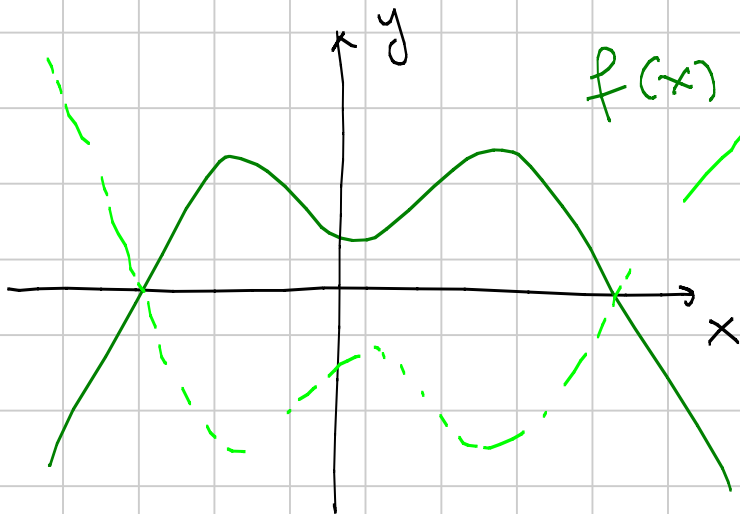
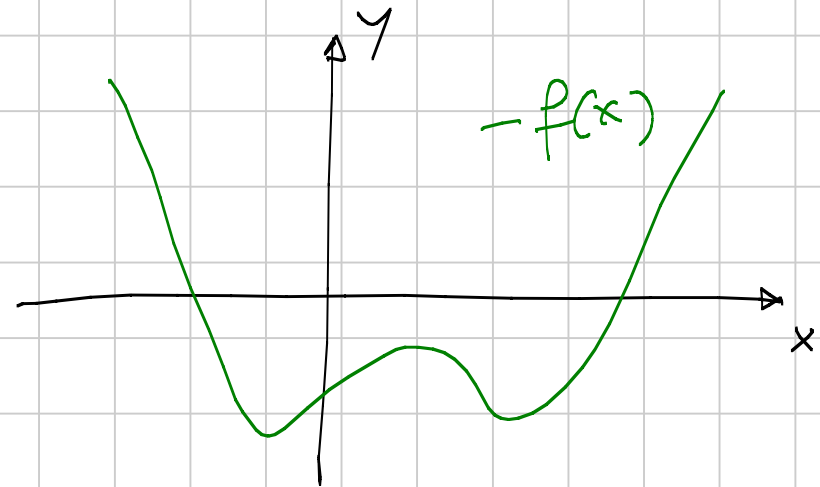


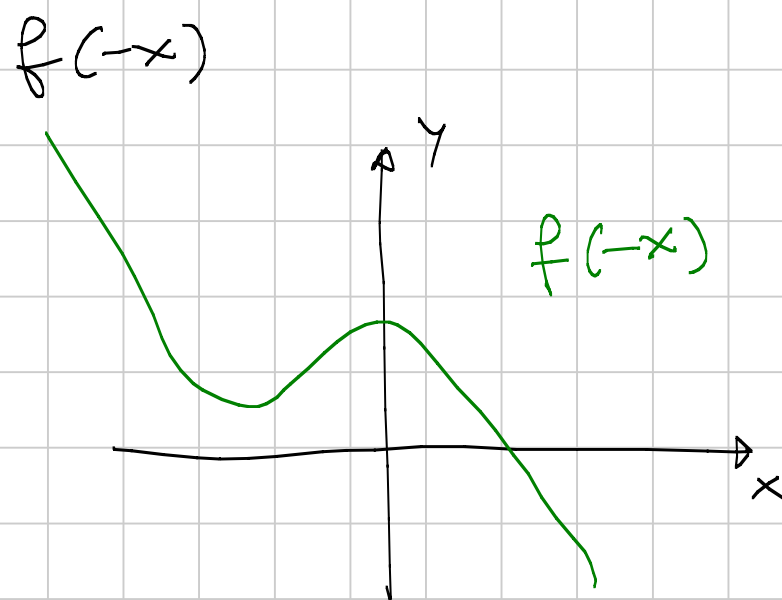
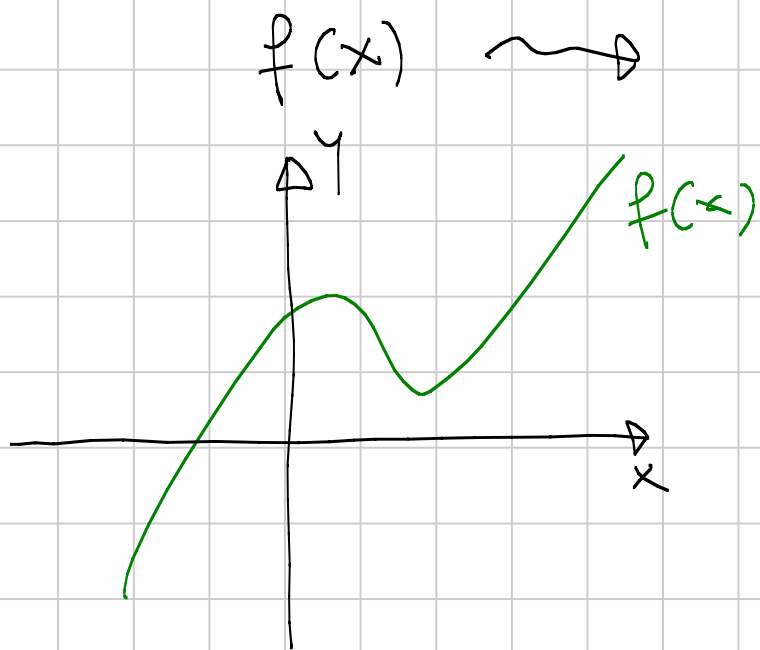
OPERAZIONI SUI GRAFICI



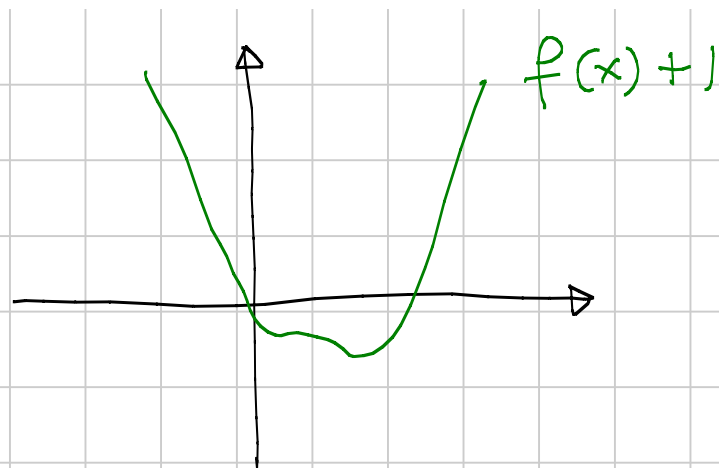
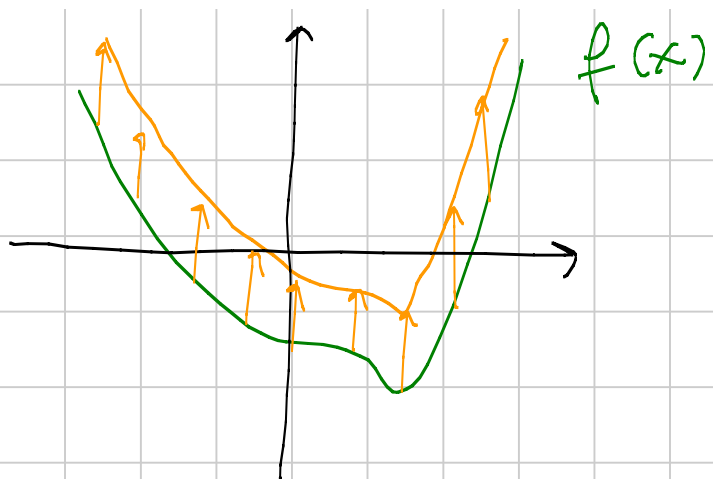
$$f(x) \rightsquigarrow -f(x)$$



SIMMETRIA RISPETTO
ASSE X



SIMMETRIA RISPETTO ASSE y

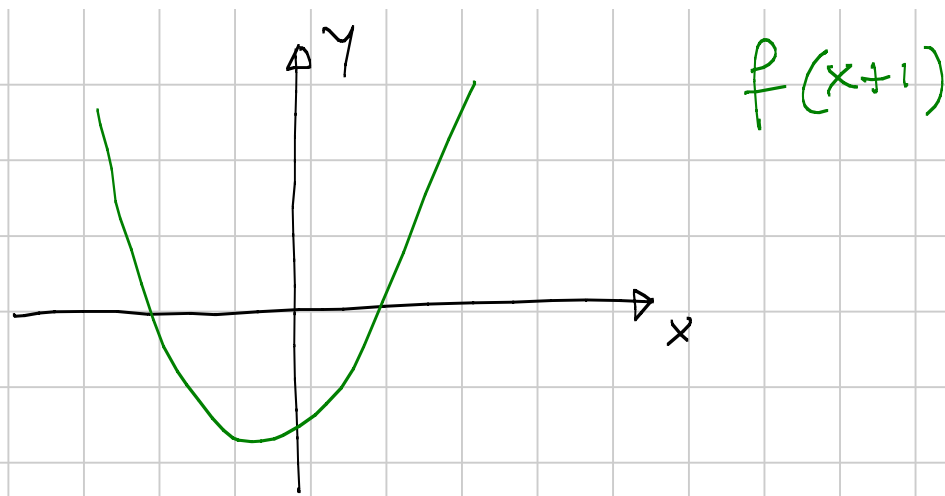
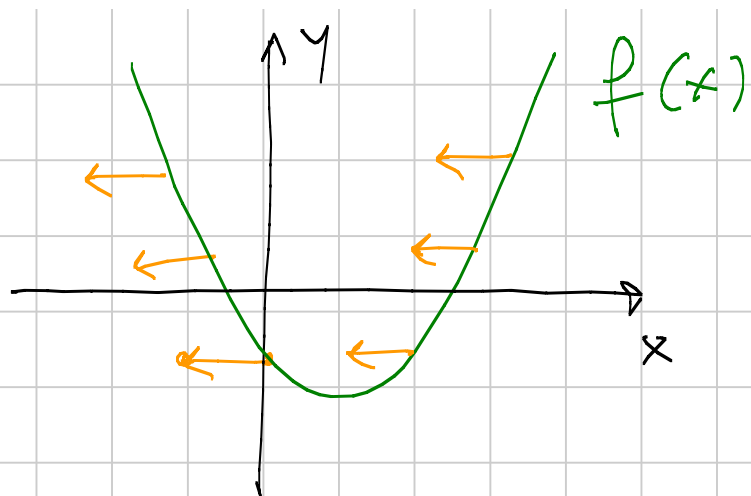


$$f(x) \rightsquigarrow f(x) + a$$

TRASLAZIONE IN
VERTICALE

↗ in alto se $a > 0$

↘ in basso se $a < 0$

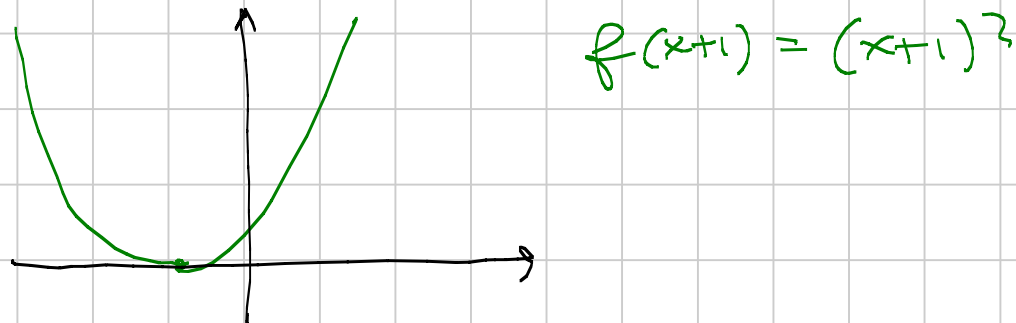
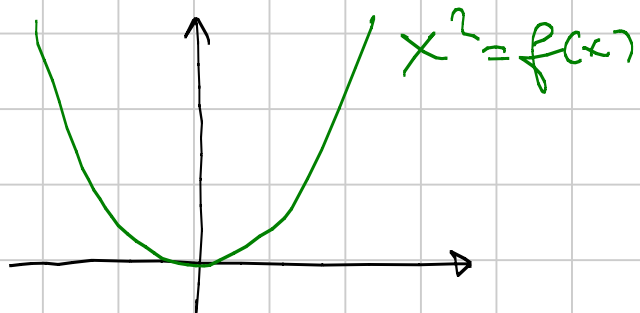


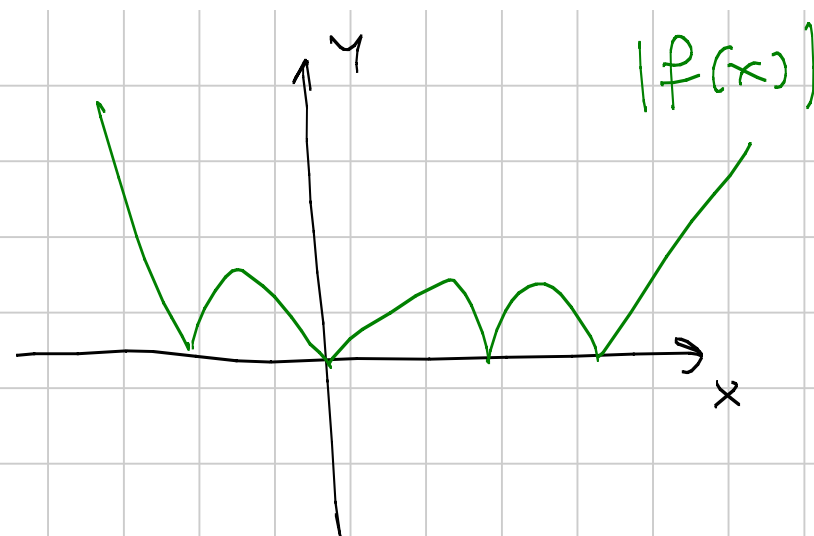
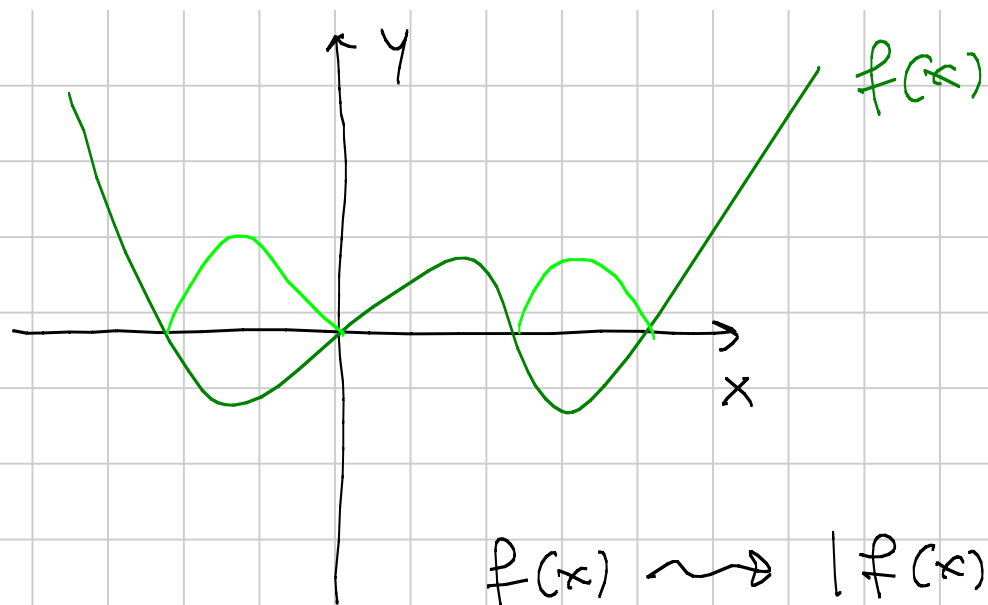
$$f(x) \rightsquigarrow f(x+a)$$

TRASLAZIONE IN
ORIZZONTALE

Verso dx se $a > 0$

Verso dx se $a < 0$

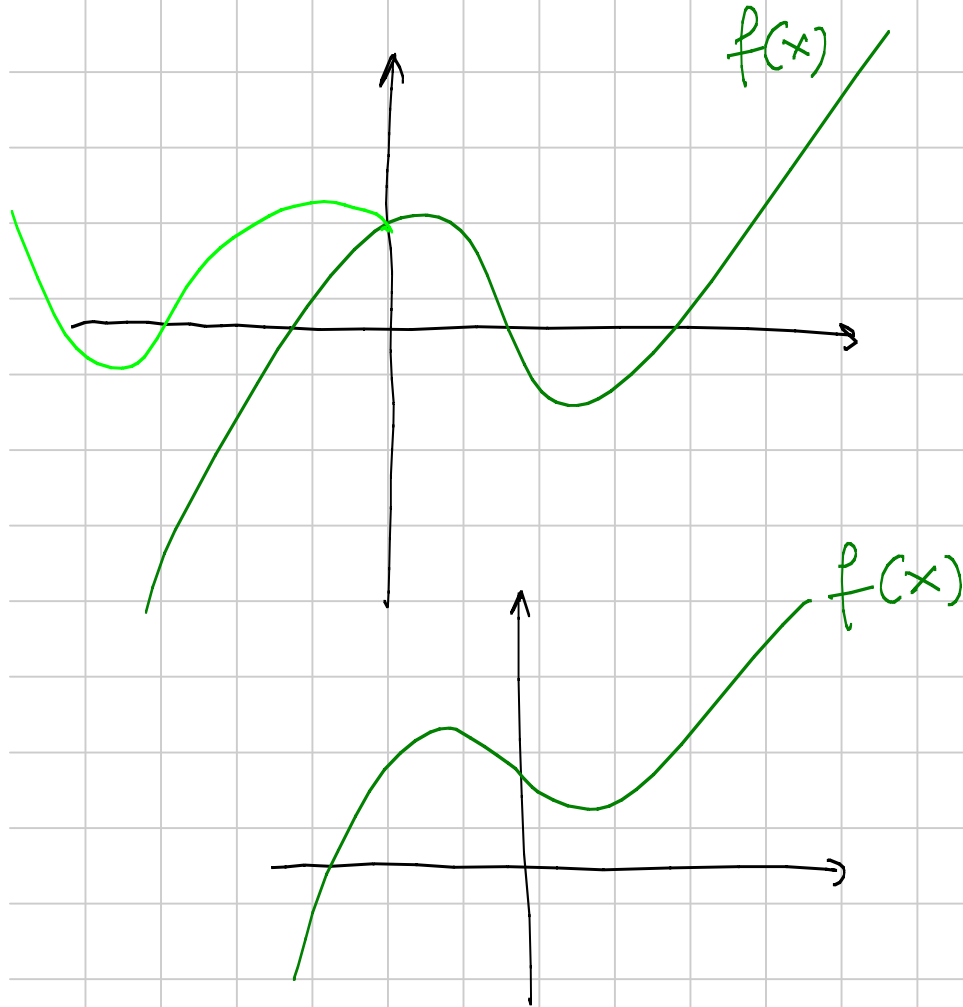




$$f(x) \rightsquigarrow |f(x)|$$

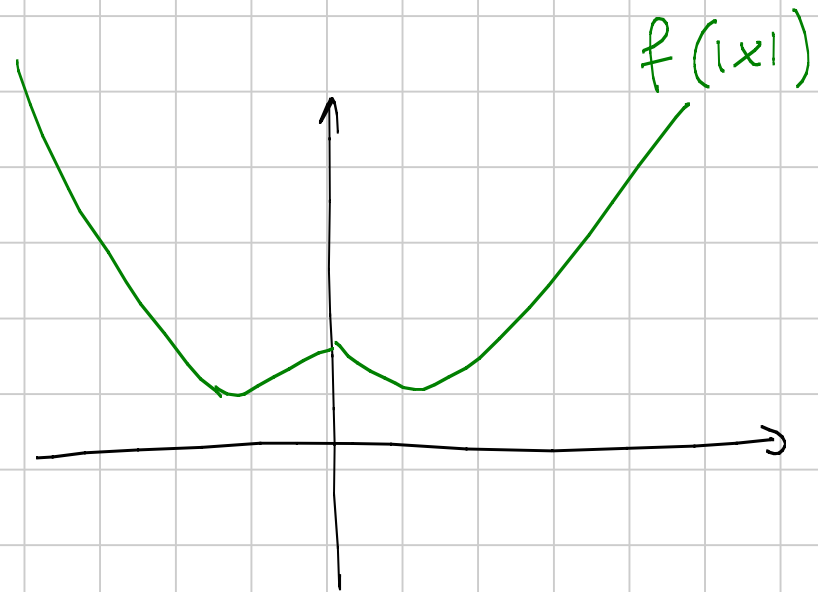
Le parti negative (nel semipiano $y \leq 0$) vengono riflesse in alto

$$f(x) \leadsto f(|x|)$$

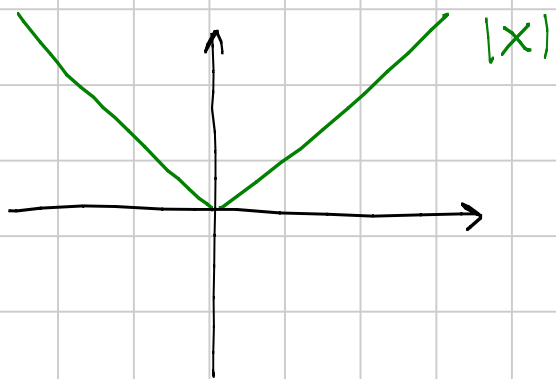


$f(|x|)$ è una funzione
che coincide con $f(x)$ per $x \geq 0$
ed inoltre è una funzione
PARI

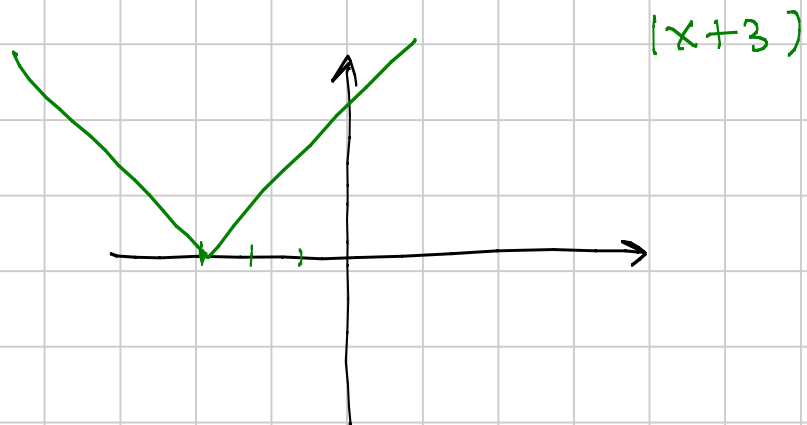
$$f(|x|) = f(|-x|)$$



Esempio 1 Grafico di $|x+3|$

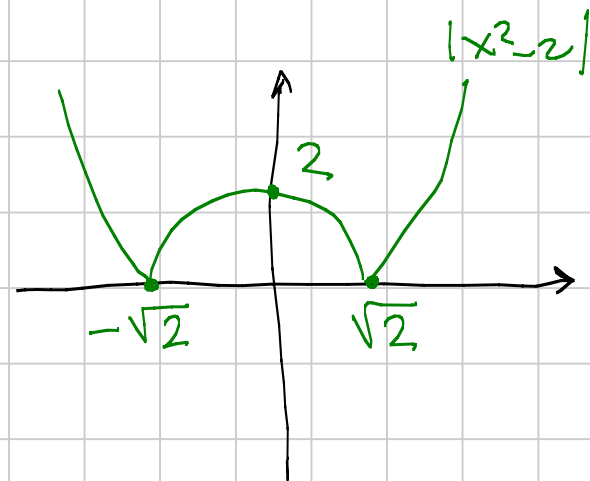
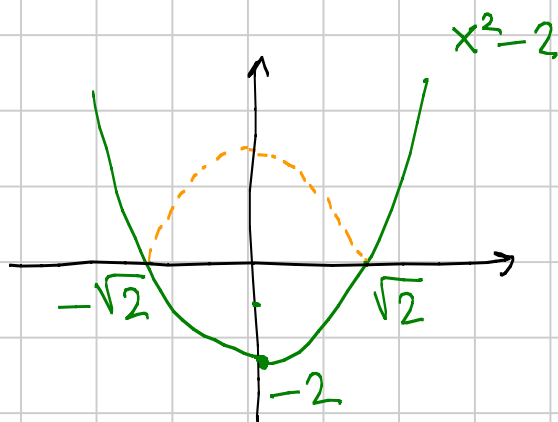
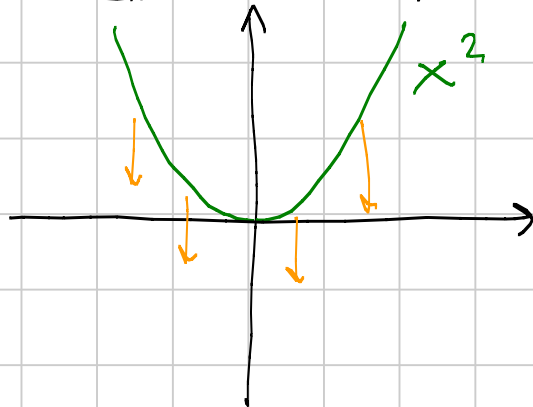


$f(x)$



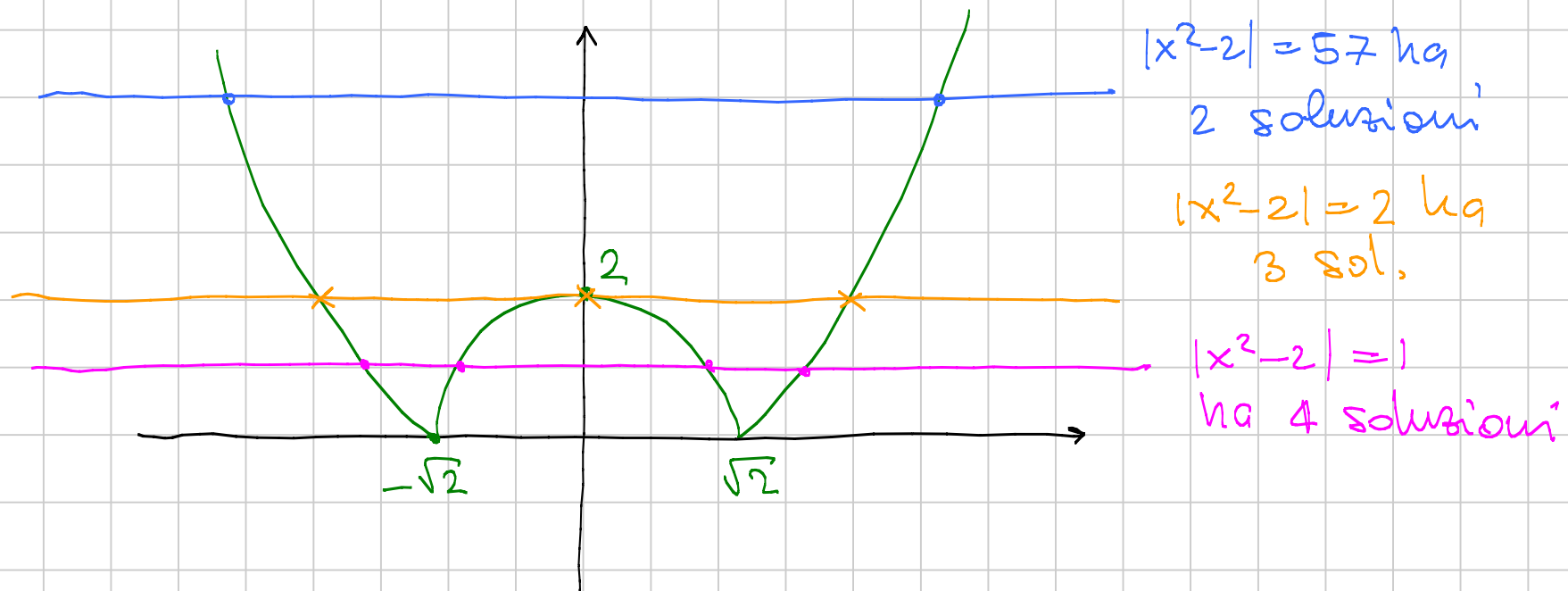
$f(x+3)$

Esempio 2 $|x^2-2|$



Esempio 3 Quante soluzioni ha l'equazione

$$|x^2 - 2| = 1 ; \quad |x^2 - 2| = 2 ; \quad |x^2 - 2| = 57$$

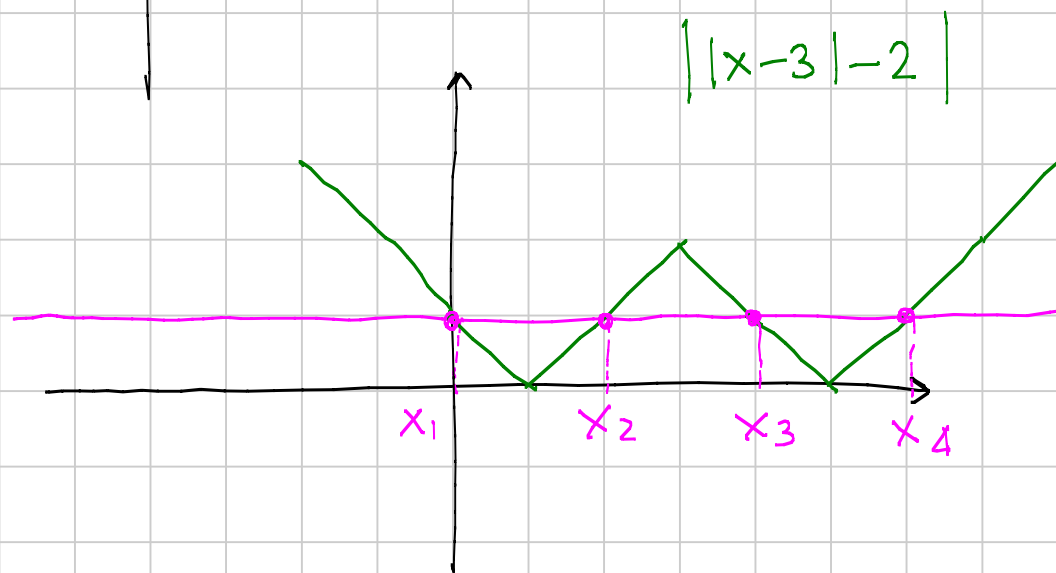
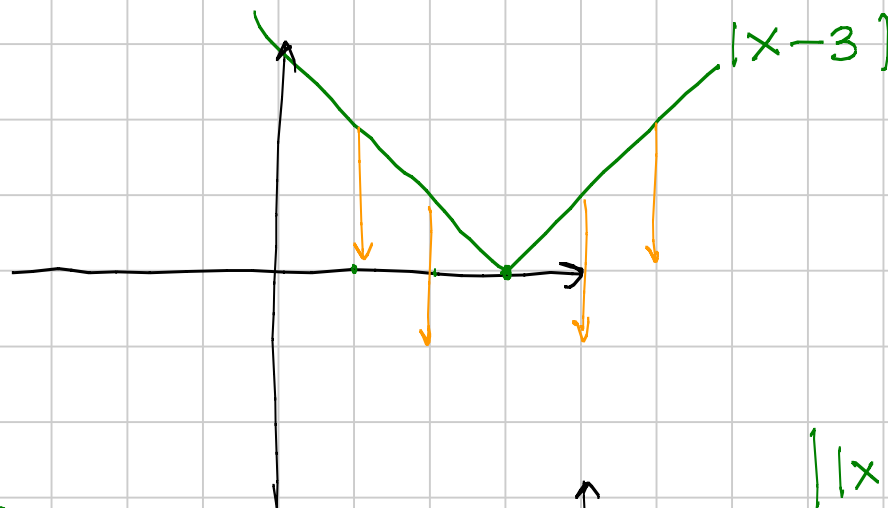
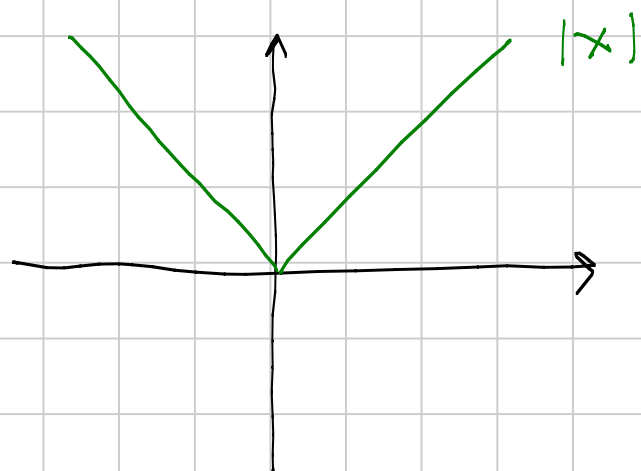


Esempio

$$||x-3|-2|=1$$

L'eq. ha 4 soluzioni:

$$x = 0, 2, 4, 6$$

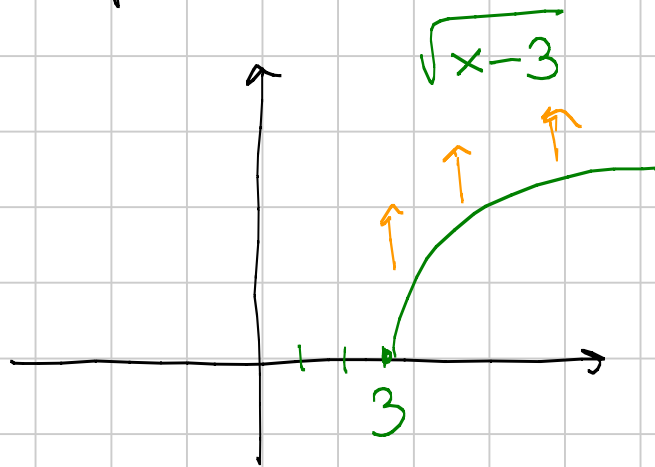


Esempio

$$3 + \sqrt{x-3} = f(x)$$



$$f(x) = 3 + \sqrt{x-3}$$



$$f: \mathbb{R} \rightarrow \mathbb{R} \quad \text{NON HA SENSO}$$

$$f: [3, +\infty) \rightarrow \mathbb{R}$$

NO SURG.

SI INIETTIVA

$$f: [3, +\infty) \rightarrow [3, +\infty) \quad \text{invertibile}$$

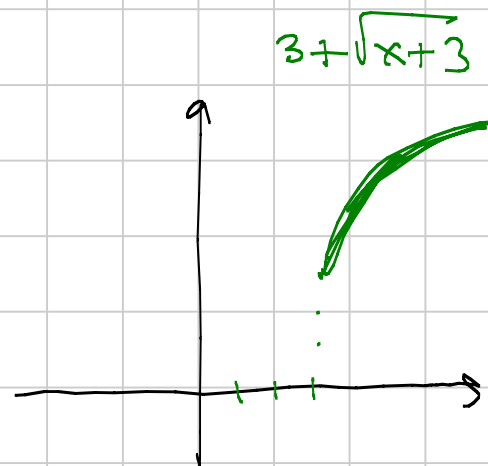
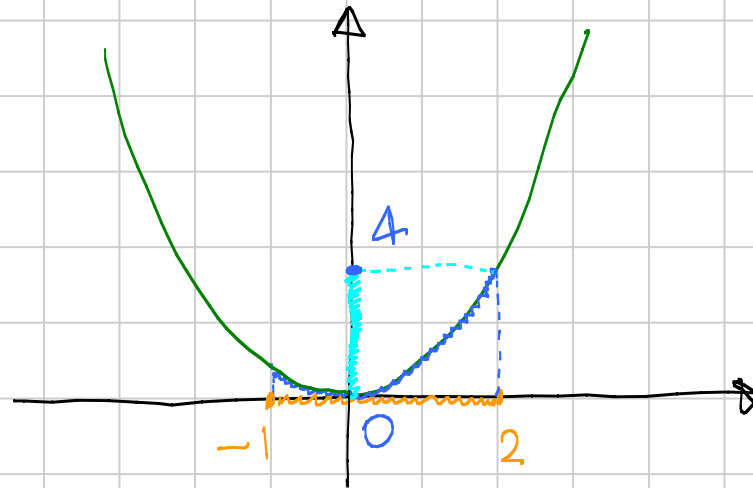


Immagine e controimmagine di insiemi

$$f(x) = x^2$$

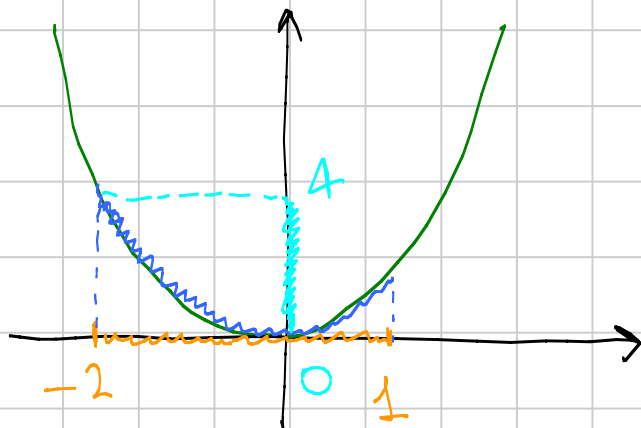
$f([1, 2])$ = insieme dei valori assunti
da $f(x)$ quando x varia
tra 1 e 2
 $= [1, 4]$

$$f([-1, 2]) = \rightarrow \cancel{[1, 4]} \\ \searrow [0, 4]$$



$$f(x) = x^2$$

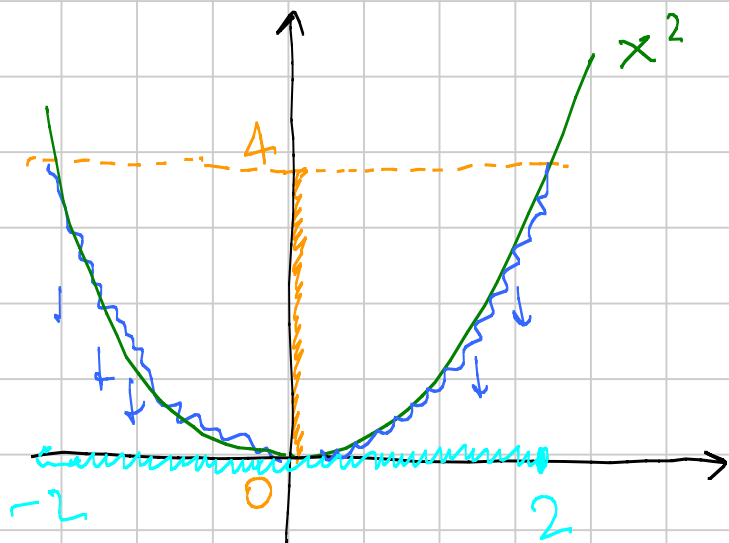
$$f([-2, 1]) = [0, 4]$$



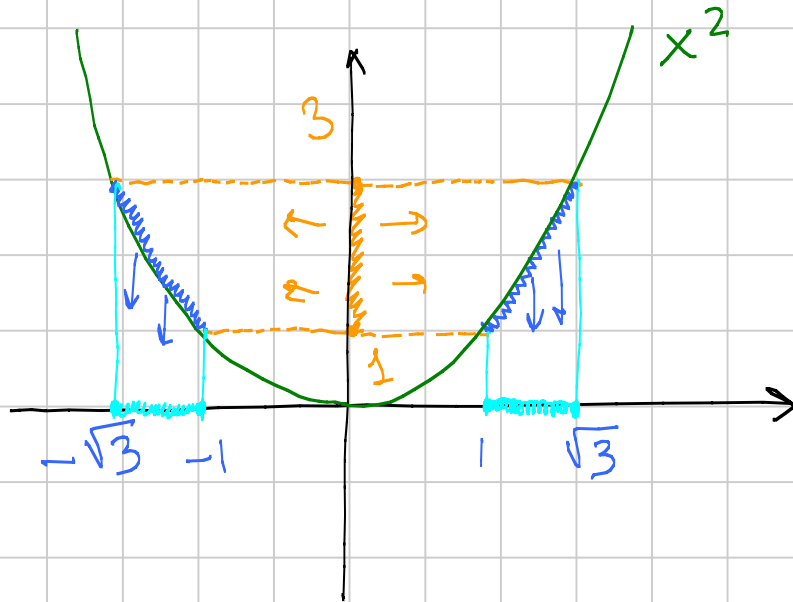
Controimmagine

$f^{-1}([0, 4]) =$ valori della x
per cui $f(x)$ cade
fra 0 e 4

$$= [-2, 2]$$



$$f^{-1}([1,3]) = \text{val. di } x \text{ per cui } f(x) \in [1,3]$$



$$= [-\sqrt{3}, -1] \cup [1, \sqrt{3}]$$

$$f^{-1}((-9, 9])$$

$$= [-3, 3]$$