Método de puntos de referencia

$$3x^2 - 6x - 24 \geq 0$$

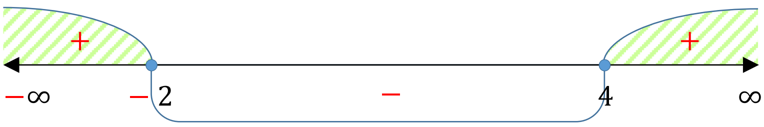
$$x^2 - 2x - 8 \geq 0$$

$$(x-4)(x+2) \geq 0$$

$$x - 4 = 0 \quad \wedge \quad x + 2 = 0$$

Valores de referencia: $x = 4 \quad \wedge \quad x = -2$

Valores de prueba: $x = -3$ $\qquad x = 0$ $\qquad x = 5$



$$\text{CS} =]-\infty; -2] \cup [4; \infty[$$

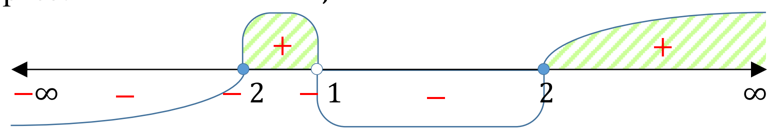
$$\frac{x^2 - 4}{x + 1} \geq 0$$

$$\frac{(x+2)(x-2)}{x+1} \geq 0$$

$$(x+2)(x-2) = 0 \quad \wedge \quad x + 1 \neq 0$$

VR: $x = -2 \quad \wedge \quad x = 2 \quad \wedge \quad x \neq -1$

Valores de paso: $x = -3$ $\qquad x = -1{,}5$ $\qquad x = 0$ $\qquad x = 3$



$$\text{CS} = [-2; -1[\cup [2; \infty[$$

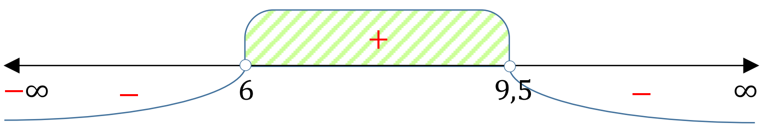
$$-2x^2 + 31x - 84 > 30$$

$$-2x^2 + 31x - 114 > 0$$

$$(-2x + 19)(x - 6) = 0$$

VR: $x = \dfrac{19}{2} \quad \wedge \quad x = 6$

VP: $x = 5$ $\qquad x = 7$ $\qquad x = 10$



$$\text{CS} =]6; 9{,}5[$$

Ejemplo 1:

$$x^3 \geq 3x^2$$

$$x^3 - 3x^2 \geq 0$$

$$x^2(x-3) \geq 0$$

$$x^2 = 0 \quad \wedge \quad x - 3 = 0$$

$$\text{VR: } x = 0 \quad \wedge \quad x = 3$$

VP: $x = -1$ $x = 1$ $x = 4$

$$\text{CS} = \{0\} \cup [3; \infty[$$

$$x^2(x-3) \geq 0$$

$$x = 0 \quad \vee \quad x - 3 \geq 0$$

$$x = 0 \quad \vee \quad x \geq 3$$

$$\text{CS} = \{0\} \cup [3; \infty[$$

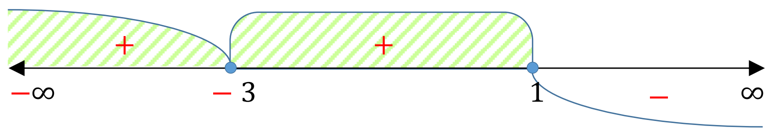
Ejemplo 2:

$$(1-x)(x+3)^2 \geq 0$$

$$1 - x = 0 \quad \wedge \quad x + 3 = 0$$

$$\text{VR: } x = 1 \quad \wedge \quad x = -3$$

VP: $x = -4$ $x = 0$ $x = 2$



$$\text{CS} =]-\infty; 1]$$

$$(1-x)(x+3)^2 \geq 0$$

$$1 - x \geq 0 \quad \vee \quad x + 3 = 0$$

$$x \leq 1 \quad \vee \quad x = -3$$

$$\text{CS} =]-\infty; 1]$$

Ejemplo 3:

$$(x-2)^2+1>0$$

$$(x-2)^2>-1$$

$$\text{CS}=\mathbb{R}$$

$$(x+5)^2\leq 0$$

$$\text{CS}=\{-5\}$$

Trabajo en clase

Determine el conjunto solución de las inecuaciones:

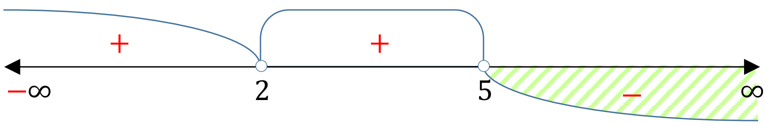
a. $(2-x)^2(5-x)<0$

$$(2-x)^2(5-x)<0$$

$$2-x=0 \quad \wedge \quad 5-x=0$$

$$\text{VR:} \quad x=2 \quad \wedge \quad x=5$$

$$\text{VP:} \quad x=1 \qquad x=3 \qquad x=6$$



$$\text{CS}=]5;\infty[$$

$$(2-x)^2(5-x)<0$$

$$2-x\neq 0 \quad \vee \quad 5-x<0$$

$$x\neq 2 \quad \vee \quad 5<x$$

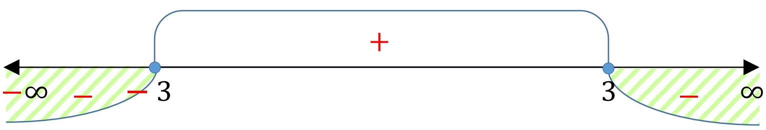
$$\text{CS}=]5;\infty[$$

b. $9-x^2\leq 0$

$$(3+x)(3-x)=0$$

$$\text{VR:} \quad x=-3 \quad \wedge \quad x=3$$

$$\text{VP:} \quad x=-4 \qquad x=0 \qquad x=4$$



$$\text{CS}=]-\infty;-3]\cup[3;\infty[$$

c. $(x+3)(x-2) \leq 6$

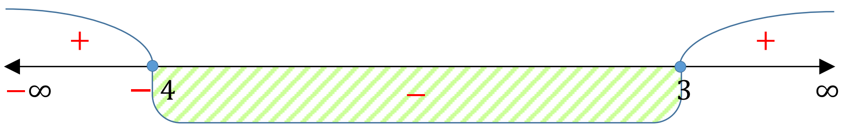
$$x^2 + x - 6 \leq 6$$

$$x^2 + x - 12 \leq 0$$

$$(x+4)(x-3) \leq 0$$

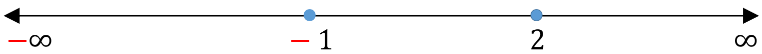
VR: $x = -4 \quad \wedge \quad x = 3$

VP: $x = -5 \qquad x = 0 \qquad x = 4$

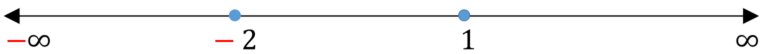


$$\mathrm{CS} = [-4; 3]$$

$-1 < 2$



$1 > -2$



¿Cómo resolvemos esta desigualdad?

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

$$\frac{x}{2x-1} - \frac{3}{x+2} \leq 0$$

$$\frac{x(x+2) - 3(2x-1)}{(2x-1)(x+2)} \leq 0$$

$$\frac{x^2 + 2x - 6x + 3}{(2x-1)(x+2)} \leq 0$$

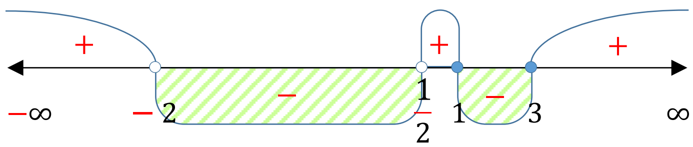
$$\frac{x^2 - 4x + 3}{(2x-1)(x+2)} \leq 0$$

$$\frac{(x-1)(x-3)}{(2x-1)(x+2)} \leq 0$$

$$(x-1)(x-3) = 0 \quad \wedge \quad (2x-1)(x+2) \neq 0$$

VR: $x = 1 \quad \wedge \quad x = 3 \quad \wedge \quad x \neq \frac{1}{2} \quad \wedge \quad x \neq -2$

VP: $x = -3 \qquad x = 0 \qquad x = \frac{3}{4} \quad x = 2 \quad x = 4$



$$\mathrm{CS} = \left]-2; \frac{1}{2}\right[\cup [1; 3]$$

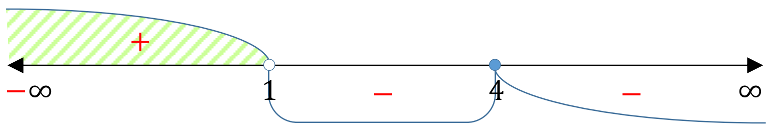
Ejemplo 4:

$$\frac{(4-x)^2}{(1-x)} \geq 0$$

$$4 - x = 0 \quad \wedge \quad 1 - x \neq 0$$

$$\text{VR: } \; x = 4 \quad \wedge \quad x \neq 1$$

VP: $x = 0$ $\quad$ $x = 2$ $\quad$ $x = 5$



$$\text{CS} = \left]-\infty; 1\right[\cup \{4\}$$

$$1 - x > 0 \quad \vee \quad 4 - x = 0$$

$$x < 1 \quad \vee \quad x = 4$$

Ejemplo 5:

$$\frac{2x}{x+1} > 1$$

$$\frac{2x}{x+1} - 1 > 0$$

$$\frac{2x - 1(x+1)}{x+1} > 0$$

$$\frac{2x - x - 1}{x+1} > 0$$

$$\frac{x-1}{x+1} > 0$$

$$x - 1 \neq 0 \quad \wedge \quad x + 1 \neq 0$$

$$\text{VR: } \; x \neq 1 \quad \wedge \quad x \neq -1$$

VP: $x = -2$ $\quad$ $x = 0$ $\quad$ $x = 2$

$$\text{CS} = \left]-\infty; -1\right[\cup \left]1; \infty\right[$$

Ejemplo 6:

$$\text{CS} = \mathbb{R}^+ = \left]0; \infty\right[$$

Ejemplo 7:

Determine el conjunto solución de la inecuación:

$$\frac{x^2+2x+1}{x^2} \le \frac{4}{x}$$

$$\frac{x^2+2x+1}{x^2} - \frac{4}{x} \le 0$$

$$\frac{(x^2+2x+1)x-4(x^2)}{x^2(x)} \le 0$$

$$\frac{x^3+2x^2+x-4x^2}{x^3} \le 0$$

$$\frac{x^3-2x^2+x}{x^3} \le 0$$

$$\frac{x(x^2-2x+1)}{x^3} \le 0$$

$$\frac{x(x-1)^2}{x^3} \le 0$$

$$x=0 \quad \wedge \quad x-1=0 \quad \wedge \quad x^3 \neq 0$$

VR: $x=0 \quad \wedge \quad x=1 \quad \wedge \quad x \neq 0$

VP: $x=-1$ $\qquad$ $x=0{,}5$ $\qquad$ $x=2$

$$\frac{(x-1)^2}{x^2} \le 0$$

$$\left(\frac{x-1}{x}\right)^2 \le 0$$

$$x-1=0$$

$$\mathrm{CS}=\{1\}$$

Ejemplo 8:

$$\frac{9}{6x-x^2} \le 1$$

$$\frac{9}{6x-x^2} - 1 \le 0$$

$$\frac{9-(6x-x^2)}{6x-x^2} \le 0$$

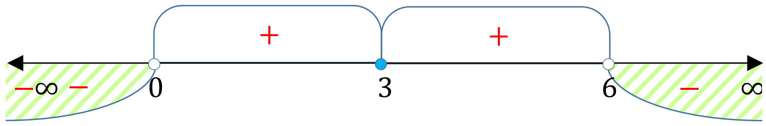
$$\frac{x^2-6x+9}{6x-x^2} \le 0$$

$$\frac{(x-3)^2}{x(6-x)} \le 0$$

$$x-3=0 \quad \wedge \quad x \neq 0 \quad \wedge \quad 6-x \neq 0$$

$$\text{VR:} \quad x = 3 \quad \wedge \quad x \neq 0 \quad \wedge \quad x \neq 6$$

$$\text{VP: } x = -1 \qquad x = 1 \qquad x = 4 \qquad x = 7$$



$$\text{CS} = \left]-\infty; 0\right[\cup \{3\} \cup \left]6; \infty\right[$$

Trabajo en casa

1. Determine el intervalo al que pertenece x, a partir de la expresión: $\frac{1}{x} \in \left]-\infty; 2\right]$.

$$\frac{1}{x} \in \left]-\infty; 2\right]$$

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

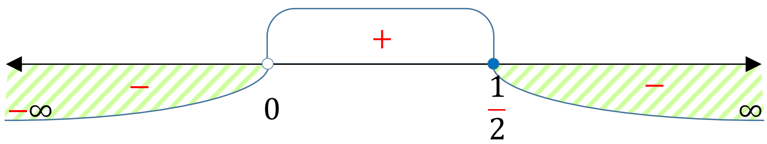
$$\frac{1}{x} - 2 \leq 0$$

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

$$1 - 2x = 0 \quad \wedge \quad x \neq 0$$

$$\text{VR:} \quad x = \frac{1}{2} \quad \wedge \quad x \neq 0$$

$$\text{VP:} \qquad x = -1 \qquad x = \frac{1}{4} \qquad x = 1$$



$$\text{CS} = \left]-\infty; 0\right[\cup \left[\frac{1}{2}; \infty\right[$$

$$x \in \left]-\infty; 0\right[\cup \left[\frac{1}{2}; \infty\right[$$

2. Se sabe que $6 - x^2 \in \left[-3; +\infty\right[$, ¿a qué intervalo pertenece x?

$$6 - x^2 \geq -3$$

$$0 \geq x^2 - 9$$