434 $\dfrac{1}{x^2+2x} - \dfrac{1}{x^2-4} \geq \dfrac{2}{x^3+2x^2}$ $\qquad [x < -2 \lor 1 \leq x < 2]$

$$\dfrac{1}{\underset{x(x+2)}{x^2+2x}} - \dfrac{1}{\underset{(x-2)(x+2)}{x^2-4}} - \dfrac{2}{\underset{x^2(x+2)}{x^3+2x^2}} \geq 0$$

$$\dfrac{x(x-2) - x^2 - 2(x-2)}{x^2(x+2)(x-2)} \geq 0$$

$$\dfrac{\cancel{x^2} - 2x - \cancel{x^2} - 2x + 4}{x^2(x+2)(x-2)} \geq 0$$

$$\dfrac{\overset{\boxed{N}}{4-4x}}{\underset{\boxed{D_1}\ \boxed{D_2}\ \boxed{D_3}}{x^2(x+2)(x-2)}} \geq 0$$

$N > 0 \qquad 4-4x > 0 \qquad -4x > -4 \qquad x < 1$

$D_1 > 0 \qquad x^2 > 0 \qquad x \neq 0$

$D_2 > 0 \qquad x+2 > 0 \qquad x > -2$

$D_3 > 0 \qquad x-2 > 0 \qquad x > 2$
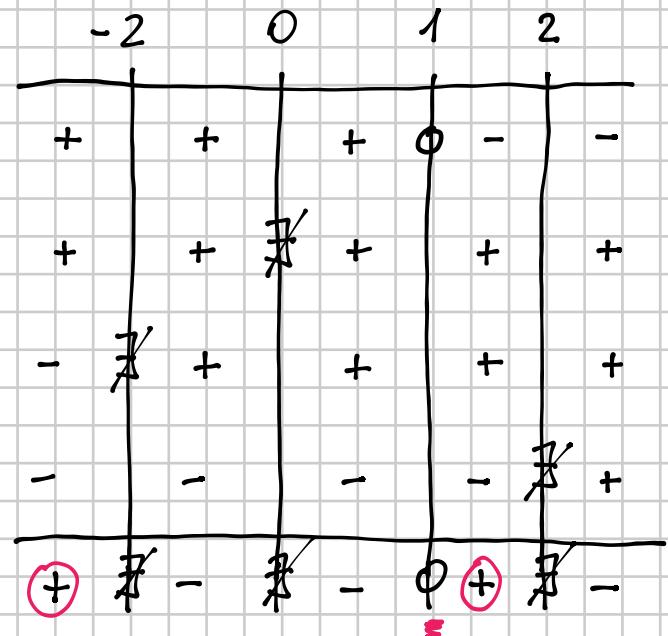
$$\boxed{x < -2 \quad \lor \quad 1 \leq x < 2}$$

437 $\dfrac{x}{x^3 + 2x^2 - x - 2} \ge \dfrac{1}{x+1} + \dfrac{1}{1-x}$ $\qquad \left[x < -2 \lor -\dfrac{4}{3} \le x < -1 \lor x > 1\right]$

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

$$x^2(x+2) - (x+2) \qquad\qquad -(x-1)$$

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

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

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

$$x - \cancel{x^2} + x - \cancel{2x} + 2 + \cancel{x^2} + x + \cancel{2x} + 2$$

$$\frac{\overset{N}{3x+4}}{\underset{D_1 \quad D_2 \quad D_3}{(x+2)(x-1)(x+1)}} \ge 0$$

$N > 0 \qquad 3x + 4 > 0 \qquad x > -\dfrac{4}{3}$

$D_1 > 0 \qquad x + 2 > 0 \qquad x > -2$

$D_2 > 0 \qquad x - 1 > 0 \qquad x > 1$

$D_3 > 0 \qquad x + 1 > 0 \qquad x > -1$

	-2	$-\frac{4}{3}$	-1	1
	$-$	$-$	0 $+$	$+$	$+$
	$-$	$+$	$+$	$+$	$+$
	$-$	$-$	$-$	$-$	$+$
	$-$	$-$	$-$	$+$	$+$
	$+$	$-$	0	$+$	$-$	$+$
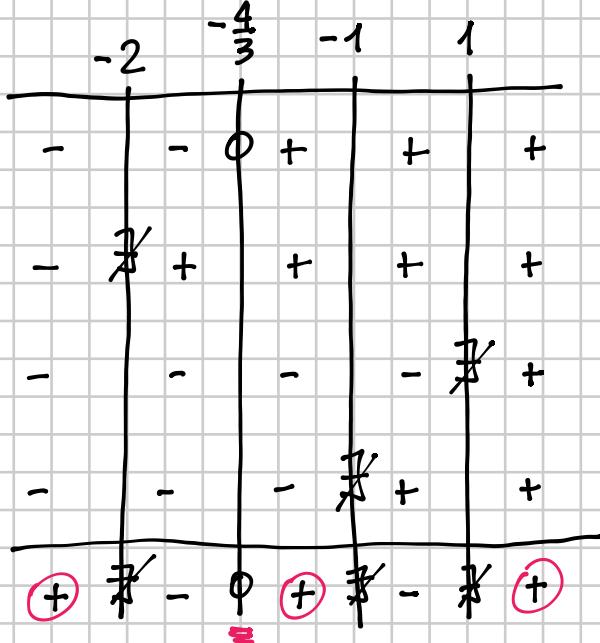
$$\boxed{x < -2 \quad \lor \quad -\frac{4}{3} \le x < -1 \quad \lor \quad x > 1}$$

482 $\begin{cases} ① \dfrac{x - x^2 - 3}{2x^2 - 5x} \geq 0 \\ ② x^2 + 7x - 8 \geq 0 \end{cases}$

$\left[1 \leq x < \dfrac{5}{2} \right]$

①

$$\dfrac{x - x^2 - 3}{2x^2 - 5x} \geq 0$$

$$\underset{N}{\dfrac{\overset{}{x^2 - x + 3}}{\underset{D_1 \quad D_2}{x(2x - 5)}}} \leq 0$$

$N > 0 \qquad x^2 - x + 3 > 0 \qquad \forall x$

$\qquad \Delta = 1 - 12 = -11 < 0$

$D_1 \qquad x > 0$

$D_2 \qquad 2x - 5 > 0 \qquad x > \dfrac{5}{2}$

$$0 < x < \dfrac{5}{2}$$

② $\quad x^2 + 7x - 8 \geq 0$

$\quad (x + 8)(x - 1) \geq 0 \qquad\qquad x \leq -8 \;\lor\; x \geq 1$

$\qquad\;\; \underset{N_1}{}\quad \underset{N_2}{}$
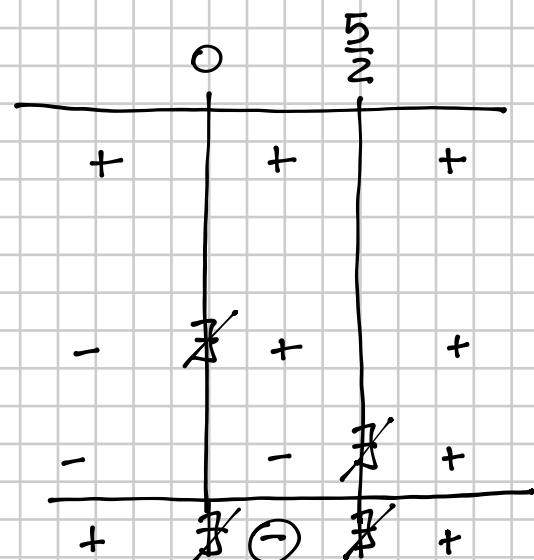
$\quad x_1 = -8 \quad x_2 = 1$

$\begin{cases} 0 < x < \dfrac{5}{2} \\ \\ x \leq -8 \;\lor\; x \geq 1 \end{cases}$
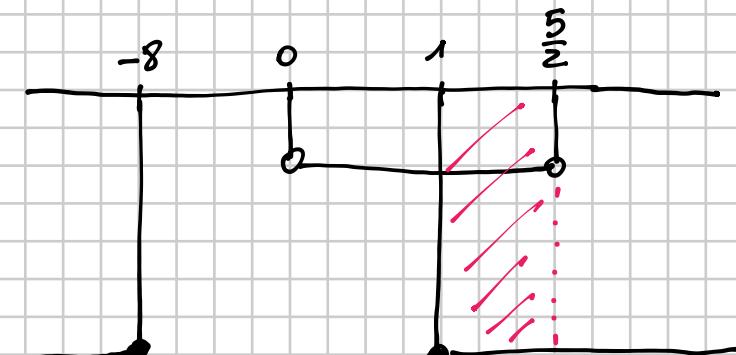
$$\boxed{1 \leq x < \dfrac{5}{2}}$$

483 $\begin{cases} \text{①} & (x - 2\sqrt{2})^2 + (x - \sqrt{2})^2 \geq 2 \\ \text{②} & \dfrac{2}{x - \sqrt{2}} \geq x + \sqrt{2} \end{cases}$ $\qquad [x \leq -2]$

① $\quad x^2 + 8 - 4\sqrt{2}x + x^2 + \cancel{2} - 2\sqrt{2}x - \cancel{2} \geq 0$

$2x^2 - 6\sqrt{2}x + 8 \geq 0$

$\cancel{2}(x^2 - 3\sqrt{2}x + 4) \geq 0$

$x^2 - 3\sqrt{2}x + 4 \geq 0$

$\triangle = 18 - 16 = 2$

$x = \dfrac{3\sqrt{2} \pm \sqrt{2}}{2} = \begin{cases} \dfrac{2\sqrt{2}}{2} = \sqrt{2} \\[2mm] \dfrac{4\sqrt{2}}{2} = 2\sqrt{2} \end{cases}$

$x \leq \sqrt{2} \quad \lor \quad x \geq 2\sqrt{2}$

② $\quad \dfrac{2}{x - \sqrt{2}} - x - \sqrt{2} \geq 0$

$\dfrac{2 - x(x - \sqrt{2}) - \sqrt{2}(x - \sqrt{2})}{x - \sqrt{2}} \geq 0 \qquad \dfrac{2 - x^2 + \cancel{\sqrt{2}x} - \cancel{\sqrt{2}x} + 2}{x - \sqrt{2}} \geq 0$

$\dfrac{4 - x^2}{x - \sqrt{2}} \geq 0 \qquad \overset{N}{\underset{D}{\dfrac{x^2 - 4}{x - \sqrt{2}}}} \leq 0$

$N > 0 \quad x^2 - 4 > 0 \quad x < -2 \lor x > 2$

$D > 0 \quad x - \sqrt{2} > 0 \quad x > \sqrt{2}$

$x \leq -2 \quad \lor \quad \sqrt{2} < x \leq 2$

$$\begin{cases} x \leqslant \sqrt{2} \quad \lor \quad x \geqslant 2\sqrt{2} \\ \\ x \leqslant -2 \quad \lor \quad \sqrt{2} < x \leqslant 2 \end{cases}$$

$$\boxed{x \leqslant -2}$$