

LES INEQUATIONS DU SECOND DEGRE

1. RESOUDRE LES INEQUATIONS SUIVANTES :

$$1. \quad x^2 + 2x - 15 > 0 \quad \begin{array}{c} + \\ \hline - \end{array} \begin{array}{c} -5 \\ | \\ 0 \end{array} \begin{array}{c} 3 \\ \hline - \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \rightarrow x \quad S = \{x \mid x < -5\} \cup \{x \mid x > 3\}$$

$$2. \quad x^2 - 5x + 4 < 0 \quad \begin{array}{c} + \\ \hline \end{array} \begin{array}{c} 1 \\ | \\ 0 \end{array} \begin{array}{c} 4 \\ \hline - \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \rightarrow x \quad S = \{x \mid 1 < x < 4\}$$

$$3. \quad -2x^2 + 3x + 2 > 0 \quad \begin{array}{c} \hline - \end{array} \begin{array}{c} \frac{1}{2} \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \begin{array}{c} 2 \\ | \\ 0 \end{array} \begin{array}{c} \hline - \end{array} \rightarrow x \quad S = \left\{x \mid -\frac{1}{2} < x < 2\right\}$$

$$4. \quad -3x^2 + 7x - 2 \leq 0 \quad \begin{array}{c} \hline - \end{array} \begin{array}{c} \frac{1}{3} \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \begin{array}{c} 2 \\ | \\ 0 \end{array} \begin{array}{c} \hline - \end{array} \rightarrow x \quad S = \left\{x \mid x \leq \frac{1}{3}\right\} \cup \{x \mid x \geq 2\}$$

$$5. \quad x^2 + 31x + 150 > 0 \quad \begin{array}{c} + \\ \hline - \end{array} \begin{array}{c} -25 \\ | \\ 0 \end{array} \begin{array}{c} -6 \\ \hline - \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \rightarrow x \quad S = \{x \mid x < -25\} \cup \{x \mid x > -6\}$$

$$6. \quad x^2 - 10 \geq 3x \quad x^2 - 3x - 10 \geq 0 \quad \begin{array}{c} + \\ \hline - \end{array} \begin{array}{c} -2 \\ | \\ 0 \end{array} \begin{array}{c} 5 \\ \hline - \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \rightarrow x \quad S = \{x \mid x \leq -2\} \cup \{x \mid x \geq 5\}$$

$$7. \quad -x^2 - 7 > x - 19 \quad -x^2 - x + 12 > 0 \quad \begin{array}{c} \hline - \end{array} \begin{array}{c} -4 \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \begin{array}{c} 3 \\ | \\ 0 \end{array} \begin{array}{c} \hline - \end{array} \rightarrow x \quad S = \{x \mid -4 < x < 3\}$$

$$8. \quad x^2 + 7 > 3x \quad x^2 - 3x + 7 > 0 \quad \begin{array}{c} + \\ \hline \end{array} \rightarrow x \quad S = \mathbb{R}$$

$$9. \quad x^2 \geq 7x - 8 \quad x^2 - 7x + 8 \geq 0 \quad \begin{array}{c} + \\ \hline - \end{array} \begin{array}{c} \frac{7-\sqrt{17}}{2} \\ | \\ 0 \end{array} \begin{array}{c} \hline - \end{array} \begin{array}{c} \frac{7+\sqrt{17}}{2} \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \rightarrow x$$

$$S = \left\{x \mid x \leq \frac{7-\sqrt{17}}{2}\right\} \cup \left\{x \mid x \geq \frac{7+\sqrt{17}}{2}\right\}$$

$$10. \quad x^2 \geq 16 \quad x^2 - 16 \geq 0 \quad \begin{array}{c} + \\ \hline - \end{array} \begin{array}{c} -4 \\ | \\ 0 \end{array} \begin{array}{c} 4 \\ \hline - \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \rightarrow x \quad S = \{x \mid x \leq -4\} \cup \{x \mid x \geq 4\}$$

$$11. \quad x^2 < 6x \quad x^2 - 6x < 0 \quad \begin{array}{c} + \\ \hline \end{array} \begin{array}{c} 0 \\ | \\ 0 \end{array} \begin{array}{c} 6 \\ \hline - \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \rightarrow x \quad S = \{x \mid 0 < x < 6\}$$

$$12. \quad 256 < x^2 \quad -x^2 + 256 < 0 \quad \begin{array}{c} \hline - \end{array} \begin{array}{c} -16 \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \begin{array}{c} 16 \\ | \\ 0 \end{array} \begin{array}{c} \hline - \end{array} \rightarrow x \quad S = \{x \mid x < -16\} \cup \{x \mid x > 16\}$$

$$13. \quad x(x-2) < 6x \quad x^2 - 8x < 0 \quad \begin{array}{c} + \\ \hline \end{array} \begin{array}{c} 0 \\ | \\ 0 \end{array} \begin{array}{c} 8 \\ \hline - \\ 0 \end{array} \begin{array}{c} + \\ \hline \end{array} \rightarrow x \quad S = \{x \mid 0 < x < 8\}$$

$$14. \quad 3x(x-3) \leq 5(x-3) \quad 3x^2 - 14x + 15 \leq 0 \quad \begin{array}{c} + \\ \hline \hline \hline \end{array} \begin{array}{c} \frac{5}{3} \\ | \\ 0 \end{array} \begin{array}{c} - \\ \hline \hline \hline \end{array} \begin{array}{c} 3 \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \hline \hline \end{array} \rightarrow x$$

$$S = \left\{ x \mid \frac{5}{3} \leq x \leq 3 \right\}$$

$$15. \quad (2-x)(4x-5) \geq 0 \quad -4x^2 + 13x - 10 \geq 0 \quad \begin{array}{c} \hline \hline \hline \end{array} \begin{array}{c} \frac{5}{4} \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \hline \hline \end{array} \begin{array}{c} 2 \\ | \\ 0 \end{array} \begin{array}{c} \hline \hline \hline \end{array} \rightarrow x$$

$$S = \left\{ x \mid \frac{5}{4} \leq x \leq 2 \right\}$$

2. RESOUDRE LES INEQUATIONS RATIONNELLES SUIVANTES :

$$1. \quad \frac{x+2}{x-3} > 0 \quad \begin{array}{c} + \\ \hline \hline \hline \end{array} \begin{array}{c} -2 \\ | \\ 0 \end{array} \begin{array}{c} - \\ \hline \hline \hline \end{array} \begin{array}{c} 3 \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \hline \hline \end{array} \rightarrow x \quad S = \{x \mid x < -2\} \cup \{x \mid x > 3\}$$

$$2. \quad \frac{-x+5}{5+x} \leq 0 \quad \begin{array}{c} \hline \hline \hline \end{array} \begin{array}{c} -5 \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \hline \hline \end{array} \begin{array}{c} 5 \\ | \\ 0 \end{array} \begin{array}{c} \hline \hline \hline \end{array} \rightarrow x \quad S = \{x \mid x < -5\} \cup \{x \mid x \geq 5\}$$

$$3. \quad \frac{3x-1}{3-x} \geq 0 \quad \begin{array}{c} \hline \hline \hline \end{array} \begin{array}{c} \frac{1}{3} \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \hline \hline \end{array} \begin{array}{c} 3 \\ | \\ 0 \end{array} \begin{array}{c} \hline \hline \hline \end{array} \rightarrow x \quad S = \left\{ x \mid \frac{1}{3} \leq x < 3 \right\}$$

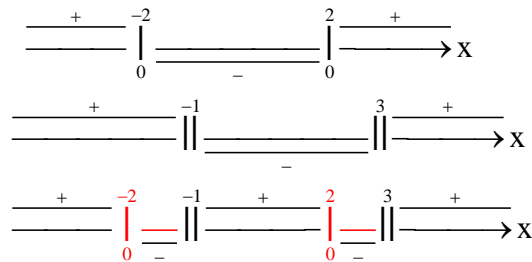
$$4. \quad \frac{1}{4x^2-x-3} \leq 0 \quad \begin{array}{c} + \\ \hline \hline \hline \end{array} \begin{array}{c} \frac{3}{4} \\ | \\ 0 \end{array} \begin{array}{c} - \\ \hline \hline \hline \end{array} \begin{array}{c} 1 \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \hline \hline \end{array} \rightarrow x \quad S = \left\{ x \mid -\frac{3}{4} < x < 1 \right\}$$

$$5. \quad \frac{2x+1}{3-x} \geq -1 \quad \frac{x+4}{-x+3} \geq 0 \quad \begin{array}{c} \hline \hline \hline \end{array} \begin{array}{c} -4 \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \hline \hline \end{array} \begin{array}{c} 3 \\ | \\ 0 \end{array} \begin{array}{c} \hline \hline \hline \end{array} \rightarrow x \quad S = \{x \mid -4 \leq x < 3\}$$

$$6. \quad \frac{x}{2x+3} \leq \frac{1}{2} \quad \frac{-3}{4x+6} \leq 0 \quad \begin{array}{c} + \\ \hline \hline \hline \end{array} \begin{array}{c} \frac{3}{2} \\ | \\ 0 \end{array} \begin{array}{c} \hline \hline \hline \end{array} \rightarrow x \quad S = \left\{ x \mid x > -\frac{3}{2} \right\}$$

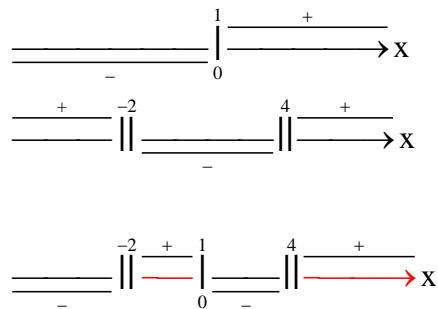
$$7. \quad \frac{2}{2x-3} \geq \frac{1}{x} \quad \frac{3}{x(2x-3)} \geq 0 \quad \begin{array}{c} + \\ \hline \hline \hline \end{array} \begin{array}{c} 0 \\ | \\ 0 \end{array} \begin{array}{c} \hline \hline \hline \end{array} \begin{array}{c} \frac{3}{2} \\ | \\ 0 \end{array} \begin{array}{c} + \\ \hline \hline \hline \end{array} \rightarrow x \quad S = \{x \mid x < 0\} \cup \left\{ x \mid x > \frac{3}{2} \right\}$$

$$8. \quad \frac{x^2 - 4}{x^2 - 2x - 3} \leq 0 \quad \frac{(x+2)(x-2)}{(x-3)(x+1)} \leq 0$$



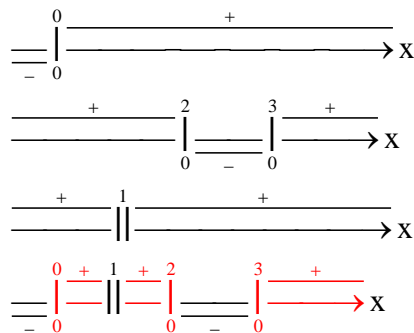
$$S = \{x \mid -2 \leq x < -1\} \cup \{x \mid 2 \leq x < 3\}$$

$$9. \quad \frac{x-1}{x^2 - 2x - 8} > 0 \quad \frac{x-1}{(x-4)(x+2)} > 0$$



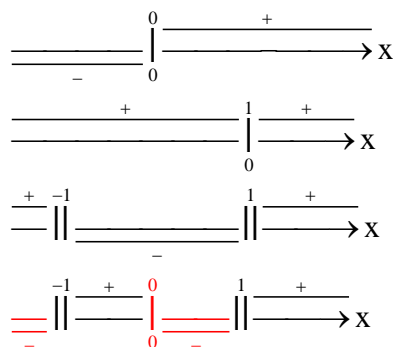
$$S = \{x \mid -2 < x < 1\} \cup \{x \mid x > 4\}$$

$$10. \quad \frac{x(x-2)(x-3)}{(x-1)^2} \geq 0$$



$$S = \{x \mid 0 \leq x < 1\} \cup \{x \mid 1 < x \leq 2\} \cup \{x \mid x \geq 3\}$$

$$11. \quad \frac{x(x-1)^2}{(x-1)(x+1)} \leq 0$$



$$S = \{x \mid x < -1\} \cup \{x \mid 0 \leq x < 1\}$$

$$12. \frac{(x^2+9)(x+3)(x-3)}{-x(x^2+x+1)} \leq 0$$

$$S = \{x | -3 \leq x < 0\} \cup \{x | x \geq 3\}$$

3. RESOUDRE LES SYSTEMES SUIVANTS :

$$1. \begin{cases} 12x^2 - 5x - 2 > 0 \\ 12x^2 + 5x + 38 > 0 \\ 24x^2 - 67x + 38 > 0 \end{cases}$$

Solution

$$S = \left\{x \mid x < -\frac{1}{4}\right\} \cup \left\{x \mid \frac{2}{3} < x < \frac{19}{24}\right\} \cup \{x \mid x > 2\}$$

$$2. \begin{cases} x^2 - 2x - 8 \geq 0 \\ -\frac{x-3}{2x-4} < 0 \\ x+5 \geq -3 \end{cases}$$

Solution

$$S = \{x \mid -8 \leq x \leq -2\} \cup \{x \mid x \geq 4\}$$

$$3. \begin{cases} x^2 \leq 9 \Leftrightarrow x^2 - 9 \leq 0 \Leftrightarrow (x-3)(x+3) \leq 0 \\ x^2 - 16 \geq 4(x-4) \Leftrightarrow x^2 - 4x \geq 0 \Leftrightarrow x(x-4) \geq 0 \end{cases}$$

Solution

$$S = \{x \mid -3 \leq x \leq 0\}$$

$$4. \begin{cases} 2x^2 - 5x - 3 \geq 0 \\ x^2 - 3x - 4 \leq 0 \\ x^2 - 1 > 0 \end{cases}$$

Solution

$$S = \{x \mid 3 \leq x \leq 4\}$$

$$5. \begin{cases} \frac{x(x^2 - 5x + 6)}{(x-1)^2} \geq 0 \\ -x - 1 < 0 \\ \frac{2x-1}{2x-3} \geq 0 \end{cases}$$

Solution

$$S = \left\{x \mid 0 \leq x \leq \frac{1}{2}\right\} \cup \left\{x \mid \frac{3}{2} < x \leq 2\right\} \cup \{x \mid x \geq 3\}$$

6.
$$\begin{cases} \frac{-5}{x^2 - 5x + 6} < 0 \\ -\frac{x-4}{-x-5} \geq 0 \\ \frac{-8x}{x^2 + 9} \geq 0 \end{cases}$$

Solution

$$S = \{x \mid x < -5\}$$

7.
$$\begin{cases} \frac{6x^2 + 14x + 20}{(x-5)(2x+6)} < 0 \\ x(2x-5) > 0 \\ 5x + 20 \geq 0 \end{cases}$$

Solution

$$S = \{x \mid -3 < x < 0\} \cup \left\{x \mid \frac{5}{2} < x < 5\right\}$$