

PRACTICA 2 CALCULO I ING VILDOZO

1. $|3x + 2| = 8$

$$3x + 2 = 8$$

$$3x = 6$$

$$x = 2$$

 $\wedge$
 $\wedge$

$$3x + 2 = -8$$

$$3x = -10$$

$$x = -10/3$$

$$Cs: \{-10/3, 2\}$$

2. $|2x - 5| = 11$

$$2x - 5 = 11$$

$$2x = 16$$

$$x = 8$$

 $\wedge$
 $\wedge$

$$2x - 5 = -11$$

$$2x = -6$$

$$x = -3$$

$$Cs: \{-3, 8\}$$

3. $|x^2 - 4| = 0$

$$x^2 - 4 = 0$$

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

$$x - 2 = 0$$

$$x = 2$$

 $\wedge$
 $\wedge$

$$x + 2 = 0$$

$$x = -2$$

$$Cs: \{-2, 2\}$$

4. $|2x^2 + 3x - 2| = 0$

$$(2x-1)(x+2) = 0$$

$$2x - 1 = 0$$

$$2x = 1$$

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

 $\wedge$
 $\wedge$

$$x + 2 = 0$$

$$x = -2$$

$$x = -2$$

$$Cs: \{-2, \frac{1}{2}\}$$

5. $|x^2 - 6x + 8| = 4$

$$x^2 - 6x + 8 = 4$$

$$x^2 - 6x + 4 = 0$$

Aplicando Fórmula General:

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4 \cdot 1 \cdot 4}}{2 \cdot 1}$$

$$x = \frac{6 \pm 2\sqrt{5}}{2}$$

$$x = 3 + \sqrt{5} \wedge x = 3 - \sqrt{5}$$

 $\wedge$
 $\wedge$
 $\wedge$
 $\wedge$
 $\wedge$

$$x^2 - 6x + 8 = -4$$

$$x^2 - 6x + 12 = 0$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4 \cdot 1 \cdot 12}}{2 \cdot 1}$$

$$x = \frac{6 \pm \sqrt{-12}}{2}$$

$$x = \emptyset$$

$$Cs: \{3 - \sqrt{5}, 3 + \sqrt{5}\}$$

$$6. |\log x| = 1$$

$$\log x = 1$$

$$x = 10^1$$

$$x = 10$$

 $\wedge$

$$\log x = -1$$

$$x = 10^{-1}$$

$$x = 1/10$$

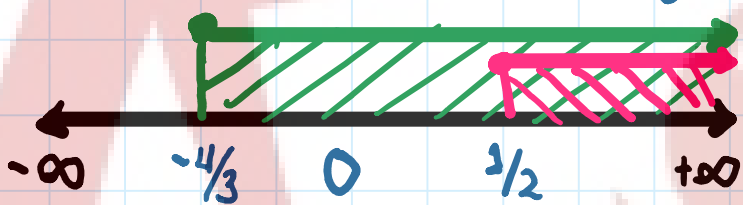
$$Cs: \{1/10, 10\}$$

$$7. |2x - 1| + |3x + 4| = 10$$

i) ++

$$2x - 1 \geq 0 \wedge 3x + 4 \geq 0$$

$$x \geq \frac{1}{2} \wedge x \geq -\frac{4}{3}$$



$$Cs: [1/2, +\infty[$$

$$2x - 1 + 3x + 4 = 10$$

$$5x + 3 = 10$$

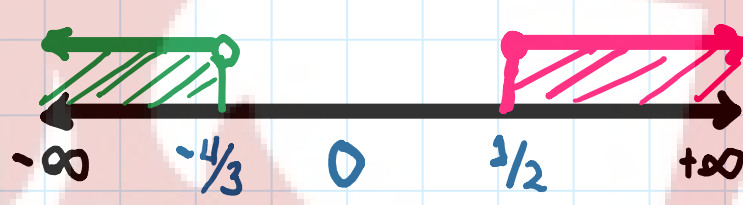
$$5x = 7$$

$$x = \frac{7}{5} \checkmark$$

ii) +-

$$2x - 1 \geq 0 \wedge 3x + 4 < 0$$

$$x \geq \frac{1}{2} \wedge x < -\frac{4}{3}$$

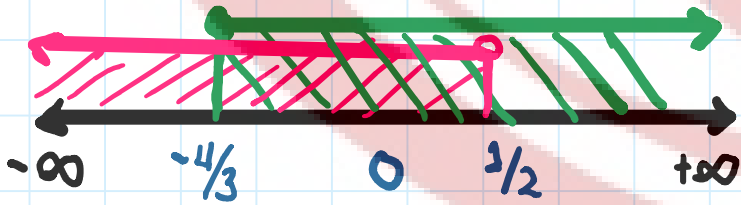


$$Cs: \emptyset$$

iii) -+

$$2x - 1 < 0 \wedge 3x + 4 \geq 0$$

$$x < \frac{1}{2} \wedge x \geq -\frac{4}{3}$$



$$Cs: [-4/3, 1/2[$$

$$-2x + 1 + 3x + 4 = 10$$

$$x + 5 = 10$$

$$x = 5 \times$$

iv) --

$$2x - 1 < 0 \wedge 3x + 4 < 0$$

$$x < \frac{1}{2} \wedge x < -\frac{4}{3}$$



$$Cs:]-\infty, -4/3[$$

$$-2x + 1 - 3x - 4 = 10$$

$$-5x - 3 = 10$$

$$5x = -13$$

$$x = -\frac{13}{5} \checkmark$$

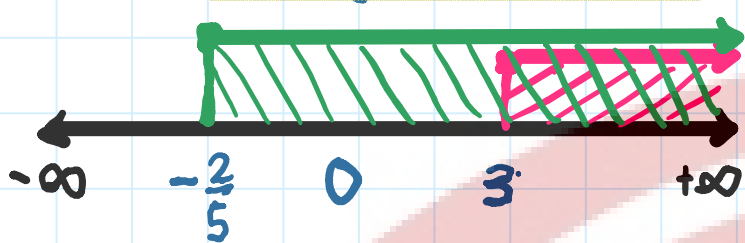
$$Cs: \{-13/5, 7/5\}$$

$$8. |5x + 2| - |x - 3| = 7$$

i) ++

$$5x + 2 \geq 0 \wedge x - 3 \geq 0$$

$$x \geq -\frac{2}{5} \wedge x \geq 3$$



$$C_s: [3, +\infty[$$

$$5x + 2 - x + 3 = 7$$

$$4x + 5 = 7$$

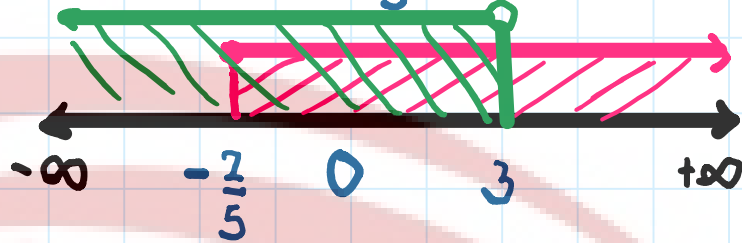
$$4x = 2$$

$$x = \frac{1}{2} \quad \text{X}$$

ii) +-

$$5x + 2 \geq 0 \wedge x - 3 < 0$$

$$x \geq -\frac{2}{5} \wedge x < 3$$



$$C_s: [-\frac{2}{5}, 3[$$

$$5x + 2 + x - 3 = 7$$

$$6x - 1 = 7$$

$$6x = 8$$

$$x = \frac{4}{3} \quad \checkmark$$

iii) -+

$$5x + 2 < 0 \wedge x - 3 \geq 0$$

$$x < -\frac{2}{5} \wedge x \geq 3$$

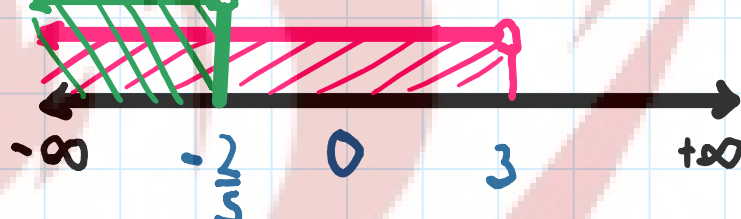


$$C_s: \emptyset$$

iv) --

$$5x + 2 < 0 \wedge x - 3 < 0$$

$$x < -\frac{2}{5} \wedge x < 3$$



$$C_s:]-\infty, -\frac{2}{5}[$$

$$-5x - 2 + x - 3 = 7$$

$$-4x - 5 = 7$$

$$-4x = 12$$

$$x = -3 \quad \checkmark$$

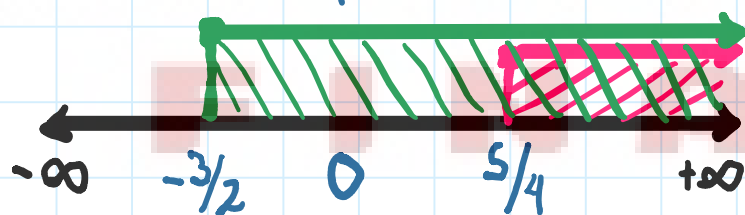
$$C_s: \{-3, \frac{4}{3}\}$$

$$9. |4x - 5| + |2x + 3| = 12$$

i) ++

$$4x - 5 \geq 0 \wedge 2x + 3 \geq 0$$

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



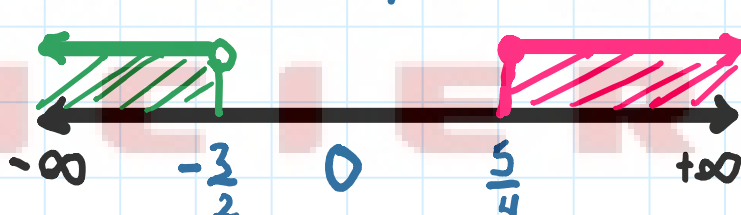
$$C_s: [\frac{5}{4}, +\infty[$$

$$4x - 5 + 2x + 3 = 12$$

ii) +-

$$4x - 5 \geq 0 \wedge 2x + 3 < 0$$

$$x \geq \frac{5}{4} \wedge x < -\frac{3}{2}$$



$$C_s: \emptyset$$

$$4x - 5 + 2x + 3 = 12$$

$$6x - 2 = 12$$

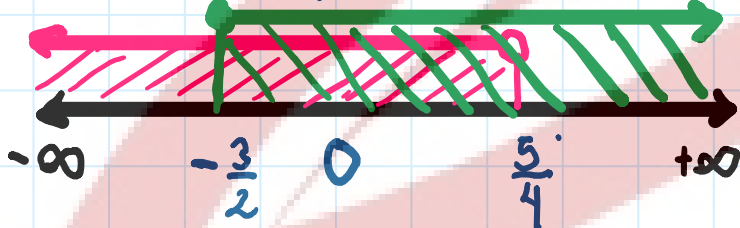
$$6x = 14$$

$$x = \frac{7}{3} \checkmark$$

iii) - +

$$4x - 5 < 0 \wedge 2x + 3 \geq 0$$

$$x < \frac{5}{4} \wedge x \geq -\frac{3}{2}$$



$$C_s: [-\frac{3}{2}, \frac{5}{4}[$$

$$-4x + 5 + 2x + 3 = 12$$

$$-2x + 8 = 12$$

$$-2x = 4$$

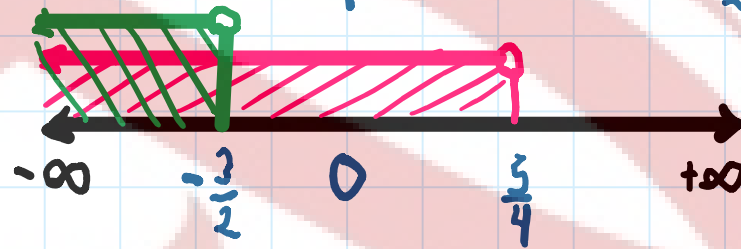
$$x = -2 \times$$

$$C_s: \{-\frac{5}{3}, \frac{7}{3}\}$$

iv) - -

$$4x - 5 < 0 \wedge 2x + 3 < 0$$

$$x < \frac{5}{4} \wedge x < -\frac{3}{2}$$



$$C_s:]-\infty, -\frac{3}{2}[$$

$$-4x + 5 - 2x - 3 = 12$$

$$-6x + 2 = 12$$

$$-6x = 10$$

$$x = -\frac{5}{3} \checkmark$$

10. $|x|^2 + |x| - 2 = 0$

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

$$x^2 + x - 2 = 0 \Rightarrow x \geq 0 \wedge$$

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

$$x+2=0; x-1=0 \wedge$$

$$x = -2; x = 1$$

$$x^2 - x - 2 = 0 \Rightarrow x < 0$$

$$(x+1)(x-2) = 0$$

$$x+1=0; x-2=0$$

$$x = -1; x = 2$$

$$C_s: \{-1, 1\}$$

11. $|2x + 4| \geq 10$

Teorema: $|x| \geq a \Rightarrow i) x \geq a \wedge ii) x \leq -a$

$$2x + 4 \geq 10$$

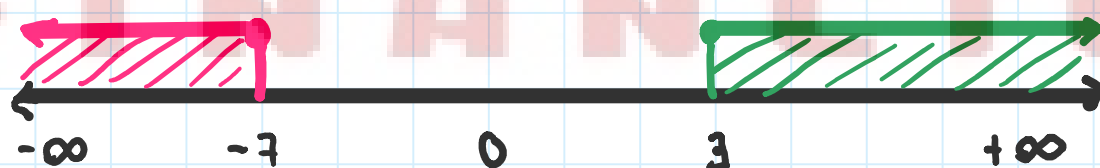
$$2x \geq 6$$

$$x \geq 3$$

$$2x + 4 \leq -10$$

$$2x \leq -14$$

$$x \leq -7$$



$$C_s:]-\infty, -7] \cup [3, +\infty[$$

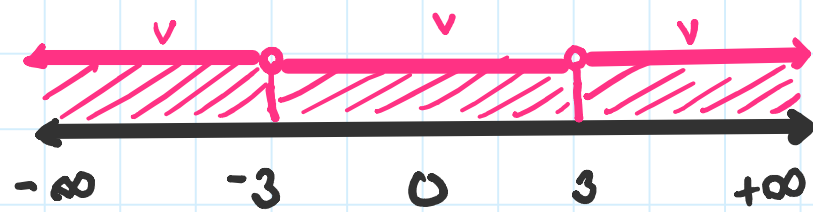
12. $|x^2 - 9| > 0$

$$x^2 - 9 = 0$$

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

$$x-3=0; x+3=0$$

$$x=3; x=-3$$



$$C_s:]-\infty, -3[\cup]3, +\infty[$$

$$C_s: \forall x \in \mathbb{R} / x \neq -3 \wedge x \neq 3$$

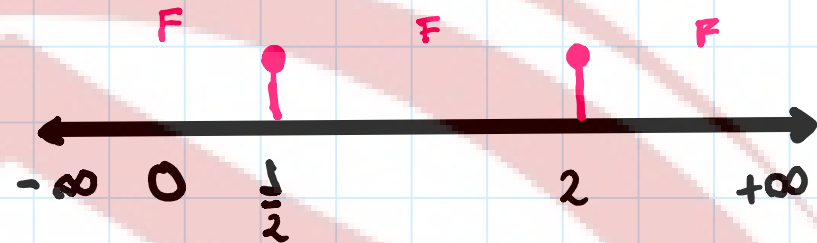
13. $|2x^2 - 5x + 2| \leq 0$

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

$$(2x-1)(x-2) = 0$$

$$2x-1=0; x-2=0$$

$$x = \frac{1}{2}; x = 2$$



$$C_s: \left\{ \frac{1}{2}, 2 \right\}$$

$$C_s: \forall x \in \mathbb{R} / x = \frac{1}{2} \wedge x = 2$$

14. $|4x^2 - 3x - 2| > 4$

$$4x^2 - 3x - 2 > 4$$

$$4x^2 - 3x - 6 > 0$$

Aplicando Formula General

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(4)(-6)}}{2 \cdot 4}$$

$$x = \frac{3 \pm \sqrt{105}}{8}$$

$$x = \frac{3 + \sqrt{105}}{8}; x = \frac{3 - \sqrt{105}}{8}$$

$$\wedge 4x^2 - 3x - 2 < -4$$

$$\wedge 4x^2 - 3x + 2 < 0$$

$$\wedge x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(4)(2)}}{2 \cdot 4}$$

$$\wedge x = \frac{3 \pm \sqrt{-23}}{8}$$

$$\wedge x = \emptyset$$



$$C_s:]-\infty, \frac{3 - \sqrt{105}}{8}] \cup [\frac{3 + \sqrt{105}}{8}, +\infty[$$

15. $|2x^2 + 5x - 3| < 2$

$$2x^2 + 5x - 3 > -2$$

$$2x^2 + 5x - 1 > 0$$

Aplicando Formula General

$$x = \frac{-(5) \pm \sqrt{(5)^2 - 4(2)(-1)}}{2 \cdot 2}$$

$$x = \frac{-5 \pm \sqrt{33}}{4}$$

$$\wedge 2x^2 + 5x - 3 < 2$$

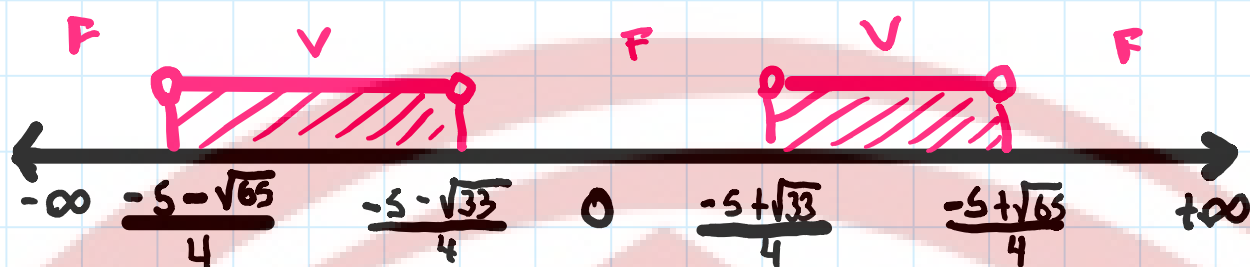
$$\wedge 2x^2 + 5x - 5 < 0$$

$$\wedge x = \frac{-(5) \pm \sqrt{(5)^2 - 4(2)(-5)}}{2 \cdot 2}$$

$$\wedge x = \frac{-5 \pm \sqrt{65}}{4}$$

$$x = \frac{-5 + \sqrt{33}}{4} ; x = \frac{-5 - \sqrt{33}}{4}$$

$$x = \frac{-5 + \sqrt{65}}{4} ; x = \frac{-5 - \sqrt{65}}{4}$$



$$Cs:] -5 - \sqrt{65}/4, -5 - \sqrt{33}/4 [\cup] -5 + \sqrt{33}/4, -5 + \sqrt{65}/4 [$$

16. $|x^3 - 27| \geq 0$

$$x^3 - 27 = 0$$

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

$$x-3=0; x+3=0; x+3=0$$

$$x=3; x=-3; x=-3$$



$$Cs: x \in \mathbb{R}$$

17. $|x^2 - 6x + 9| \geq 5$

$$x^2 - 6x + 9 \geq 5$$

$$x^2 - 6x + 4 \geq 0$$

$\wedge$

$$x^2 - 6x + 9 \leq -5$$

$\wedge$

$$x^2 - 6x + 14 \leq 0$$

Aplicando Formula General

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(4)}}{2 \cdot 1}$$

$$x = \frac{6 \pm 2\sqrt{5}}{2}$$

$\wedge$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(14)}}{2 \cdot 1}$$

$\wedge$

$$x = \frac{6 \pm \sqrt{-20}}{2}$$

$$x = 3 + \sqrt{5} ; x = 3 - \sqrt{5}$$

$\wedge$

$$x = \emptyset$$

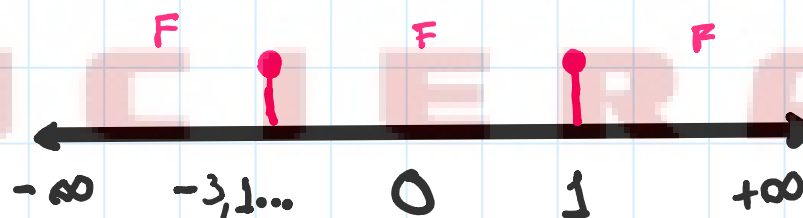


$$Cs:] -\infty, 3 - \sqrt{5}] \cup [3 + \sqrt{5}, +\infty [$$

18. $|x^4 + 3x^3 - 4| \leq 0$

M. Ruffini

	1	3	0	0	-4
1	1	4	4	4	4
	1	4	4	4	0



$$Cs: \{-3, 1, \dots, 1\}$$

$$Cs: \forall x \in \mathbb{R} / x = -3, 1 \wedge x = 1$$

$$(x-1)(x^3+4x^2+4x+4)=0$$

$$x-1=0; \quad x^3+4x^2+4x+4=0$$

$$\boxed{x=1}; \quad x^3+4x^2+4x+4=0$$

Para el Polinomio

$$x^3+4x^2+4x+4 \leq 0$$

Para $x=-3$

$$(-3)^3+4(-3)^2+4(-3)+4 \leq 0$$

$$1 \leq 0$$

Para $x=-4$

$$(-4)^3+4(-4)^2+4(-4)+4 \leq 0$$

$$-12 \leq 0$$

Concluimos que x está entre 3 y 4

tomamos como referencia $x \approx 3,1...$

19. $\left| \frac{x-4}{x+2} \right| - \left| \frac{x-6}{x-3} \right| < 0$ Si: $x \neq -2 \wedge x \neq 3$

$$\left| \frac{x-4}{x+2} \right| < \left| \frac{x-6}{x-3} \right|$$

$$\frac{x-4}{x+2} < \frac{x-6}{x-3} \quad \wedge \quad \frac{x-4}{x+2} > -\frac{x-6}{x-3}$$

$$\frac{x-4}{x+2} - \frac{x-6}{x-3} < 0 \quad \wedge \quad \frac{x-4}{x+2} + \frac{x-6}{x-3} > 0$$

$$\frac{x^2-7x+12-x^2+4x+12}{(x+2)(x-3)} < 0 \quad \wedge \quad \frac{x^2-7x+12+x^2-4x-12}{(x+2)(x-3)} > 0$$

$$\frac{-3x+24}{(x+2)(x-3)} < 0 \quad \wedge \quad \frac{2x^2-11x}{(x+2)(x-3)} > 0$$

$$\frac{3x-24}{(x+2)(x-3)} > 0$$

①

Para ①
Numerador

$$3x-24=0$$

$$3x=24$$

$$\boxed{x=8}$$

$$\frac{x(2x-11)}{(x+2)(x-3)} > 0$$

②

Para ②
Numerador

$$x(2x-11)=0$$

$$x=0; \quad 2x-11=0$$

$$\boxed{x=0; \quad x=11/2}$$

Denominador

$$(x+2)(x-3)=0$$

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

$$x=-2; x=3$$

Denominador

$$(x+2)(x-3)=0$$

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

$$x=-2; x=3$$



$$Cs:]0,3[\cup]3,4/2[\cup]8,+\infty[$$

20.

$$\left| \frac{2x-5}{x+2} \right| \leq 1$$

Si $x \neq -2$

$$\frac{2x-5}{x+2} \leq 1$$

$$\wedge \frac{2x-5}{x+2} \geq -1$$

$$\frac{2x-5}{x+2} - 1 \leq 0$$

$$\wedge \frac{2x-5}{x+2} + 1 \geq 0$$

$$\frac{2x-5-x-2}{x+2} \leq 0$$

$$\wedge \frac{2x-5+x+2}{x+2} \geq 0$$

$$\frac{x-7}{x+2} \leq 0$$

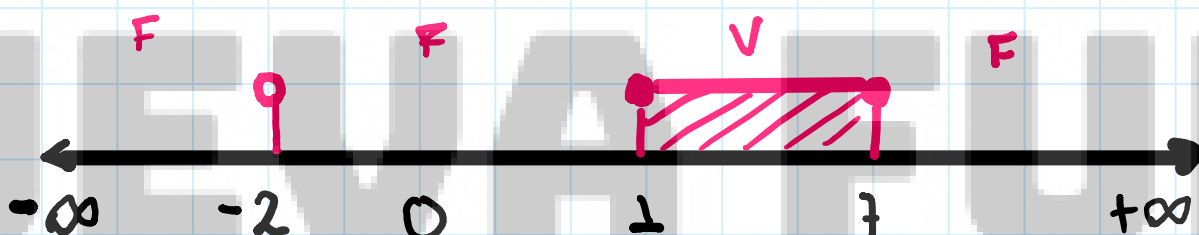
$$\wedge \frac{3x-3}{x+2} \geq 0$$

Numerador: $x-7=0$
 $x=7$

Numerador: $3x-3=0$
 $3x=3$
 $x=1$

Denominador: $x+2=0$
 $x=-2$

Denominador: $x+2=0$
 $x=-2$



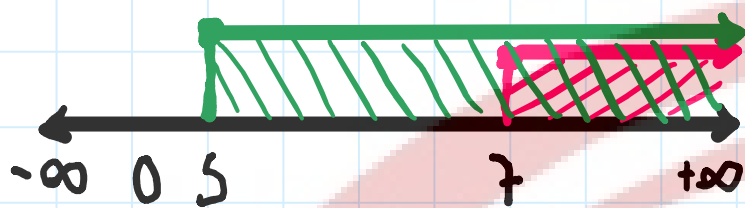
$$Cs: [1,7]$$

21. $|x-7| - |x-5| \leq 0$

i) ++

$$x-7 \geq 0 \wedge x-5 \geq 0$$

$$x \geq 7 \wedge x \geq 5$$



$$C_s: [7, +\infty[$$

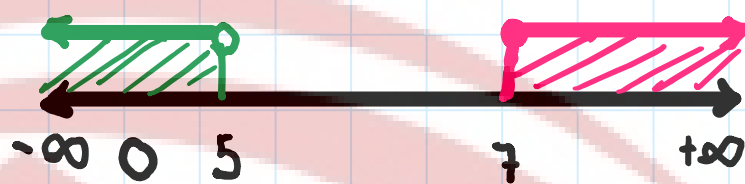
$$x-7 - x+5 \leq 0$$

$$-2 \leq 0 \quad \times$$

ii) +-

$$x-7 \geq 0 \wedge x-5 < 0$$

$$x \geq 7 \wedge x < 5$$

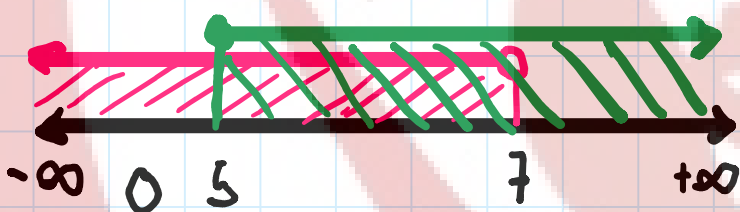


$$C_s: \emptyset$$

iii) -+

$$x-7 < 0 \wedge x-5 \geq 0$$

$$x < 7 \wedge x \geq 5$$



$$C_s: [5, 7[$$

$$-x+7 - x+5 \leq 0$$

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

$$-2x \leq -12 // (-1)$$

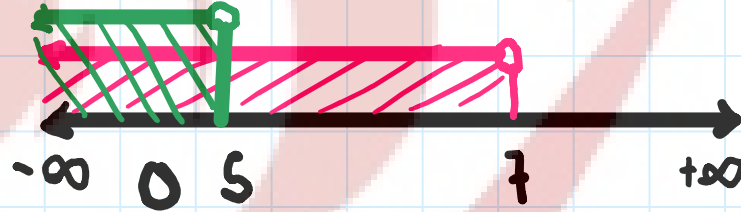
$$x \geq 6$$

$$C_s: [6, +\infty[$$

iv) --

$$x-7 < 0 \wedge x-5 < 0$$

$$x < 7 \wedge x < 5$$



$$C_s:]-\infty, 5[$$

$$-x+7 + x-5 \leq 0$$

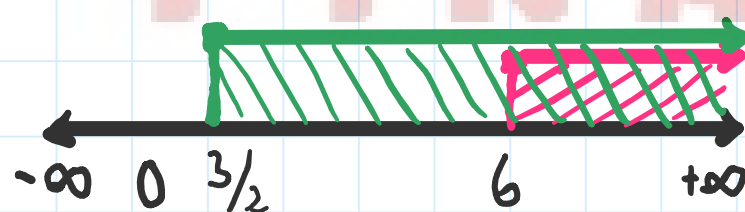
$$2 \leq 0 \quad \times$$

22. $|2x-3| - |x-6| \geq 0$

i) ++

$$2x-3 \geq 0 \wedge x-6 \geq 0$$

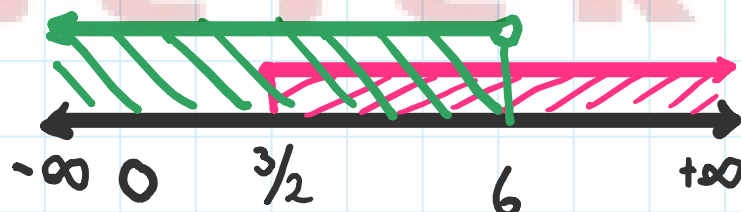
$$x \geq \frac{3}{2} \wedge x \geq 6$$



ii) +-

$$2x-3 \geq 0 \wedge x-6 < 0$$

$$x \geq \frac{3}{2} \wedge x < 6$$



$$C_s: [6, +\infty[$$

$$2x-3-x+6 \geq 0$$

$$x+3 \geq 0$$

$$x \geq -3$$

✗

$$C_s: [3/2, 6[$$

$$2x-3+x-6 \geq 0$$

$$3x-9 \geq 0$$

$$3x \geq 9$$

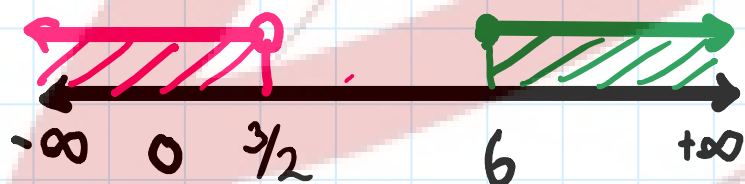
$$x \geq 3$$

✓

iii) - +

$$2x-3 < 0 \wedge x-6 \geq 0$$

$$x < 3/2 \wedge x \geq 6$$

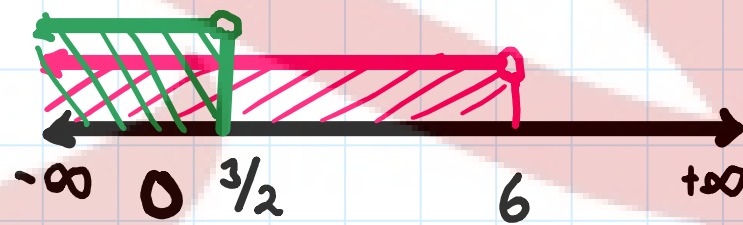


$$C_s: \emptyset$$

iv) - -

$$2x-3 < 0 \wedge x-6 < 0$$

$$x < 3/2 \wedge x < 6$$



$$C_s:]-\infty, 3/2[$$

$$-2x+3+x-6 \geq 0$$

$$-x-3 \geq 0 \quad // (-1)$$

$$x+3 \leq 0$$

$$x \leq -3$$

✓

$$C_s:]-\infty, -3] \cup [3, +\infty[$$

NUEVA FUERZA
FINANCIERA