

①

$$\begin{array}{r|rrrr}
 -2 & 2 & -3 & -11 & 6 \\
 & & -4 & 14 & -6 \\
 \hline
 3 & 2 & -7 & 3 & 0 \\
 & & 6 & -3 & \\
 \hline
 1/2 & 2 & -1 & 0 & \\
 & & 1 & & \\
 \hline
 & 2 & & 0 &
 \end{array}$$

$$2x^3 - 3x^2 - 11x + 6 = 2(x+2)(x-3)\left(x - \frac{1}{2}\right)$$

②

$$\begin{array}{r|rrrrrr}
 a) & 1 & 2 & -5 & 0 & 5 & -2 \\
 & & & 2 & -3 & -3 & 2 \\
 \hline
 & 1 & 2 & -3 & -3 & 2 & 0 \\
 & & -1 & -2 & 5 & -2 & \\
 \hline
 & 1 & 2 & -5 & 2 & 0 & \\
 & & 2 & 4 & -2 & & \\
 \hline
 & 1 & 2 & -1 & 0 & & \\
 & & 1/2 & 1 & & & \\
 \hline
 & & 2 & & 0 & &
 \end{array}$$

Soluciones:

$$x = \begin{cases} 1 \\ -1 \\ 2 \\ 1/2 \end{cases}$$

$$\begin{array}{r|rrrr}
 b) & 1 & -1 & 0 & -4 \\
 2 & & 2 & 2 & 4 \\
 \hline
 & 1 & 1 & 2 & 0
 \end{array}$$

$$x^2 + x + 2 = 0$$

$$x = \frac{-1 \pm \sqrt{1-8}}{2} = \frac{-1 \pm \sqrt{-7}}{2} = \frac{-1 \pm i\sqrt{7}}{2}$$

Soluciones:

$$x = \begin{cases} 2 \\ -\frac{1}{2} + i\frac{\sqrt{7}}{2} \\ -\frac{1}{2} - i\frac{\sqrt{7}}{2} \end{cases}$$

$$c) 2x^4 - 7x^2 - 4 = 0$$

$$t = x^2$$

$$2t^2 - 7t - 4 = 0$$

$$t = \frac{7 \pm \sqrt{49+32}}{4} = \frac{7 \pm 9}{4}$$

Soluciones:

$$x^2 = 4; x = \pm 2$$

$$x^2 = -\frac{1}{2}; x = \pm i\sqrt{\frac{1}{2}} = \pm i\frac{\sqrt{2}}{2}$$

③

$$\begin{array}{r|l}
 2x^4 - 5x^3 & -3x + 2 \\
 -2x^4 - 4x^3 - 6x^2 & \\
 \hline
 -9x^3 - 6x^2 - 3x + 2 & \\
 9x^3 + 18x^2 + 27x & \\
 \hline
 12x^2 + 24x + 2 & \\
 -12x^2 - 24x - 36 & \\
 \hline
 -34 &
 \end{array}$$

$$\begin{array}{l}
 \text{Dividite: } 2x^2 - 9x + 12 \\
 \text{Resto: } -34
 \end{array}$$

④

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

$$x = \frac{8 \pm \sqrt{64-8C}}{4}$$

$$64 - 8C = 0$$

$$C = 8$$

⑤

$$\frac{15-5x}{6} - \frac{x-4}{2} \geq \frac{2x-3}{3} - x$$

$$15-5x-3(x-4) \geq 2(2x-3)-6x$$

$$15-5x-3x+12 \geq 4x-6-6x$$

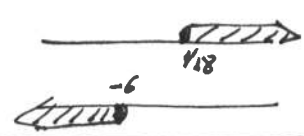
$$-5x-3x-4x+6x \geq -6-15-12$$

$$-6x \geq -33; 2x \leq 11 \quad x \leq \frac{11}{2}$$

Soluciones

$$x \in (-\infty, \frac{11}{2}]$$

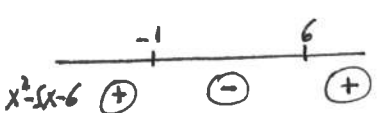
⑥ $\frac{2}{3}x \leq 2x + \frac{1}{2} \quad \left\{ \begin{array}{l} 4 - 6x \leq 12x + 3 \\ 2x - 6 + 3x \geq 6x \end{array} \right. \quad \left\{ \begin{array}{l} -18x \leq -1 \\ -x \geq 6 \end{array} \right. \quad \left\{ \begin{array}{l} x \geq 1/18 \\ x \leq -6 \end{array} \right.$



No time solution

⑦ a) $x^2 - 5x - 6 > 0$

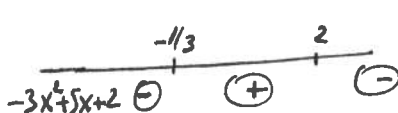
$x = \frac{5 \pm \sqrt{25 + 24}}{2} = \frac{5 \pm 7}{2} \rightarrow -1, 6$



Solution: $(-\infty, -1) \cup (6, +\infty)$

b) $-3x^2 + 5x + 2 \geq 0$

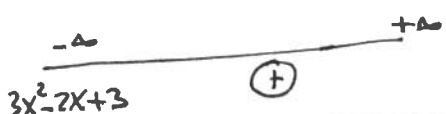
$x = \frac{-5 \pm \sqrt{25 + 24}}{-6} = \frac{-5 \pm 7}{-6} \rightarrow -1/3, 2$



Solution: $[-1/3, 2]$

c) $3x^2 - 2x + 3 \geq 0$

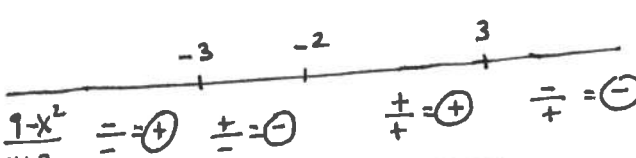
$x = \frac{2 \pm \sqrt{4 - 36}}{6} = \frac{2 \pm \sqrt{-32}}{6}$ ✗



Solution: $(-\infty, +\infty)$

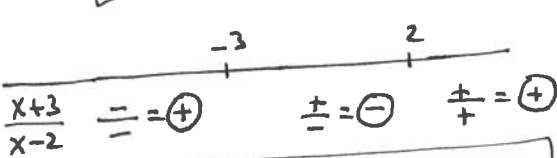
⑧ a) $\frac{9 - x^2}{x + 2} < 0$

$9 - x^2 = 0 \rightarrow x = \pm 3$
 $x + 2 = 0 \rightarrow x = -2$



Solution: $(-3, -2) \cup (3, +\infty)$

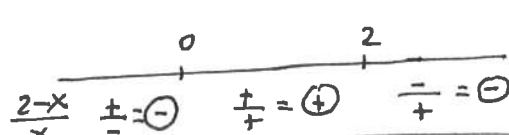
b) $\frac{x + 3}{x - 2} \geq 0$



Solution: $(-\infty, -3] \cup (2, +\infty)$

c) $\frac{2}{x} \leq 1$

$\frac{2}{x} - 1 \leq 0$
 $\frac{2 - x}{x} \leq 0$



Solution: $(-\infty, 0) \cup [2, +\infty)$

9) a) $|2x-3|=7 \rightarrow 2x-3=\pm 7 \begin{cases} 2x-3=7 ; 2x=10 ; x=5 \\ 2x-3=-7 ; 2x=-4 ; x=-2 \end{cases}$

b) $|3-5x| \leq 2 \rightarrow -2 \leq 3-5x \leq 2 ;$
 $\begin{cases} 5x \leq 5 & -5x \leq -1 \\ x \leq 1 & x \geq \frac{1}{5} \end{cases}$

$x \in [\frac{1}{5}, 1]$

Otro procedimiento:

$|3-5x|=2 \rightarrow \begin{cases} 3-5x=2 ; -5x=-1 ; x=1/5 \\ 3-5x=-2 ; -5x=-5 ; x=1 \end{cases}$

$\begin{array}{c} 1/5 \qquad 1 \\ \hline \end{array}$
 $\begin{array}{c} \text{¿} |3-5x| \leq 2? \\ \text{No} \quad \text{Si} \quad \text{No} \end{array}$
 $x \in [\frac{1}{5}, 1]$

c) $|3x+7| > 4 \rightarrow \begin{cases} 3x+7 > 4 & 3x+7 < -4 \\ 3x > -3 & 3x < -11 \\ x > -1 & x < -\frac{11}{3} \end{cases}$

$x \in (-\infty, -\frac{11}{3}) \cup (-1, +\infty)$

Otro procedimiento:

$|3x+7|=4 \rightarrow \begin{cases} 3x+7=4 ; 3x=-3 ; x=-1 \\ 3x+7=-4 ; 3x=-11 ; x=-\frac{11}{3} \end{cases}$

$\begin{array}{c} -11/3 \qquad -1 \\ \hline \end{array}$
 $\begin{array}{c} \text{¿} |3x+7| > 4? \\ \text{Si} \quad \text{No} \quad \text{Si} \end{array}$
 $x \in (-\infty, -\frac{11}{3}) \cup (-1, +\infty)$

10) a) $\frac{x+1}{x+2} + \frac{x-1}{x-2} = \frac{2x+1}{x+1}$

MCM = $(x+2)(x-2)(x+1)$

$(x+1)(x-2)(x+1) + (x-1)(x+2)(x+1) = (2x+1)(x+2)(x-2)$

$(x^2-x-2)(x+1) + (x^2-1)(x+2) = (2x+1)(x^2-4)$

$x^3 + x^2 - x - 2 - x^2 - 1 + 2x^2 + x - 2 = 2x^3 - 8x + x^2 - 4$

$x^2 + 4x = 0$

$x = \begin{cases} 0 \\ -4 \end{cases}$

b)

$\frac{x^2+2}{x+1} - \frac{3-3x}{x-1} = \frac{7x+1}{x^2-1}$

MCM = x^2-1

$(x^2+2)(x-1) - (3-3x)(x+1) = 7x+1$

$x^3 - x^2 + 2x - 2 - 3x - 3 + 3x^2 + 3x = 7x+1$

$x^3 + 2x^2 - 5x - 6 = 0$

$\begin{array}{r|rrrr} & 1 & 2 & -5 & -6 \\ -1 & & -1 & -1 & 6 \\ \hline & 1 & 1 & -6 & 0 \\ 2 & & 2 & 6 & 6 \\ \hline & 1 & 3 & 0 & 6 \\ -3 & & -3 & 0 & 0 \\ \hline & 1 & 0 & 0 & 0 \end{array}$

Soluciones: $\begin{matrix} x=1 \\ x=2 \\ x=-3 \end{matrix}$ se anulan dos denominadores

(11)

$$a) \quad x - \sqrt{25 - x^2} = 1$$

$$x - 1 = \sqrt{25 - x^2}$$

$$(x-1)^2 = 25 - x^2$$

$$x^2 - 2x + 1 = 25 - x^2$$

$$2x^2 - 2x - 24 = 0 ; \quad x^2 - x - 12 = 0$$

$$x = \boxed{4}$$

~~No is solution~~

$$b) \quad \sqrt{7+2x} - \sqrt{3+x} = 1$$

$$\sqrt{7+2x} = 1 + \sqrt{3+x}$$

$$7+2x = (1 + \sqrt{3+x})^2$$

$$7+2x = 1 + 2\sqrt{3+x} + 3+x$$

$$3+x = 2\sqrt{3+x}$$

$$(3+x)^2 = 4(3+x)$$

$$9+6x+x^2 = 12+4x$$

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

$$x = \begin{matrix} 1 \\ -3 \end{matrix}$$

(12)

$$\begin{matrix} x = \text{n}^\circ \text{ mujeres} \\ y = \text{n}^\circ \text{ hombres} \\ z = \text{n}^\circ \text{ niños} \end{matrix}$$

$$x = 2y$$

$$z = 3(x+y)$$

$$x+y+z = 156$$

$$x = 2y$$

$$x+y+3x+3y = 156$$

$$x = 2y$$

$$4x+4y = 156$$

$$\rightarrow \begin{matrix} x = 2y \\ x+y = 39 \end{matrix} \rightarrow \begin{matrix} 2y+y = 39 \\ 3y = 39 \\ y = 13 \end{matrix} \rightarrow x = 2 \cdot 13 = \boxed{26} \rightarrow z = 3(13+26) = \boxed{117}$$

Hay 26 mujeres, 13 hombres, 117 niños

(13)

$x = \text{Edad actual}$

$$x = 3(x-8) ; \quad x = 3x - 24 ; \quad -2x = -24$$

$$\boxed{x = 12 \text{ años}}$$

(14)

Ángulos: $2x, 3x, 4x$

$$2x+3x+4x = 180^\circ ; \quad 9x = 180^\circ ; \quad x = 20$$

$$\boxed{\text{Ángulos: } 40^\circ, 60^\circ, 80^\circ}$$

(15)

Capacidad de estampe = v

$t = \text{tiempo que tardan los 3 caños juntos}$

$$\text{Cañal } 1^\circ \text{ caño} = \frac{v}{36}$$

$$\text{" } 2^\circ \text{ caño} = \frac{v}{30}$$

$$\text{" } 3^\circ \text{ caño} = \frac{v}{25}$$

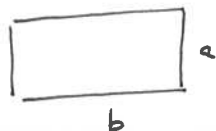
$$\text{" } \text{caños juntos} = \frac{v}{t}$$

$$\frac{v}{36} + \frac{v}{30} + \frac{v}{25} = \frac{v}{t} ; \quad \frac{1}{36} + \frac{1}{30} + \frac{1}{25} = \frac{1}{t} ; \quad \frac{91}{900} = \frac{1}{t}$$

$$t = \frac{900}{91} \text{ horas} = \boxed{9'890 \text{ horas}} = \boxed{9 \text{ horas } 53 \text{ min } 24,396 \text{ seg}}$$

Dimensiones: $a \times b$

(16)



$$\begin{cases} a \cdot b = 750 \\ 2a + 2b = 110 \end{cases} \rightarrow \begin{cases} b = 750/a \\ a + b = 55 \end{cases} \rightarrow a + \frac{750}{a} = 55 ; a^2 + 750 = 55a$$

$$a^2 - 55a + 750 = 0 ; a = \begin{cases} 30 \rightarrow b = 25 \\ 25 \rightarrow b = 30 \end{cases}$$

Finca: $30m \times 25m$

(17)

Número: AB

$$\begin{cases} A+B=8 \\ 10A+B+18=10B+A \end{cases} \rightarrow \begin{cases} A+B=8 \\ 9A-9B=-18 \end{cases} ; \begin{cases} A+B=8 \\ A-B=-2 \end{cases}$$

$$2A=6 \rightarrow A=3 \rightarrow B=5$$

Número: 35

(18)

x = litros leche entera
 y = " " desnatada

$$\begin{cases} x+y=20 \\ \frac{35}{100}x + \frac{4}{100}y = \frac{25}{100} \cdot 20 \end{cases} \rightarrow \begin{cases} x+y=20 \\ 35x+4y=500 \end{cases} \xrightarrow{(\times 4)} \begin{cases} 4x+4y=80 \\ 35x+4y=500 \end{cases}$$

$$\begin{array}{r} 35x+4y=500 \\ -4x-4y=80 \\ \hline 31x=420 \end{array}$$

$$x = \frac{420}{31} = 13,55l \rightarrow y = 6,45l$$

Debemos mezclar $13,55l$ de leche entera con $6,45l$ de leche desnatada

(19)

x = nº billetes de $10€$
 y = " " " $20€$
 z = " " " $50€$

$$\begin{cases} x+y+z=95 \\ 10x+20y+50z=2000 \\ x=2y \end{cases} \rightarrow \begin{cases} x+y+z=95 \\ x+2y+5z=200 \\ x=2y \end{cases}$$

$$\begin{cases} 3y+z=95 \\ 4y+5z=200 \end{cases} \xrightarrow{(\times 5)} \begin{cases} 15y+5z=475 \\ 4y+5z=200 \end{cases}$$

$$\begin{array}{r} 15y+5z=475 \\ -4y-5z=200 \\ \hline 11y=275 \end{array}$$

$$y=25 \rightarrow z=95-3 \cdot 25=20$$

$$x=2 \cdot 25=50$$

Hay 50 billetes de $10€$, 25 billetes de $20€$ y 20 billetes de $50€$

(20)

x = precio primitivo de la harina
 y = " " " arroz

$$\begin{cases} 50x+80y=66'10 \\ \frac{80}{100}50x + \frac{90}{100}80y=56'24 \end{cases} \rightarrow \begin{cases} 5x+8y=66'1 \\ 40x+72y=56'24 \end{cases} \xrightarrow{(\times 8)} \begin{cases} 40x+64y=52'88 \\ 40x+72y=56'24 \end{cases}$$

$$8y=3'36$$

$$y=0'42 \rightarrow x = \frac{66'1-8 \cdot 0'42}{5} = 0'65$$

La harina costaba $0'65€$ el Kg y el arroz $0'42€$ el Kg