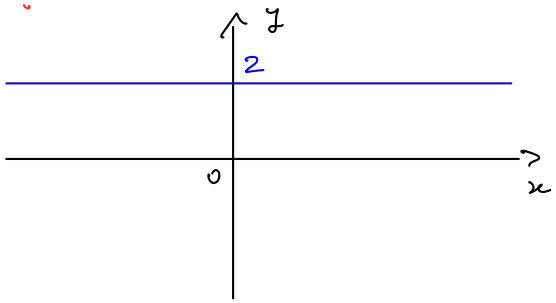
Trasformazione di grafici

ES

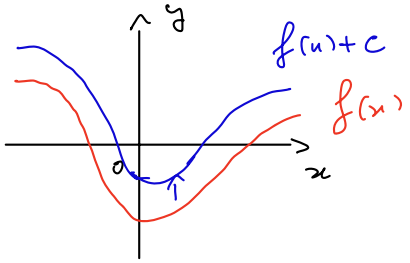
? $e^x + e^{-x} = 2$



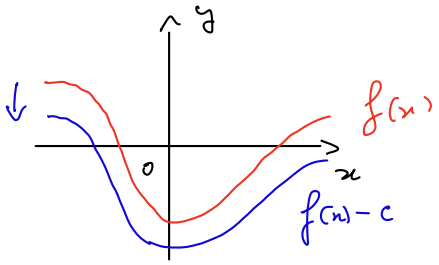
$$e^x = 2 - e^{-x}$$

Traslazioni Se conosco il grafico di $f(x)$, e $c > 0$, allora

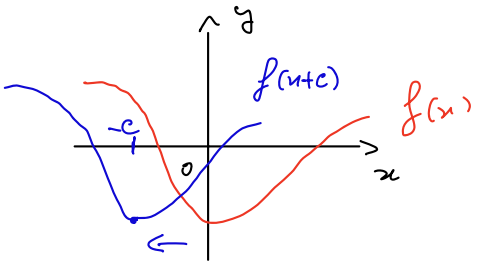
- $f(x) + c$



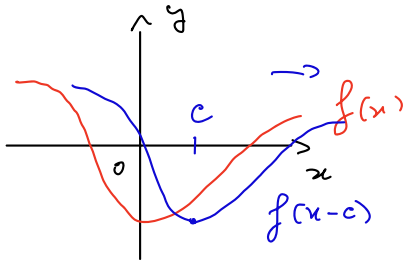
- $f(x) - c$



- $f(x+c)$

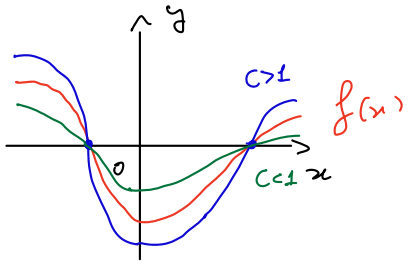


- $f(x-c)$

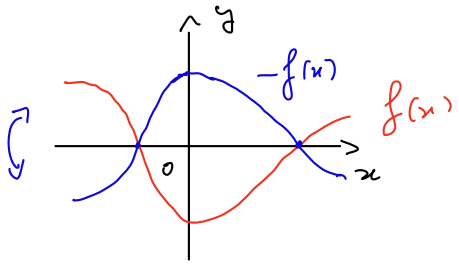


Moltiplicazione $c \neq 0$

- $c\,f(x)$

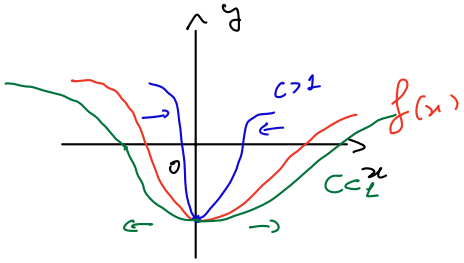


$c > 0$

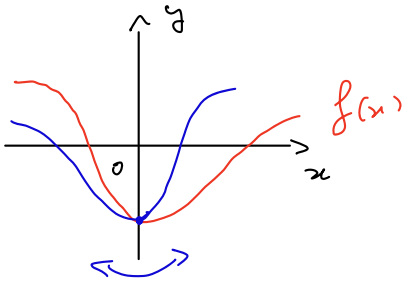


$c = -1$

- $f(cx)$



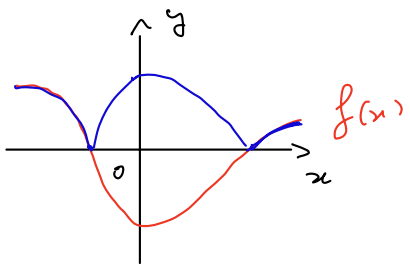
$c > 0$



$c = -1$

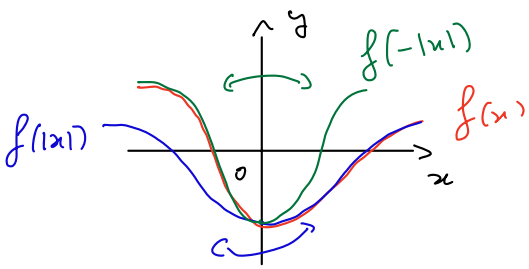
Valore assoluto

- $|f(x)|$



- $f(|x|)$

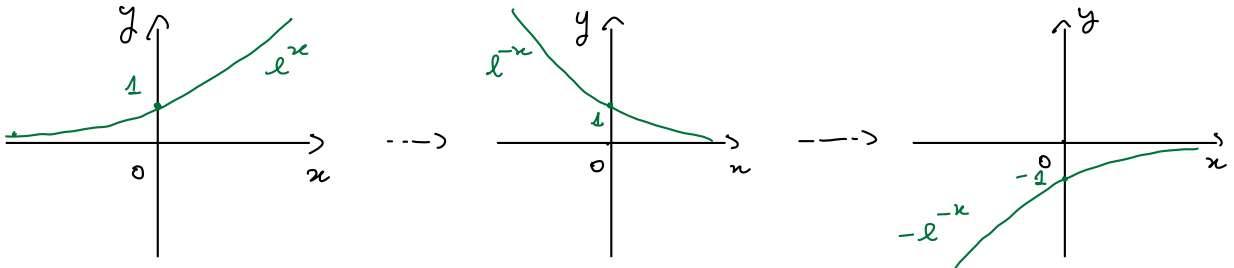
$f(-|x|)$

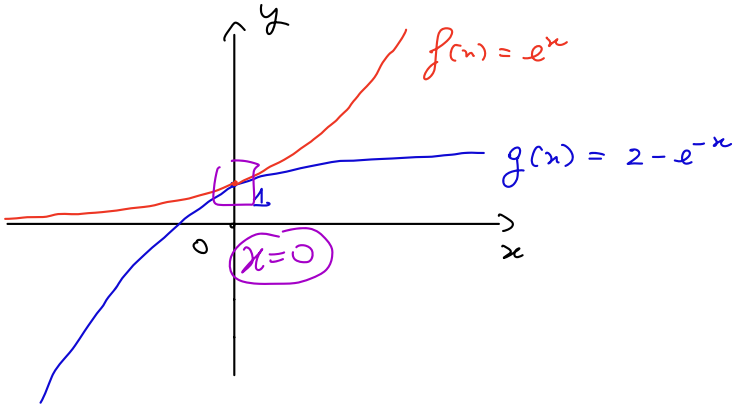


ES $e^x = 2 - e^{-x}$

$f(x)$ $g(x)$

$e^x \dashrightarrow e^{-x} \dashrightarrow -e^{-x} \dashrightarrow 2 - e^{-x}$

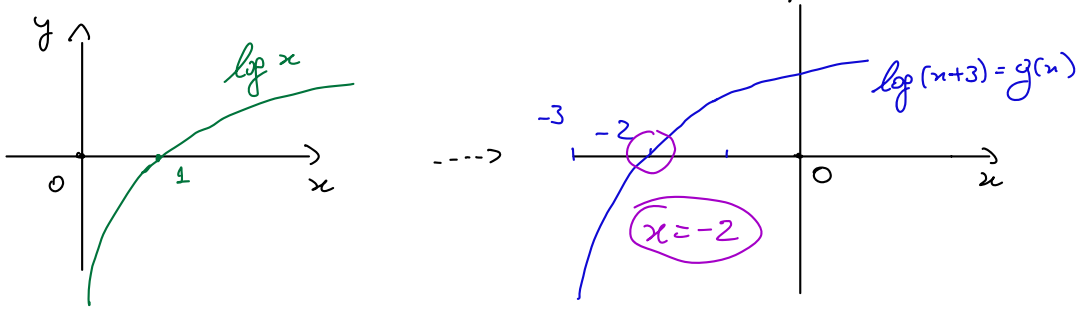




ES $\log(x+3) = 0$

$g(x)$

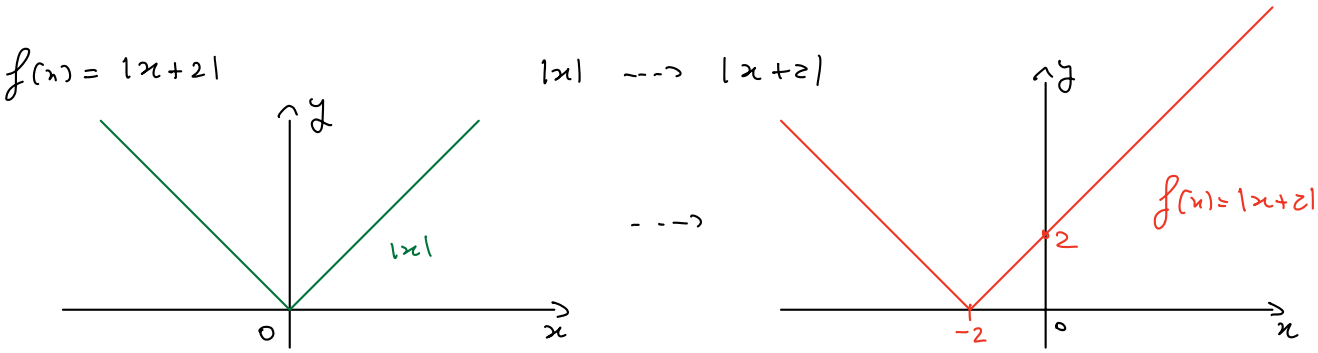
$f(x) = \log(x)$, $\log(x+3) = f(x+3) = g(x)$



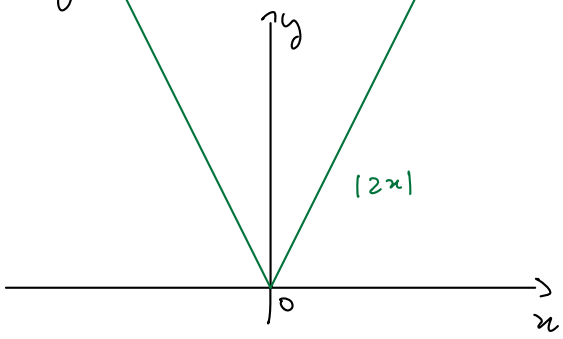
ES $|x+2| \leq |2x-3| + 1$.

$f(x)$ $g(x)$

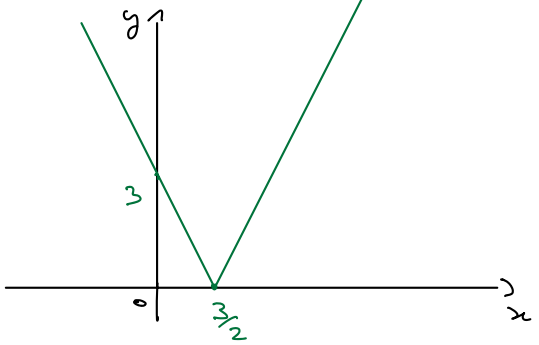
$f(x) = |x+2|$ $\quad |x| \dashrightarrow |x+2|$



$g(x) = |2x-3|+1$,



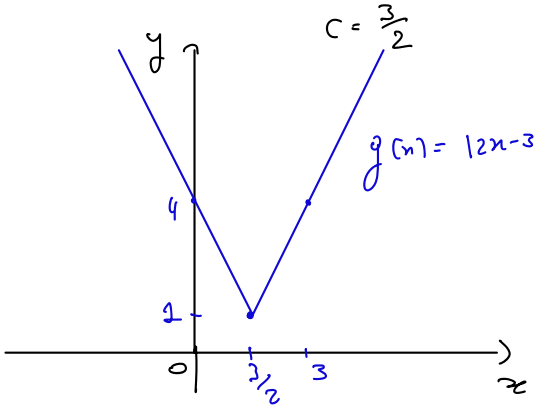
$|x| \dashrightarrow |2x| \dashrightarrow |2x-3| \dashrightarrow |2x-3|+1$

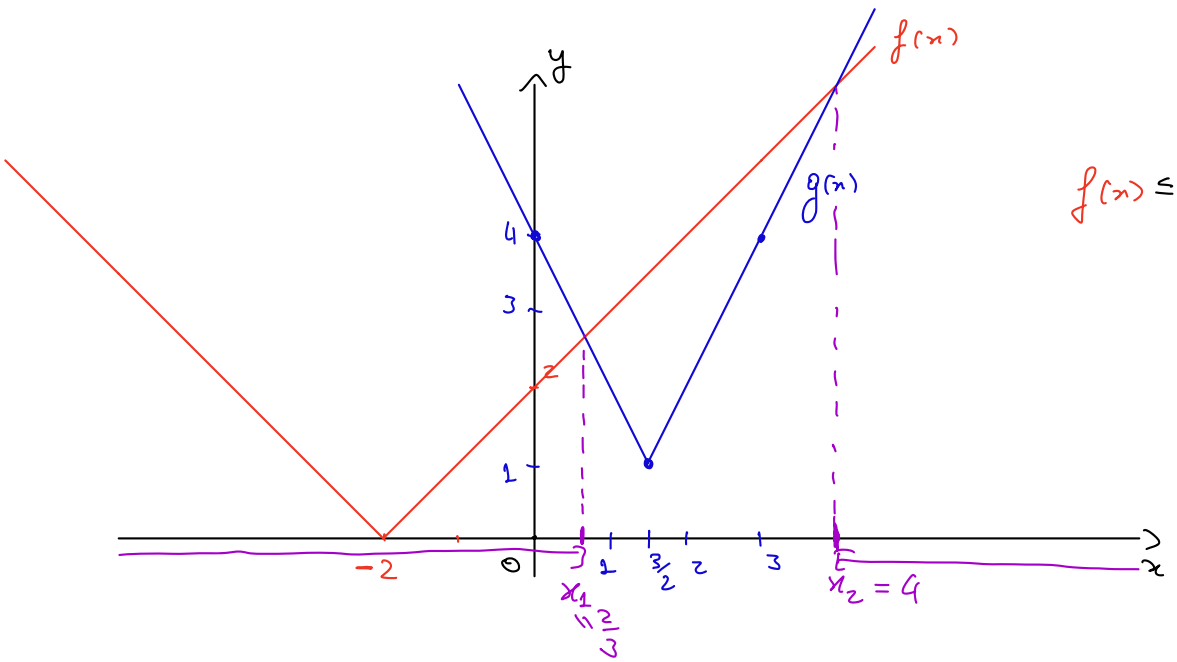


$2x-3 = 2\left(x-\frac{3}{2}\right)$

$f(x) = |2x|$, $|2x-3| = f(x-c) = |2(x-c)|$

$\dashrightarrow$





$f(x) \le g(x)$

$f(x) \le g(x) \iff x \in (-\infty, x_1] \cup [x_2, +\infty)$

- $f(4) = |4+2| = 6$
  $g(4) = |2\cdot 4 - 3| + 1 = 6$
  $\Rightarrow x_2 = 4$

- $x_1 \in (0,1)$. $f(x_1) = |x_1+2| = x_1+2$

$$g(x_1) = |2x_1 - 3| + 1 = 3 - 2x_1 + 1 = 4 - 2x_1$$

$$f(x_1) = g(x_1) \iff x_1 + 2 = 4 - 2x_1 \iff 3x_1 = 2$$

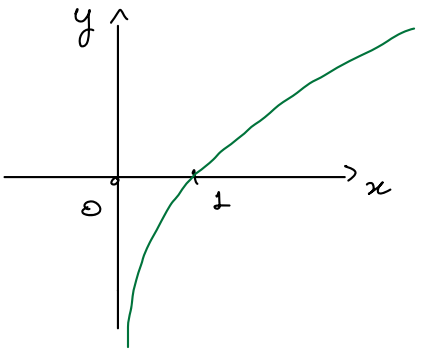
$$\iff x_1 = \tfrac{2}{3}$$

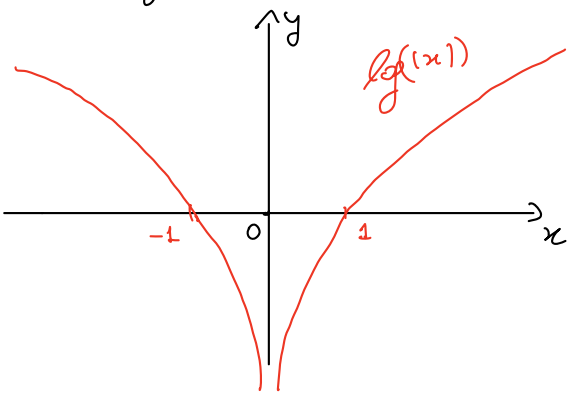
$$|x+2| \le |2x-3| + 1 \iff x \in (-\infty, \tfrac{2}{3}] \cup [4, +\infty)$$

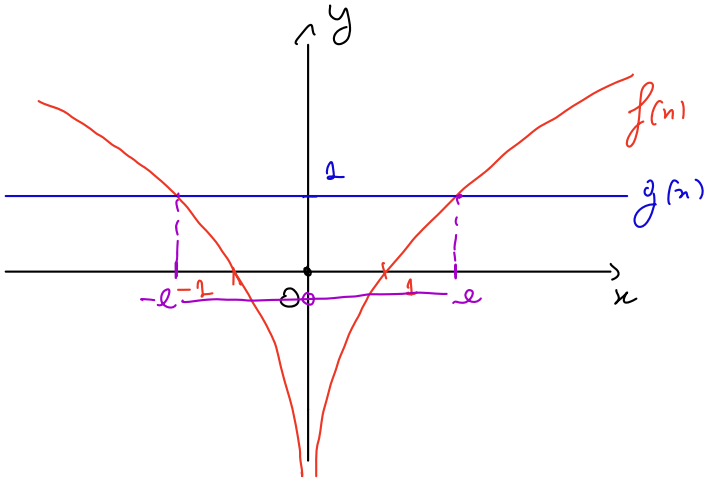
ES $\quad \log(|x|) < 1$

$f(x)$ $\quad$ $g(x)$

$f(x) = \log(|x|)$, $\quad \log(x) \dashrightarrow \log(|x|)$







$\log x = 1 \iff x = e$

$$f(x) < g(x) \iff x \in (-e, 0) \cup (0, e)$$

Dominio naturale di $f = \mathbb{R} \setminus \{0\}$

" " " $g = \mathbb{R}$ $\quad . \quad (\mathbb{R} \setminus \{0\}) \cap \mathbb{R} = \mathbb{R} \setminus \{0\}$

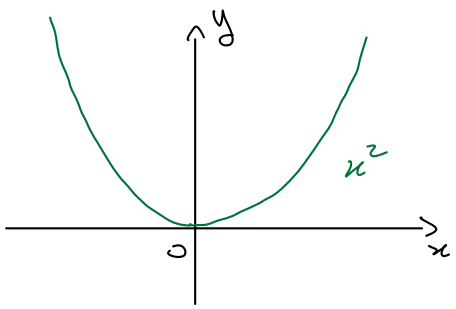
OSS $\quad f(x) = \log(x^2) = 2\log|x|$

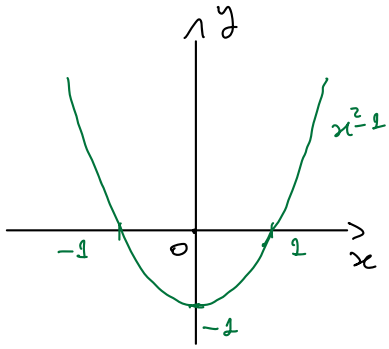
$\mathbb{R} \setminus \{0\} \qquad \mathbb{R} \setminus \{0\}$

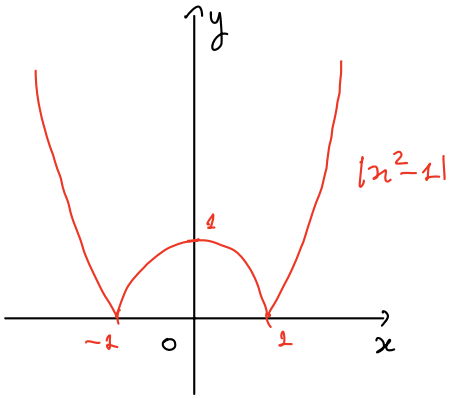
$$\log(x^2) = \log\left((\sqrt{x^2})^2\right) = 2\log\left(\sqrt{x^2}\right) = 2\log(|x|)$$

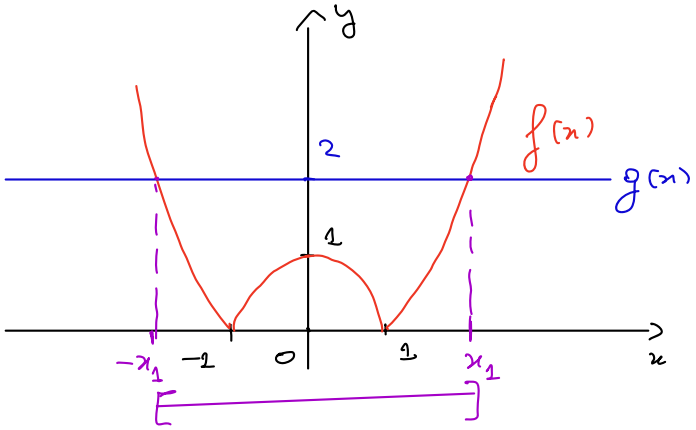
ES $\underbrace{|x^2-1|}_{f(x)} \leq \underbrace{2}_{g(x)}$

$f(x) = |x^2-1|$, $\quad x^2 \dashrightarrow x^2-1 \dashrightarrow |x^2-1|$









$f(x) \leq g(x) \iff x \in [-x_1, x_1] = [-\sqrt{3}, \sqrt{3}]$

$x_1^2 - 1 = 2 \iff x_1 = +\sqrt{3}$