

$$\begin{aligned}\text{Dividente} &= x^2 + 5 \\ \text{Resto} &= -15x + 1\end{aligned}$$

$$\begin{aligned}\text{Liquidity} &= -2x^2 + 5x - 6 \\ \text{Reto} &= 14x - 14\end{aligned}$$

$$\begin{aligned}\text{Cociente} &= -x^3 + 3x^2 - 3x \\ \text{Resido} &= 1\end{aligned}$$

$$4 \cdot (-2)^3 - K \cdot (-2)^2 + 2 \cdot (-2) - 7 = 1$$
$$-32 - 4K - 4 - 7 = 1$$
$$-4K = 44 \quad \boxed{K = -11}$$

$$5) \quad x^4 - 18x^2 + 81 = (x^2 - 9)^2 = \boxed{(x+3)^2(x-3)^2} \quad 6) \quad 12x^3 + 12x^2 + 3x = 3x(4x^2 + 4x + 1) = \boxed{3x(2x+1)^2}$$

$$2x^5 - 6x^3 - 7x^2 = 2x^2(x^3 - 3x - 2) =$$

$$\begin{array}{l} \underline{b)} \\ \begin{array}{r|rrrr} 2 & 1 & -4 & -1 & 16 & -12 \\ & & 2 & -4 & -10 & 12 \\ \hline 1 & 1 & -2 & -5 & 6 & 0 \\ & & 2 & -1 & -6 & \\ \hline 3 & 1 & -1 & -6 & 0 & \\ & & 3 & 6 & & \\ \hline -2 & 1 & 2 & 10 & & \\ & & -2 & & & \\ \hline & 1 & 0 & & & \end{array} \end{array}$$

$$9) \quad a) \quad (2x+1)^5 = (2x)^5 + 5(2x)^4 \cdot 1 + 10(2x)^3 \cdot 1^2 + 10(2x)^2 \cdot 1^3 + 5(2x) \cdot 1^4 + 1^5 =$$

$$= \boxed{32x^5 + 80x^4 + 80x^3 + 40x^2 + 10x + 1}$$

$$b) \quad (1-3x)^4 = 1 - 4 \cdot 3x + 6 \cdot (3x)^2 - 4 \cdot (3x)^3 + (3x)^4 =$$

$$= \boxed{1 - 12x + 54x^2 - 108x^3 + 81x^4}$$

$$c) \quad (\sqrt{2}-1)^3 = (\sqrt{2})^3 - 3 \cdot (\sqrt{2})^2 + 3 \cdot \sqrt{2} - 1 = 2\sqrt{2} - 6 + 3\sqrt{2} - 1 = \boxed{5\sqrt{2} - 7}$$

$$10) \quad a) \quad \frac{x+2}{x^2-9} \cdot \frac{2x+6}{3x+6} - \frac{1}{2} \cdot \frac{1-x}{x-3} = \frac{(x+2) \cdot 2(x+3)}{(x+3)(x-3) \cdot 3(x+3)} - \frac{1-x}{2(x-3)} = \frac{2}{3(x-3)} - \frac{1-x}{2(x-3)} =$$

$$= \frac{4-3+3x}{6(x-3)} = \boxed{\frac{3x+1}{6(x-3)}}$$

$$b) \quad \frac{6}{1-x} - \frac{x}{x^2-x} = \frac{6}{1-x} - \frac{1}{x-1} = \frac{-6}{x-1} - \frac{1}{x-1} = \boxed{\frac{-7}{x-1}}$$

$$c) \quad \frac{4}{3x^2-5x-18} - \frac{3}{2x+7} = \frac{4}{3(x^2-x-6)} - \frac{3}{2(x+7)} = \frac{4}{3(x+2)(x-3)} - \frac{3}{2(x+7)} =$$

$$= \frac{8-3 \cdot 3(x-3)}{6(x+2)(x-3)} = \frac{8-9x+27}{6(x+2)(x-3)} = \boxed{\frac{35-9x}{6(x+2)(x-3)}}$$

$$11) \quad a) \quad \frac{6x-12}{4} = x-5; \quad 6x-12 = 4x-20; \quad 2x = -8; \quad \boxed{x = -4}$$

$$b) \quad 4x-9-x+5 = 4x+70; \quad 4x = 24; \quad \boxed{x = 6}$$

$$c) \quad \frac{6}{8} - \frac{12x-18}{16} - \frac{9x}{4} = \frac{9x-6}{8}; \quad 12-12x+18-36x = 18x-12; \quad -66x = -42; \quad \boxed{x = \frac{7}{11}}$$

$$12) \quad a) \quad x(3x+2) = 0; \quad \boxed{x = \begin{cases} 0 \\ -\frac{2}{3} \end{cases}} \quad b) \quad x^2 = 4; \quad \boxed{x = \pm 2}$$

$$c) \quad 3x^2-9x-30=0; \quad x^2-3x-10=0; \quad \boxed{x = \begin{cases} 5 \\ -2 \end{cases}}$$

$$d) \quad 10x^2+15x-8x-12=5; \quad 10x^2+7x-17=0; \quad \boxed{x = \begin{cases} 1 \\ -\frac{17}{10} \end{cases}}$$

$$13) \quad a) \quad (2-x)(x+2)+8 = 2(x+2); \quad 4-x^2+8 = 2x+4; \quad 0 = x^2+2x-8; \quad \boxed{x = \begin{cases} 2 \\ -4 \end{cases}}$$

$$b) \quad \frac{x^2-3x+2}{2} = 1 - \frac{2x-x^2}{3}; \quad 3x^2-9x+6 = 6-4x+2x^2; \quad x^2-5x=0; \quad \boxed{x = \begin{cases} 0 \\ 5 \end{cases}}$$

$$c) \quad 2(x+1)^2 - (x+1) = 36; \quad 2x^2+4x+2-x-1-36=0; \quad 2x^2+3x-35=0$$

$$x = \frac{-3 \pm \sqrt{9+280}}{4} = \frac{-3 \pm 17}{4} \quad \begin{matrix} 17/4 = \frac{7}{2} \\ -20/4 = -5 \end{matrix} \quad \boxed{x = \begin{cases} \frac{7}{2} \\ -5 \end{cases}}$$

$$d) \quad x^2-9 = 3-x; \quad x^2+x-12=0; \quad \boxed{x = \begin{cases} -4 \\ 3 \end{cases}}$$

14) a) $x^2(x^2-9)=0$; $\boxed{x=0}$
 $\boxed{x=\pm 3}$

b) $x^4-13x^2+36=0$
 $x^2 = \begin{cases} 9 \rightarrow \boxed{x=\pm 3} \\ 4 \rightarrow \boxed{x=\pm 2} \end{cases}$

c) $x^4+x^2=2$; $x^4+x^2-2=0$; $x^2 = \frac{-1 \pm \sqrt{1+8}}{2} = \frac{-1 \pm 3}{2} = \begin{cases} 1 \rightarrow x = \pm \sqrt{1} = \boxed{\pm 1} \\ -2 \rightarrow x = \pm \sqrt{-2} \times \end{cases}$

15) a) $3\sqrt{x-1} = 2x-4$; $9(x-1) = 4x^2-16x+16$; $0 = 4x^2-25x+25$;

$x = \frac{25 \pm \sqrt{625-1000}}{8} = \frac{25 \pm 15}{8} \rightarrow \begin{cases} \frac{40}{8} = \boxed{5} \rightarrow \sqrt{5-1} = 2 \cdot 5 - 4 \checkmark \\ \frac{10}{8} \rightarrow 3\sqrt{\frac{5}{4}-1} \neq \frac{10}{4} - 4 \end{cases}$

b) $\sqrt{x+5} = 3 - \sqrt{x+2}$

$x+5 = 9 - 6\sqrt{x+2} + x+2$; $6\sqrt{x+2} = 6$; $\sqrt{x+2} = 1$; $x+2=1$; $\boxed{x=-1}$

$\sqrt{-1+5} = 3 - \sqrt{-1+2} \checkmark$

c) $\sqrt{2x+1} = 1 + \sqrt{x}$

$2x+1 = 1 + 2\sqrt{x} + x$; $x = 2\sqrt{x}$; $x^2 = 4x$; $x^2-4x=0$; $x(x-4)=0$; $\boxed{x=0}$; $\sqrt{0+1} = 1 + \sqrt{0} \checkmark$
 $\boxed{x=4}$; $\sqrt{8+1} = 1 + \sqrt{4} \checkmark$

16) a) $\begin{cases} 2x+3y=3 \\ 5x+7y=8 \end{cases} \rightarrow \begin{cases} 10x+15y=15 \\ -10x-14y=-16 \end{cases} \rightarrow \begin{cases} \boxed{y=-1} \\ \boxed{x=3} \end{cases}$

b) $\begin{cases} x + \frac{6}{y} = 2 \\ 3x - y = -5 \end{cases} \rightarrow \begin{cases} x + \frac{6}{3x+5} = 2 \\ 3x - y = -5 \end{cases} \rightarrow \begin{cases} 3x^2 + 5x + 6 = 6x + 10 \\ 3x^2 - x - 4 = 0 \\ x = \frac{1 \pm \sqrt{1+48}}{6} = \frac{1 \pm 7}{6} \rightarrow \begin{cases} \frac{4}{3} \\ -1 \end{cases} \end{cases}$

$\boxed{x = \frac{4}{3} \rightarrow y = 9}$
 $\boxed{x = -1 \rightarrow y = 2}$

c) $\begin{cases} x^2+y=3 \\ 2x-y=5 \end{cases} \rightarrow \begin{cases} x^2+2x-5=3 \\ x^2+2x-8=0 \end{cases} ; x = \frac{-2 \pm \sqrt{4+32}}{2} = \frac{-2 \pm 6}{2} \rightarrow \begin{cases} 2 \\ -4 \end{cases}$
 $\begin{cases} x=2 \rightarrow y=-1 \\ x=-4 \rightarrow y=-13 \end{cases}$

17) $\begin{cases} (-2)^2 + b \cdot (-2) + c = 0 \\ (-1)^2 + b \cdot (-1) + c = -4 \end{cases} \rightarrow \begin{cases} -2b + c = -4 \\ -b + c = -5 \end{cases} \rightarrow \begin{cases} \boxed{b=-1} \\ \boxed{c=-6} \end{cases}$

18) $\begin{cases} x - y + 3z = 4 \\ 2x - y + 2z = 6 \\ -3x + z = -8 \end{cases} \rightarrow \begin{cases} E2 \rightarrow E2 - 2E1 \\ E3 \rightarrow E3 + 3E1 \end{cases} \rightarrow \begin{cases} x - y + 3z = 4 \\ y - 4z = -2 \\ -3y + 10z = 4 \end{cases} \rightarrow \begin{cases} E3 \rightarrow E3 + 3E2 \end{cases} \rightarrow \begin{cases} x - y + 3z = 4 \\ y - 4z = -2 \\ -2z = -2 \end{cases}$

$\boxed{z=1} \rightarrow \boxed{y=2} \rightarrow \boxed{x=3}$

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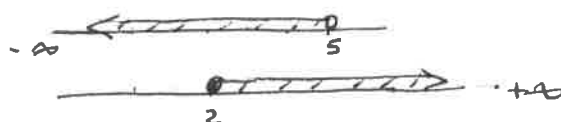
$$a) \frac{1}{3}(2-x) \leq x+2$$

$$\frac{2-x}{3} \leq x+2 ; 2-x \leq 3x+6 ; -4x \leq 4 ; x \geq \frac{4}{-4} ; x \geq -1 ; \boxed{x \in [-1, +\infty)}$$

$$b) \begin{cases} 1 - \frac{x-3}{2} > x-5 \\ 3x-2 \geq 4-(2-x) \end{cases}$$

$$\rightarrow 2-(x-3) > 2x-10 ; 2-x+3 > 2x-10 ; -3x > -15 ; x < \frac{-15}{-3} ; x < 5$$

$$\rightarrow 3x-2 \geq 4-2+x ; 2x \geq 4 ; x \geq 2$$

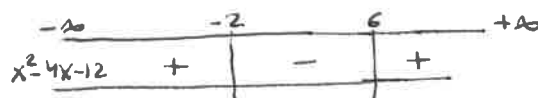


$$\boxed{x \in [2, 5)}$$

$$c) x^2 - 4x - 12 > 0$$

$$x^2 - 4x - 12 = 0$$

$$x = \frac{4 \pm \sqrt{16 + 48}}{2} = \frac{4 \pm 8}{2} \begin{matrix} 6 \\ -2 \end{matrix}$$

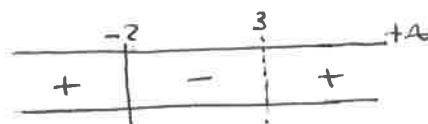


$$\boxed{x \in (-\infty, -2) \cup (6, +\infty)}$$

$$d) \frac{x+2}{2x-6} \leq 0$$

$$\begin{cases} \frac{x+2}{2x-6} = 0 ; x+2=0 ; x=-2 \\ 2x-6=0 ; x=3 \end{cases}$$

$$\frac{x+2}{2x-6}$$



$$\boxed{x \in [-2, 3)}$$

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$$3x^2 + 2bx + 3 = 0$$

$$x = \frac{-2b \pm \sqrt{4b^2 - 36}}{6}$$

$$\text{Soluci3n 3nica} \Rightarrow 4b^2 - 36 = 0 ; b^2 = 9 ; b = \begin{matrix} 3 \\ -3 \end{matrix} \text{ Dicen que } b > 0$$

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$$2x^2 - bx + 8 = 0$$

$$x = \frac{b \pm \sqrt{b^2 - 64}}{4}$$

$$\text{Dos soluciones} \Rightarrow b^2 - 64 > 0 ; b^2 > 64 ; b > 8 \text{ o } b < -8 ; \boxed{b \in (-\infty, -8) \cup (8, +\infty)}$$

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$$\left(2x^2 - \frac{3}{x}\right)^6 = \sum_{r=0}^6 \binom{6}{r} (2x^2)^r \left(-\frac{3}{x}\right)^{6-r} = \sum_{r=0}^6 \binom{6}{r} \frac{2^r \cdot x^{2r} \cdot (-3)^{6-r}}{x^{6-r}}$$

$$2r = 6-r ; 3r = 6 ; r = 2 ; \binom{6}{2} \cdot \frac{2^2 \cdot x^4 \cdot (-3)^4}{x^4} = 15 \cdot 4 \cdot 81 = \boxed{4860}$$

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$$(2+ax)^{10} = \sum_{r=0}^{10} \binom{10}{r} 2^r (ax)^{10-r}$$

$$10-r = 3 \rightarrow r = 7 ; \binom{10}{7} \cdot 2^7 \cdot a^3 \cdot x^3 = 15360 a^3 x^3$$

$$15360 a^3 = 414720 ; a^3 = 27 ; a = \sqrt[3]{27} = \boxed{3}$$