$$|x-2| \leq |x-3|$$

1° modo: "spezzando" i valori assoluti.

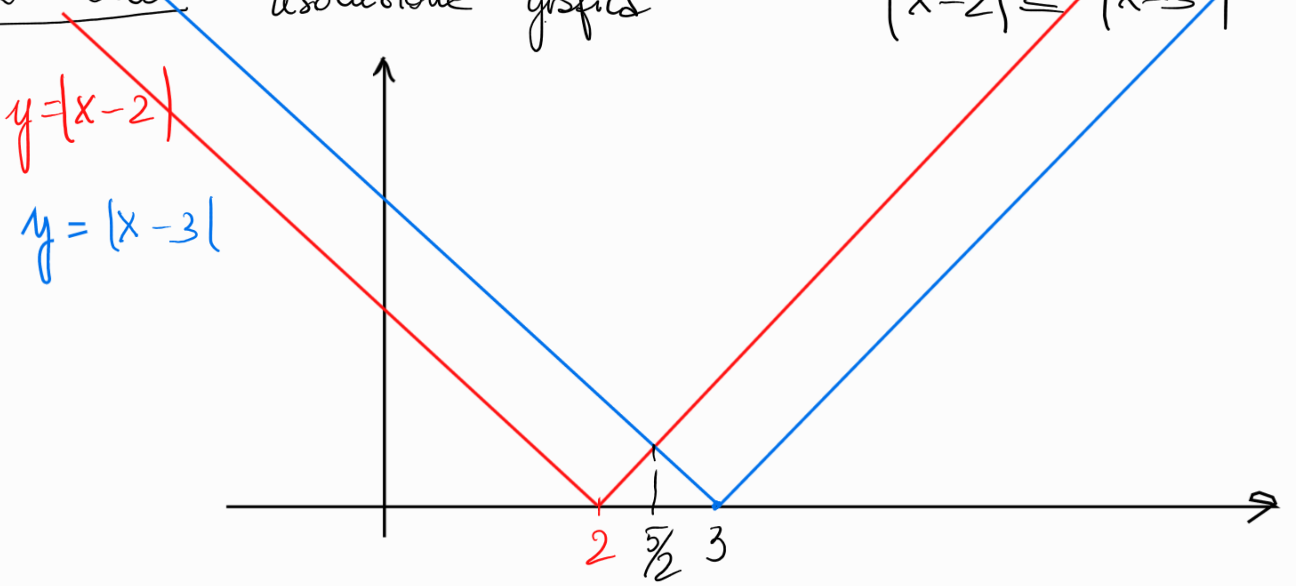
$$\begin{cases} x < 2 \\ 2-\cancel{x} \leq 3-\cancel{x} \end{cases} \qquad \begin{cases} 2 \leq x < 3 \\ x-2 \leq 3-x \end{cases} \qquad \begin{cases} x \geq 3 \\ \cancel{x}-2 \leq \cancel{x}-3 \end{cases}$$

↖ sempre vera — $2x \leq 5$ cioè $x \leq 5/2$ — sempre falsa

$x \in (-\infty, 2)$ — $x \in \left[2, \frac{5}{2}\right]$ — nessuna sol.

Sol^{ne} della diseq^{ne}: $\quad x \in \left(-\infty, \frac{5}{2}\right]$

2° modo risoluzione grafica $\quad |x-2| \leq |x-3|$



Dove la curva rossa è "non al di sopra" della curva blu?

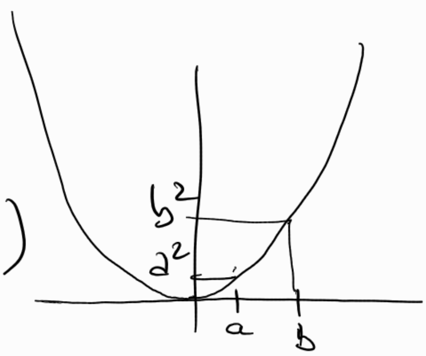
per $x \in \left(-\infty, \frac{5}{2}\right]$

3° modo $\quad |x-2| \leq |x-3|$

i) siano $a, b \geq 0$. Allora

$$a \leq b \iff a^2 \leq b^2$$

(è la crescenza di $f(x) = x^2$ in $[0, +\infty)$)



ii) $|x|^2 = x^2 \quad \forall x \in \mathbb{R}$.

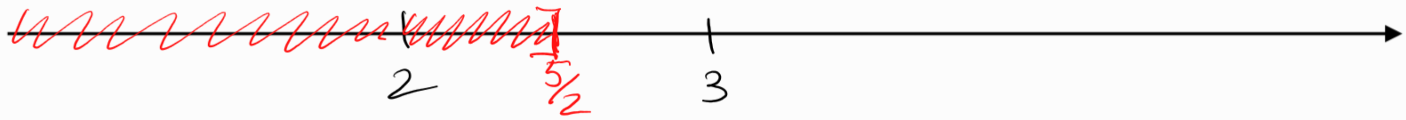
"Quadrando" la diseq^{ne}

$$|x-2| \le |x-3| \iff |x-2|^2 \le |x-3|^2 \iff (x-2)^2 \le (x-3)^2$$

$$\iff \cancel{x^2} - 4x + 4 \le \cancel{x^2} - 6x + 9 \iff 2x \le 5 \iff x \le \frac{5}{2}$$

4° modo $\qquad |x-2| \le |x-3|$

La diseq^{ne} significa: "quali punti distano da 2 non più di quanto distano da 3?"



Disegnare il grafico di $f(x) = \left||x^2-4|-1\right|$

$$f(x) = \begin{cases} |x^2-4|-1 & \text{se } |x^2-4| \ge 1 \\ 1-|x^2-4| & \text{se } \underbrace{|x^2-4|<1} \quad \text{cioè } -1 < x^2-4 < 1 \end{cases}$$

$$3 < x^2 < 5$$

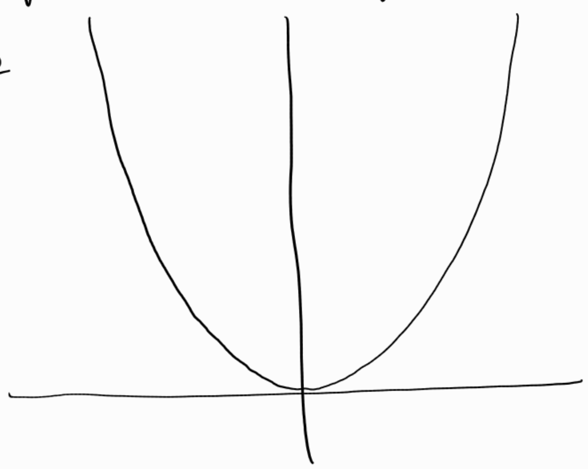
$$(-\sqrt{5} < x < -\sqrt{3}) \vee (\sqrt{3} < x < \sqrt{5})$$

etc...

(abbastanza laborioso ...)

Meglio farlo con trasformazioni di grafico. $f(x) = \left||x^2-4|-1\right|$

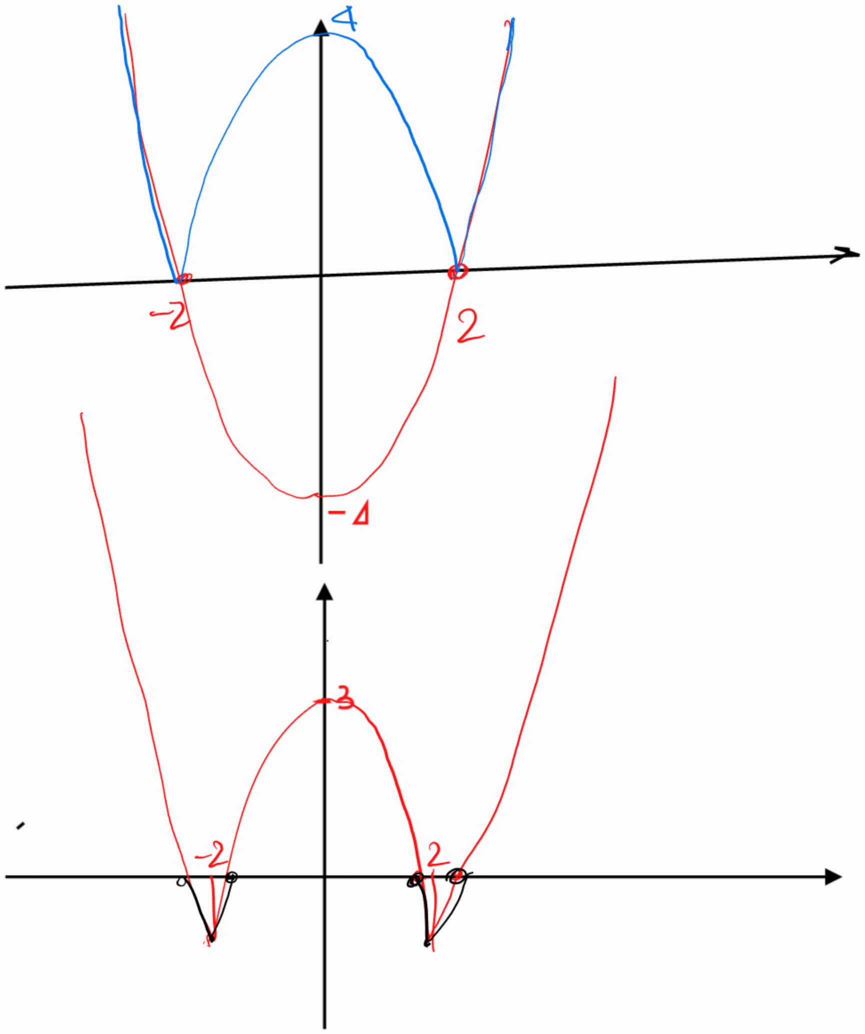
$y = x^2$



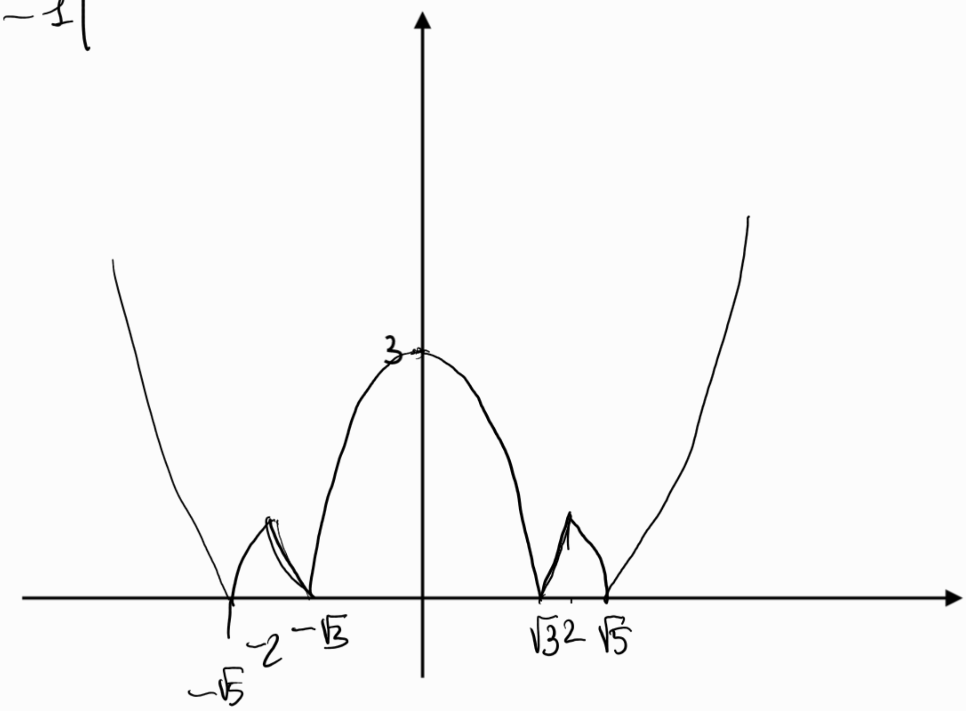
$y = x^2 - 4$

$y = |x^2 - 4|$

$y = |x^2 - 4| - 1$



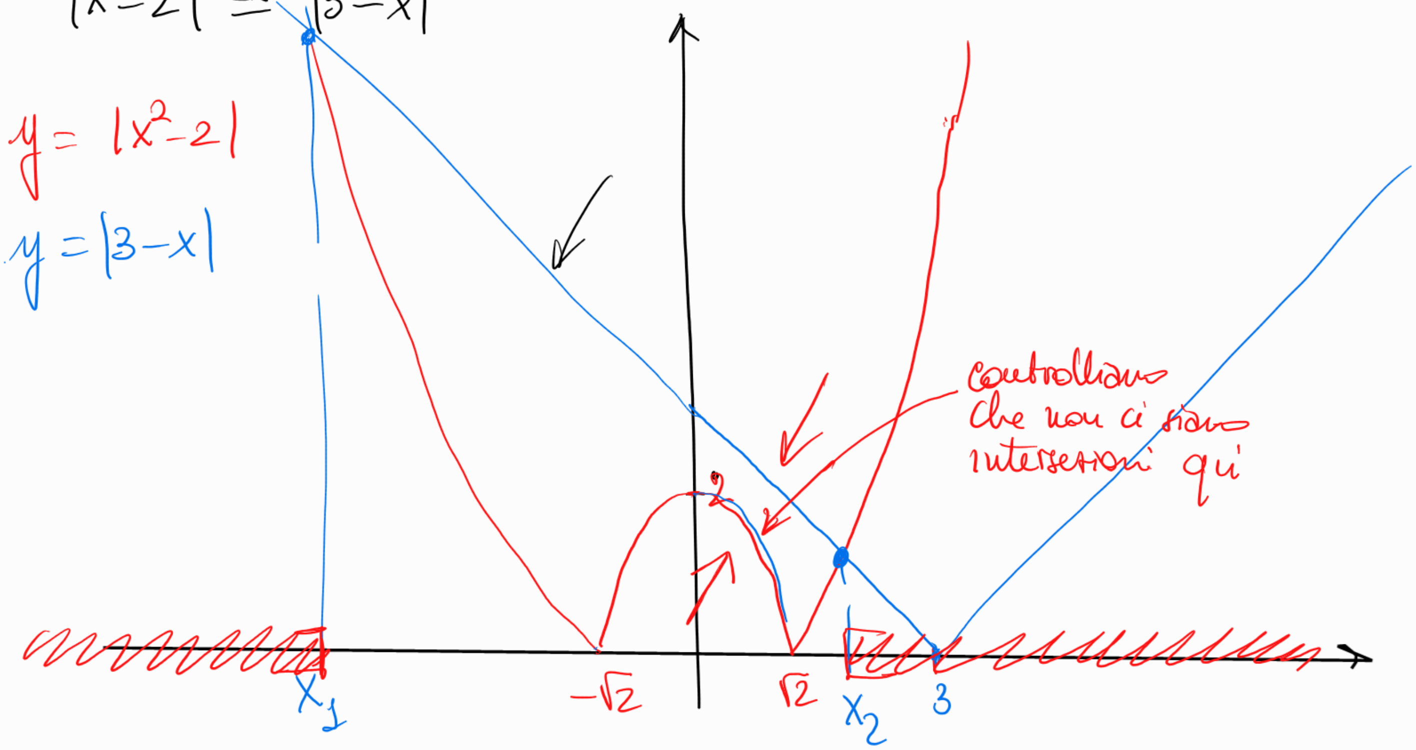
$y = ||x^2 - 4| - 1|$



Trovare il dominio di $f(x) = \sqrt{|x^2 - 2| - |3 - x|}$

dom $f = \{x : |x^2 - 2| - |3 - x| \geq 0\}$

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



$3-x = x^2-2$ sono i valori di x_1, x_2.

$x^2+x-5=0$

$$x_{1,2} = \frac{-1 \pm \sqrt{1+20}}{2} = \frac{-1 \pm \sqrt{21}}{2}$$

Solni: $x \leq \frac{-1-\sqrt{21}}{2} \quad \vee \quad x \geq \frac{-1+\sqrt{21}}{2}$

$3-x = 2-x^2$

$x^2-x+1=0$

$\Delta = 1-4<0$ nessuna sol^{ne}.