16/12/2020

143 $\dfrac{x+x^2}{2x^2+x-3} \geq 0$ $\left[x < -\dfrac{3}{2} \vee -1 \leq x \leq 0 \vee x > 1\right]$

$$\frac{\overset{N_1}{x}\,\overset{N_2}{(1+x)}}{\underset{D_1}{(x-1)}\,\underset{D_2}{(2x+3)}} \geqslant 0$$

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

$S = 1$ $\quad = 2x(x-1) + 3(x-1)$

$P = -6$ $\quad = (x-1)(2x+3)$

$N_1 > 0 \quad x > 0$

$N_2 > 0 \quad 1 + x > 0 \quad x > -1$

$D_1 > 0 \quad x - 1 > 0 \quad x > 1$

$D_2 > 0 \quad 2x + 3 > 0 \quad 2x > -3 \quad x > -\frac{3}{2}$

		$-\frac{3}{2}$		-1		0		1	
N_1	$-$		$-$		$-$	0	$+$		$+$
N_2	$-$		$-$	0	$+$		$+$		$+$
D_1	$-$		$-$		$-$		$-$	$\nexists$	$+$
D_2	$-$	$\nexists$	$+$		$+$		$+$		$+$
	$+$	$\nexists$	$-$	0	$+$	0	$-$	$\nexists$	$+$

$$\boxed{x < -\frac{3}{2} \quad \vee \quad -1 \leq x \leq 0 \quad \vee \quad x > 1}$$

144 $\dfrac{x^3(x^2+4)}{(x-1)^2} > 0$ $\qquad [x > 0 \wedge x \neq 1]$

$$\frac{\overbrace{x^3}^{N_1}\ \overbrace{(x^2+4)}^{N_2}}{\underbrace{(x-1)}_{D_1}\ \underbrace{(x-1)}_{D_2}} > 0$$

$N_1 > 0$	$x^3 > 0$	$x > 0$
$N_2 > 0$	$x^2+4 > 0$	$\forall x \in \mathbb{R}$
$D_1 > 0$	$x-1 > 0$	$x > 1$
$D_2 > 0$	$x-1 > 0$	$x > 1$

		0		1	
N_1	$-$	0	$+$		$+$
N_2	$+$		$+$		$+$
D_1	$-$		$-$	$\nexists$	$+$
D_2	$-$		$-$	$\nexists$	$+$
	$-$	0	$+$	$\nexists$	$+$

$$\boxed{0 < x < 1 \ \vee \ x > 1}$$

$x > 0 \ \wedge \ x \neq 1$

145 $\dfrac{x^4(x^2-1)^2}{2x^2+1} \ge 0$ $[\forall x \in \mathbf{R}]$

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

Si potrebbe riscrivere

$$\frac{\underset{N_1}{x^4}\,\underset{N_2}{(x-1)}\,\underset{N_3}{(x-1)}\,\underset{N_4}{(x+1)}\,\underset{N_5}{(x+1)}}{\underset{D}{2x^2+1}}$$

$$\frac{\underset{N_1}{x^4}\,\underset{N_2}{(x-1)^2}\,\underset{N_3}{(x+1)^2}}{\underset{D}{2x^2+1}} \geq 0$$

				-1		0		1	
$N_1 > 0$	$x^4 > 0$	$\forall x \neq 0$	+		+	0	+		+
$N_2 > 0$	$(x-1)^2 > 0$	$\forall x \neq 1$	+		+		+	0	+
$N_3 > 0$	$(x+1)^2 > 0$	$\forall x \neq -1$	+	0	+		+		+
$D > 0$	$2x^2+1 > 0$	$\forall x$	+		+		+		+
			+	0 =	+	0 =	+	0 =	+

$S = \mathbb{R}$ $\boxed{\forall x \in \mathbb{R}}$

Se fosse stato $\dfrac{x^4\,(x-1)^2(x+1)^2}{2x^2+1} > 0$ $\quad \forall x \in \mathbb{R} \setminus \{-1, 0, 1\}$

Se fosse stato

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

$S = \emptyset$

IMPOSSIBILE

Se fosse stato

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

$\boxed{x=-1 \ \vee \ x=0 \ \vee \ x=1}$

$S = \{-1, 0, 1\}$

166
$$\begin{cases} \boxed{1}\ (x-1)(x+1) > (x-2)^2 \\ \boxed{2}\ 0{,}3x - 9 \le 0 \\ \boxed{3}\ \dfrac{x+1}{x-2} > 2 \end{cases}$$

$[2 < x < 5]$

$\boxed{1}$ $\cancel{x^2} - 1 > \cancel{x^2} + 4 - 4x \qquad 4x > 5 \qquad x > \frac{5}{4}$

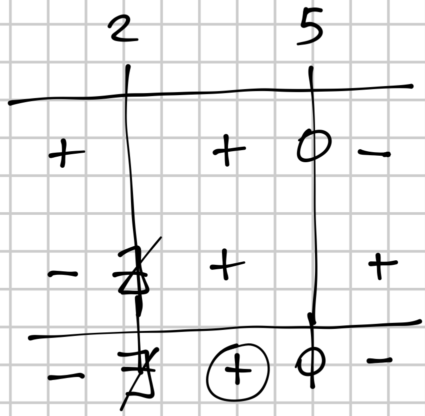
$\boxed{2}$ $\frac{\cancel{3}^{1}}{10}x \le \cancel{9}^{3} \qquad x \le 30$

$\boxed{3}$ $\frac{x+1}{x-2} - 2 > 0 \qquad \frac{x+1-2(x-2)}{x-2} > 0 \qquad \frac{x+1-2x+4}{x-2} > 0$

$$\frac{-x+5}{x-2} > 0 \qquad \begin{matrix} N \\ D \end{matrix}$$

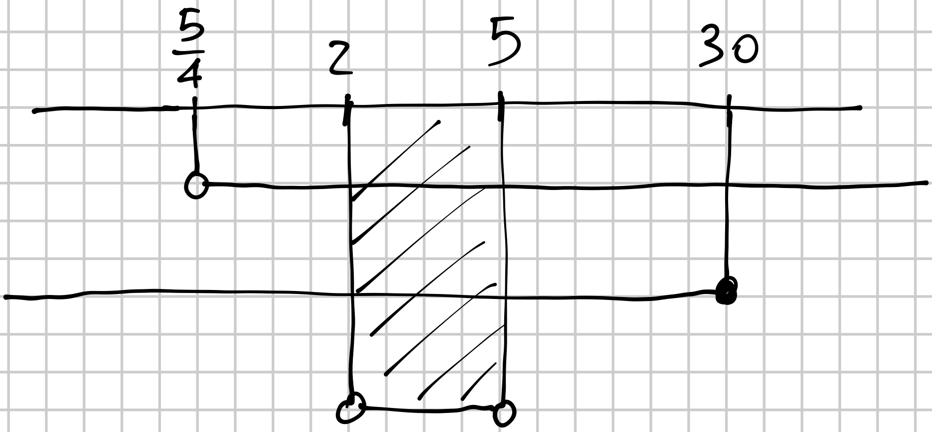
$N > 0 \qquad -x+5>0 \qquad -x>-5 \qquad x<5$

$D > 0 \qquad x-2>0 \qquad x>2$



$2 < x < 5$

$$\begin{cases} x > \frac{5}{4} \\ x \le 30 \\ 2 < x < 5 \end{cases}$$



$$\boxed{2 < x < 5}$$

$$\text{168} \quad \begin{cases} ① \; 1 > \dfrac{1}{x - 0,\overline{2}} \\ ② \; 2x - 0,2 > 0 \\ ③ \; -0,2(x+3) < 4 \end{cases} \qquad \left[\frac{1}{10} < x < \frac{2}{9} \vee x > \frac{11}{9}\right]$$

$$0,\overline{2} = \frac{2-0}{9} = \frac{2}{9}$$

① $$1 > \frac{1}{x - \frac{2}{9}}$$

$$1 > \frac{1}{\frac{9x-2}{9}} \Rightarrow 1 > \frac{9}{9x-2} \Rightarrow 1 - \frac{9}{9x-2} > 0$$

$$\frac{9x-2-9}{9x-2} > 0 \qquad \begin{array}{l} N \\ D \end{array} \frac{9x-11}{9x-2} > 0$$

$N > 0 \qquad 9x - 11 > 0 \qquad x > \frac{11}{9}$

$D > 0 \qquad 9x - 2 > 0 \qquad x > \frac{2}{9}$

		$\frac{2}{9}$		$\frac{11}{9}$	
N	$-$		$-$	0	$+$
D	$-$	$\nexists$	$+$		$+$
	$+$	$\nexists$	$-$	0	$+$

$$x < \frac{2}{9} \quad \vee \quad x > \frac{11}{9}$$

② $2x - 0,2 > 0$

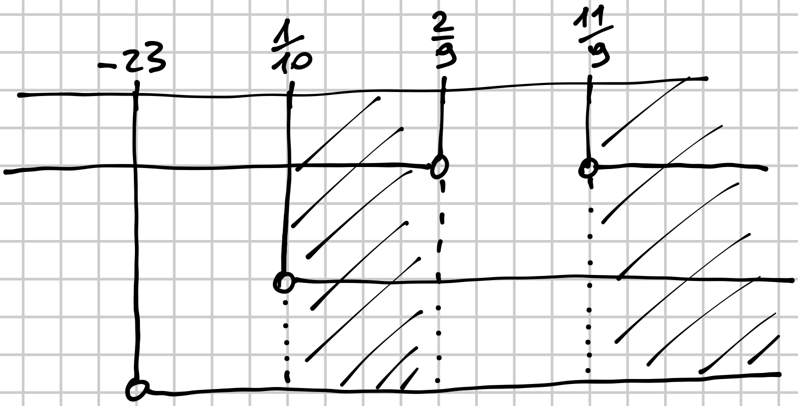
$\cancel{2}x - \frac{\cancel{2}}{10} > 0 \qquad x > \frac{1}{10}$

③ $-0,2(x+3) < 4$

$-\frac{\overset{1}{\cancel{2}}}{10}(x+3) < \overset{2}{\cancel{4}}$

$-(x+3) < 20 \qquad x+3 > -20 \qquad x > -23$

$$\begin{cases} x < \frac{2}{9} \quad \vee \quad x > \frac{11}{9} \\ x > \frac{1}{10} \\ x > -23 \end{cases}$$



$$\boxed{\frac{1}{10} < x < \frac{2}{9} \quad \vee \quad x > \frac{11}{9}}$$