$

$$\left(3\sqrt{3x-1}\right)^2 = \left(2\sqrt{3(2x-1)}\right)^2 \Rightarrow 9(3x-1) = 4[3(2x-1)] \Rightarrow 27x-9 = 12(2x-1)$$

$$\Rightarrow 27x-9 = 24x-12 \Rightarrow 3x = -3 \Rightarrow \underline{x = -1} \text{ NO VALE}$$

COMPROBAMOS:

$$3 \cdot \sqrt{-4} = 2 \cdot \sqrt{-9} \text{ NO SOL.}$$

85 g. $\log \sqrt{7x+51} - 1 = \log 9 - \log \sqrt{2x+67} \Rightarrow$

$$\Rightarrow \log \sqrt{7x+51} - \log 10 = \log 9 - \log \sqrt{2x+67} \Rightarrow$$

$$\Rightarrow \log \frac{\sqrt{7x+51}}{10} = \log \frac{9}{\sqrt{2x+67}} \Rightarrow \left(\frac{\sqrt{7x+51}}{10}\right)^2 = \left(\frac{9}{\sqrt{2x+67}}\right)^2$$

$$\Rightarrow \frac{7x+51}{100} = \frac{81}{2x+67} \Rightarrow (7x+51)(2x+67) = 81 \cdot 100$$

$$\Rightarrow 14x^2 + 102x + 469x + 3417 = 8100 \Rightarrow 14x^2 + 571x - 4683 = 0$$

$$\Rightarrow x = \frac{-571 \pm \sqrt{588289}}{28} = \frac{-571 \pm 767}{28} = \begin{cases} \rightarrow 7 \text{ SI VALE} \\ \rightarrow -\frac{1338}{28} = -\frac{669}{14} \text{ NO VALE} \end{cases}$$

$$7 \cdot \left(-\frac{669}{14}\right) + 51 = -\frac{4683}{14} + 51 = -283,5$$

$$90e. \quad \begin{cases} x^2 - 2(x-y)^2 = 36 \\ \frac{x}{2} + \frac{y}{3} = 5 \end{cases} \quad \left\{ \begin{array}{l} x^2 - 2(x^2 - 2xy + y^2) = 36 \\ \frac{3x}{6} + \frac{2y}{6} = \frac{30}{6} \end{array} \right.$$

$$\Rightarrow \begin{cases} x^2 - 2x^2 + 4xy - 2y^2 = 36 \\ 3x + 2y = 30 \end{cases} \quad \left\{ \begin{array}{l} -x^2 + 4xy - 2y^2 = 36 \\ 3x + 2y = 30 \end{array} \right. \quad \boxed{x = \frac{30-2y}{3}}$$

$$- \left(\frac{30-2y}{3} \right)^2 + 4 \cdot \left(\frac{30-2y}{3} \right) y - 2y^2 = 36 \Rightarrow$$

$$\Rightarrow - \frac{900 + 4y^2 - 120y}{9} + \frac{4y(30-2y)}{3} - 2y^2 = 36 \Rightarrow$$

$$\Rightarrow \frac{-900 - 4y^2 + 120y}{9} + \frac{120y - 8y^2}{3} - 2y^2 = 36 \Rightarrow$$

$$\Rightarrow \frac{-4y^2 + 120y - 900}{9} + \frac{360y - 24y^2}{9} - \frac{18y^2}{9} = \frac{324}{9}$$

$$\Rightarrow -4y^2 + 120y - 900 + 360y - 24y^2 - 18y^2 = 324 \Rightarrow -46y^2 + 480y - 1224 = 0$$

$$\Rightarrow 46y^2 - 480y + 1224 = 0 \Rightarrow y = \frac{480 \pm \sqrt{5184}}{92} = \frac{480 \pm 72}{92} \rightarrow \begin{matrix} 6 \\ \frac{408-102}{92 \cdot 23} \end{matrix}$$

$$y = 6 \Rightarrow x = \frac{30 - 2 \cdot 6}{3} = 6 \Rightarrow (6, 6)$$

$$y = \frac{102}{23} \Rightarrow x = \frac{30 - 2 \cdot \frac{102}{23}}{3} = \frac{30 - \frac{204}{23}}{3} = \frac{\frac{456}{23}}{3} = \frac{456}{69} = \frac{152}{23} \Rightarrow \left(\frac{152}{23}, \frac{102}{23} \right)$$

87b.

$$\begin{cases} x - 2y - 6z = 2 \\ x + y + z = 0 \\ -2x + y + 3z = -4 \end{cases} \quad \left(\begin{array}{ccc|c} 1 & -2 & -6 & 2 \\ 1 & 1 & 1 & 0 \\ -2 & 1 & 3 & -4 \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 1 & -2 & -6 & 2 \\ 1 & 1 & 1 & 0 \\ -2 & 1 & 3 & -4 \end{array} \right) \rightarrow \left(\begin{array}{ccc|c} 1 & -2 & -6 & 2 \\ 0 & 3 & 7 & -2 \\ 0 & -3 & -9 & 0 \end{array} \right) \rightarrow \left(\begin{array}{ccc|c} 1 & -2 & -6 & 2 \\ 0 & 3 & 7 & -2 \\ 0 & 0 & -2 & -2 \end{array} \right) \leftarrow -2z = -2 \Rightarrow \boxed{z = 1}$$

$$3y + 7 \cdot 1 = -2 \Rightarrow 3y + 7 = -2 \Rightarrow 3y = -9 \Rightarrow \boxed{y = -3}$$

$$x - 2 \cdot (-3) - 6 \cdot 1 = 2 \Rightarrow x + 6 - 6 = 2 \Rightarrow \boxed{x = 2}$$

88.

$$\begin{cases} x + 2y - z = 4 \\ -x + y = 0 \\ 3y - z = 4 \end{cases} \rightarrow \left(\begin{array}{ccc|c} 1 & 2 & -1 & 4 \\ -1 & 1 & 0 & 0 \\ 0 & 3 & -1 & 4 \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 1 & 2 & -1 & 4 \\ -1 & 1 & 0 & 0 \\ 0 & 3 & -1 & 4 \end{array} \right) \rightarrow \left(\begin{array}{ccc|c} 1 & 2 & -1 & 4 \\ 0 & 3 & -1 & 4 \\ 0 & 3 & -1 & 4 \end{array} \right) \rightarrow \left(\begin{array}{ccc|c} 1 & 2 & -1 & 4 \\ 0 & 3 & -1 & 4 \\ 0 & 0 & 0 & 0 \end{array} \right)$$

SCI (infinitas sol.)

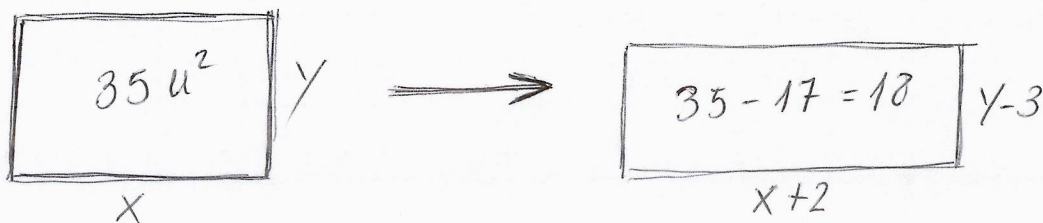
$$\begin{cases} x + 2y - z = 4 \\ 3y - z = 4 \end{cases} \left\{ \begin{array}{l} \text{Llamamos } z = t \\ \Rightarrow \end{array} \right. \begin{cases} x + 2y - t = 4 \\ 3y - t = 4 \end{cases} \Rightarrow \begin{cases} x + 2y = 4 + t \\ 3y = 4 + t \end{cases} \Rightarrow \boxed{y = \frac{4+t}{3}}$$

$$x + 2 \cdot \frac{4+t}{3} - t = 4 \Rightarrow x + \frac{8+2t}{3} - t = 4 \Rightarrow$$

$$\Rightarrow \frac{3x}{3} + \frac{8+2t}{3} - \frac{3t}{3} = \frac{12}{3} \Rightarrow 3x + 8 + 2t - 3t = 12 \Rightarrow 3x = 12 - 8 - 2t + 3t$$

$$\Rightarrow 3x = 4 + t \Rightarrow x = \frac{4+t}{3} \quad \text{sol: } \left. \begin{array}{l} x = \frac{4+t}{3} \\ y = \frac{4+t}{3} \\ z = t \end{array} \right\}$$

133.



$$\begin{cases} xy = 35 \\ (x+2)(y-3) = 18 \end{cases} \Rightarrow \begin{cases} x = \frac{35}{y} \\ \left(\frac{35}{y} + 2 \right) (y-3) = 18 \Rightarrow \left(\frac{35+2y}{y} \right) (y-3) = 18 \end{cases}$$

$$\Rightarrow \frac{(35+2y)(y-3)}{y} = 18 \Rightarrow (35+2y)(y-3) = 18y \Rightarrow$$

$$\Rightarrow 35y + 2y^2 - 105 - 6y = 18y \Rightarrow 2y^2 + 11y - 105 = 0$$

$$\Rightarrow y = \frac{-11 \pm \sqrt{961}}{4} = \frac{-11 \pm 31}{4} = \begin{cases} \rightarrow -10,5 \text{ NO VALE} \\ \rightarrow 5 \end{cases}$$

$y = 5 \Rightarrow x = 7$ sol: Lados 5 y 7 unidades de longitud

137. $x = n^\circ$ unidades producto A $x + y + z = 270$ $\left\{ \begin{array}{l} x + y + z = 270 \\ x - y - z = -30 \\ 0,35x + 0,35y - z = 0 \end{array} \right.$
 $y = n^\circ$ unidades producto B $x = (y + z) - 30$
 $z = n^\circ$ unidades producto C $z = 0,35(x + y)$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 270 \\ 1 & -1 & -1 & -30 \\ 0,35 & 0,35 & -1 & 0 \end{array} \right) \rightarrow \left(\begin{array}{ccc|c} 1 & 1 & 1 & 270 \\ 0 & -2 & -2 & -300 \\ 0 & 0 & -1,35 & -94,5 \end{array} \right) -1,35z = -94,5 \Rightarrow \boxed{z = 70}$$

$$-2 \cdot y - 2 \cdot 70 = -300 \Rightarrow -2y = -300 + 140 = -160$$

$$x + 80 + 70 = 270 \Rightarrow \boxed{x = 120} \Rightarrow \boxed{y = 80}$$

SOL: 120 unidades de A, 80 unidades de B y 70 unidades de C