

$$\textcircled{1} \quad 3^x + 3^{1-x} = 4 \qquad 3^x + \frac{3}{3^x} = 4 \qquad 3^x = z$$

$$z + \frac{3}{z} = 4 \rightarrow z^2 + 3 = 4z \rightarrow z^2 - 4z + 3 = 0$$

$$z = \frac{4 \pm \sqrt{16 - 4 \cdot 1 \cdot 3}}{2 \cdot 1} = \frac{4 \pm \sqrt{16 - 12}}{2} = \frac{4 \pm \sqrt{4}}{2}$$

$$z_1 = \frac{4+2}{2} = 3 \qquad z_2 = \frac{4-2}{2} = 1$$

$$z_1 = 3 \rightarrow 3^x = z_1 = 3 \rightarrow 3^x = 3$$

$$z_2 = 1 \rightarrow 3^x = z_2 = 1 \rightarrow 3^x = 1$$

$x = 1$
$x = 0$

$$\textcircled{2} \quad \left. \begin{array}{l} 2x + y = 4 \\ x^2 + y = 7 \end{array} \right\} \rightarrow y = 4 - 2x$$

$$\left. \begin{array}{l} 2x + y = 4 \\ x^2 + y = 7 \end{array} \right\} \rightarrow x^2 + (4 - 2x) = 7 \rightarrow x^2 + 4 - 2x = 7$$

$$x^2 - 2x + 4 - 7 = 0 \rightarrow x^2 - 2x - 3 = 0$$

$$x = \frac{2 \pm \sqrt{4 - 4 \cdot 1 \cdot (-3)}}{2 \cdot 1} = \frac{2 \pm \sqrt{4 + 12}}{2} = \frac{2 \pm \sqrt{16}}{2}$$

$$x_1 = \frac{2+4}{2} = 3 \rightarrow y_1 = 4 - 2 \cdot 3 = -2$$

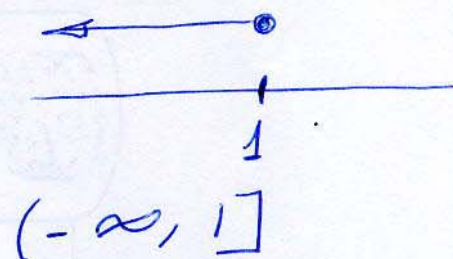
$$x_2 = \frac{2-4}{2} = -1 \rightarrow y_2 = 4 - 2(-1) = 6$$

$$\textcircled{3} \quad a) \quad 4x - \frac{3-2x}{4} \leq \frac{3x-1}{3} + \frac{37}{12}$$

$$\frac{48x - 9 + 6x}{12} \leq \frac{12x - 4 + 37}{12}$$

$$48x - 9 + 6x \leq 12x - 4 + 37 \rightarrow 48x + 6x - 12x \leq 37 + 9 - 4$$

$$42x \leq 42 \quad x \leq \frac{42}{42} \quad \boxed{x \leq 1}$$



$$b) \quad x(x+3) - 2x \geq 4x+4$$

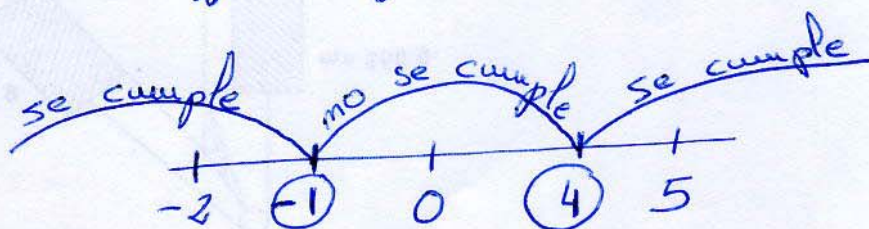
$$x^2 + 3x - 2x \geq 4x + 4 \rightarrow x^2 + 3x - 2x - 4x - 4 \geq 0$$

$$x^2 - 3x - 4 \geq 0 \rightarrow x^2 - 3x - 4 = 0$$

$$x = \frac{+3 \pm \sqrt{9 - 4 \cdot 1 \cdot (-4)}}{2 \cdot 1} = \frac{+3 \pm \sqrt{25}}{2} = \frac{+3 \pm 5}{2}$$

$$x_1 = \frac{3+5}{2} = 4$$

$$x_2 = \frac{3-5}{2} = -1$$



$$x^2 - 3x - 4 \geq 0 \quad x = -2 \quad (-2)^2 - 3(-2) - 4 \geq 0 \rightarrow 6 \geq 0 \text{ Si}$$

$$x = 0 \quad (0)^2 - 3 \cdot 0 - 4 \geq 0 \quad -4 \neq 0 \quad \text{No}$$

$$x = 5 \quad (5)^2 - 3 \cdot 5 - 4 \geq 0 \quad 6 \geq 0 \quad \text{Si}$$

$$\text{Soluci3n} \quad (-\infty, -1] \cup [4, \infty)$$

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$$\left. \begin{aligned} \frac{x-1}{3} - \frac{x+3}{2} &\leq x \\ \frac{4x-2}{4} - \frac{x-1}{3} &\geq x \end{aligned} \right\}$$

$$\begin{aligned} \frac{2x-2-3x-9}{6} &\leq \frac{6x}{6} \\ 2x-3x-6x &\leq 2+9 \\ -7x &\leq 11 \\ x &\geq -\frac{11}{7} \end{aligned}$$

$$\frac{12x-6-4x+4}{12} \geq \frac{12x}{12}$$

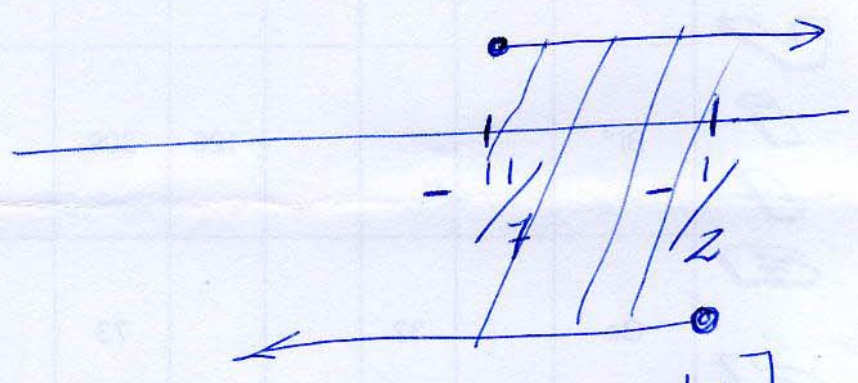
$$[-\frac{11}{7}, \infty)$$

$$\begin{aligned} 12x-4x-12x &\geq +6-4 \\ -4x &\geq 2 \end{aligned}$$

$$x \leq -\frac{2}{4}$$

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

$$(-\infty, -\frac{1}{2}]$$



$$\text{Soluc } [-\frac{11}{7}, -\frac{1}{2}]$$



$$⑥ \quad 2 \cdot \log(2x+3) = 0$$

$$\log(2x+3)^2 = \log 1 \rightarrow (2x+3)^2 = 1$$

$$4x^2 + 9 + 12x = 1$$

$$4x^2 + 12x + 9 - 1 = 0 \rightarrow 4x^2 + 12x + 8 = 0$$

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

$$x = \frac{-3 \pm \sqrt{9 - 4 \cdot 1 \cdot 2}}{2 \cdot 1} = \frac{-3 \pm \sqrt{1}}{2} = \frac{-3 \pm 1}{2}$$

$$x_1 = \frac{-3+1}{2} = -1$$

$$x_2 = \frac{-3-1}{2} = -2$$