4/5/2022

115 $|x+2|+x = x|x|-1$ [3]

$x+2 > 0 \quad x > -2$

$x > 0$

	-2		0	
$x+2$	$-$	0	$+$	$+$
x	$-$	$\nexists$	$-$	$+$

① $\begin{cases} x < -2 \\ -(x+2)+x = x(-x)-1 \end{cases}$ ∨ ② $\begin{cases} -2 \le x < 0 \\ x+2+x = x(-x)-1 \end{cases}$

③ $\begin{cases} x \ge 0 \\ x+2+x = x \cdot x - 1 \end{cases}$

① $\begin{cases} x < -2 \\ -x-2+x = -x^2-1 \end{cases}$ $\begin{cases} x < -2 \\ x^2 = 1 \end{cases}$ $\begin{cases} x < -2 \\ x = \pm 1 \end{cases}$ $\emptyset$ IMPOSS.

② $\begin{cases} -2 \le x < 0 \\ 2x+2 = -x^2-1 \end{cases}$ $\begin{cases} -2 \le x < 0 \\ x^2+2x+3 = 0 \end{cases}$ $\emptyset$ IMPOSS.

$\frac{\Delta}{4} = 1-3 = -2 < 0$

③ $\begin{cases} x \ge 0 \\ 2x+2 = x^2-1 \end{cases}$ $\begin{cases} x \ge 0 \\ -x^2+2x+3 = 0 \end{cases}$ $\begin{cases} x \ge 0 \\ x^2-2x-3 = 0 \end{cases}$

$(x-3)(x+1)$

$\begin{cases} x \ge 0 \\ x = 3 \vee x = -1 \end{cases}$ N. ACC. $x = 3$

SOLUZ. DELL'EQUAZIONE DI PARTENZA

$\boxed{x = 3}$

102 $|2x^2 - 1| = |x^4|$ $[\pm 1; \pm\sqrt{\sqrt{2} - 1}]$

$2x^2 - 1 = \pm x^4$

$x^4 + 2x^2 - 1 = 0$ ① $\vee$ $x^4 - 2x^2 + 1 = 0$ ②

① $x^4 + 2x^2 - 1 = 0$ $\quad t = x^2$

$t^2 + 2t - 1 = 0$ $\quad \frac{\Delta}{4} = 1 + 1 = 2$ $\quad t = -1 \pm \sqrt{2}$

$\Downarrow$

$x^2 = -1 - \sqrt{2}$ IMPOSSIBILE $\vee$ $x^2 = -1 + \sqrt{2}$

$\Downarrow$

$x = \pm\sqrt{-1 + \sqrt{2}}$

② $x^4 - 2x^2 + 1 = 0$ $\quad t = x^2$

$t^2 - 2t + 1 = 0$

$(t-1)^2 = 0 \Rightarrow t = 1 \Rightarrow x^2 = 1 \Rightarrow x = \pm 1$

$$\boxed{x = \pm 1 \vee x = \pm\sqrt{-1 + \sqrt{2}}}$$

116 $|1-x|+|x-3|=x^2-x$ $\left[\frac{-1-\sqrt{17}}{2};2\right]$

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

$x-3>0 \quad x>3$

	1		3	
$1-x$	+	|	−	−
$x-3$	−	|	−	+

① $\begin{cases} x<1 \\ 1-x-(x-3)=x^2-x \end{cases}$

② $\begin{cases} 1\le x<3 \\ -(1-x)-(x-3)=x^2-x \end{cases}$

③ $\begin{cases} x\ge 3 \\ -(1-x)+x-3=x^2-x \end{cases}$

① $\begin{cases} x<1 \\ 1-x\cancel{-x}+3=x^2\cancel{-x} \end{cases}$ $\begin{cases} x<1 \\ x^2+x-4=0 \end{cases}$ $\begin{cases} x<1 \\ x=\frac{-1\pm\sqrt{17}}{2} \end{cases}$

$\Delta=1+16=17$

$x=\frac{-1-\sqrt{17}}{2}$ unica accettabile

② $\begin{cases} 1\le x<3 \\ -1+\cancel{x}\cancel{-x}+3=x^2-x \end{cases}$ $\begin{cases} 1\le x<3 \\ x^2-x-2=0 \end{cases}$ $\begin{cases} 1\le x<3 \\ x=\frac{1\pm 3}{2}= \end{cases}$ $\frac{4}{2}=2$, -1 N.AC.

$\Delta=1+8=9$

$x=2$

③ $\begin{cases} x\ge 3 \\ -1+x+x-3=x^2-x \end{cases}$ $\begin{cases} x\ge 3 \\ x^2-3x+4=0 \end{cases}$ IMPOSS.

$\Delta=9-16<0$

$$\boxed{x=2 \quad \vee \quad x=\frac{-1-\sqrt{17}}{2}}$$

123 $|x-1|+|x|=|x-4|$ $\left[-3;\frac{5}{3}\right]$

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

$x>0$

$x-4>0 \quad x>4$

	0		1		4	
$x-1$	−		−	+		+
x	−		+	+		+
$x-4$	−		−	−		+

① $\begin{cases} x<0 \\ -x+1-x=-x+4 \end{cases}$ ∨ ② $\begin{cases} 0\le x<1 \\ -x+1+x=-x+4 \end{cases}$ ∨ ③ $\begin{cases} 1\le x<4 \\ x-1+x=-x+4 \end{cases}$ ∨

④ $\begin{cases} x\ge 4 \\ x-1+x=x-4 \end{cases}$

① $\begin{cases} x<0 \\ -x=3 \end{cases} \quad \begin{cases} x<0 \\ x=-3 \end{cases}$ $\boxed{x=-3}$

② $\begin{cases} 0\le x<1 \\ x=3 \text{ N.A.} \end{cases}$ $\emptyset$

③ $\begin{cases} 1\le x<4 \\ 3x=5 \end{cases} \quad \begin{cases} 1\le x<4 \\ x=\frac{5}{3} \end{cases}$ $\boxed{x=\frac{5}{3}}$

④ $\begin{cases} x\ge 4 \\ x=-3 \text{ N.Acc.} \end{cases}$ $\emptyset$

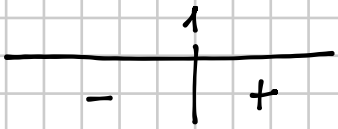
$\boxed{x=-3 \ \vee \ x=\frac{5}{3}}$

Traccia i grafici delle seguenti funzioni.

128 $y = |x - 1| - x$ $\qquad$ $y = 2x - |x - 1|$

$y = |x-1| - x$

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

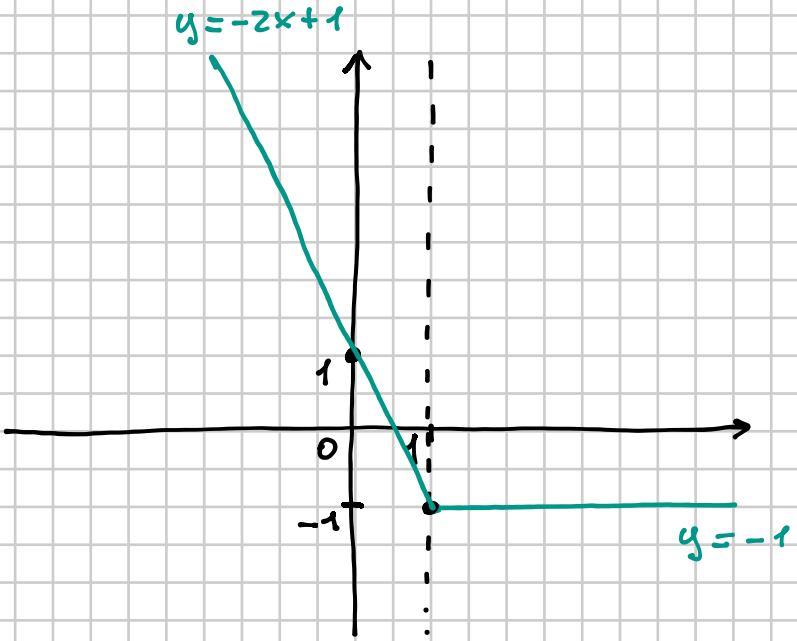


$$y = \begin{cases} x - 1 - x & \text{se } x \geq 1 \\ -(x-1) - x & \text{se } x < 1 \end{cases} \qquad y = \begin{cases} -1 & \text{se } x \geq 1 \\ -x + 1 - x & \text{se } x < 1 \end{cases}$$

$$y = \begin{cases} -2x + 1 & \text{se } x < 1 \\ -1 & \text{se } x \geq 1 \end{cases}$$

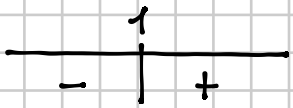
$y = -2x + 1$

x	y
1	−1
0	1



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

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



$$y = \begin{cases} 2x+x-1 & \text{se } x \le 1 \\ 2x-x+1 & \text{se } x > 1 \end{cases}$$

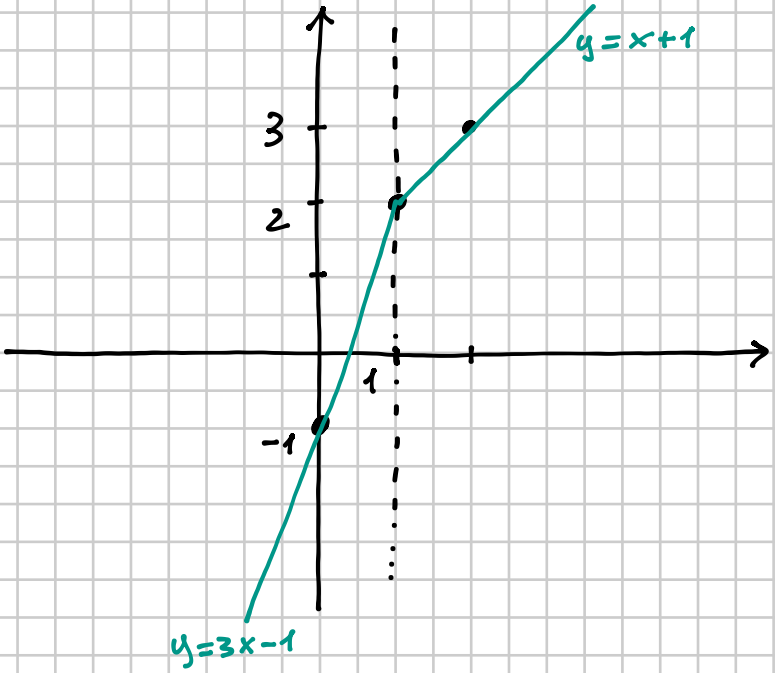
$$y = \begin{cases} 3x-1 & \text{se } x \le 1 \\ x+1 & \text{se } x > 1 \end{cases}$$

$y = 3x-1$

x	y
1	2
0	-1

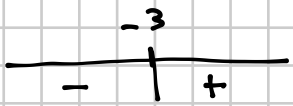
$y = x+1$

x	y
1	2
2	3



152 $y = |x+3|$

$x+3>0 \quad x>-3$



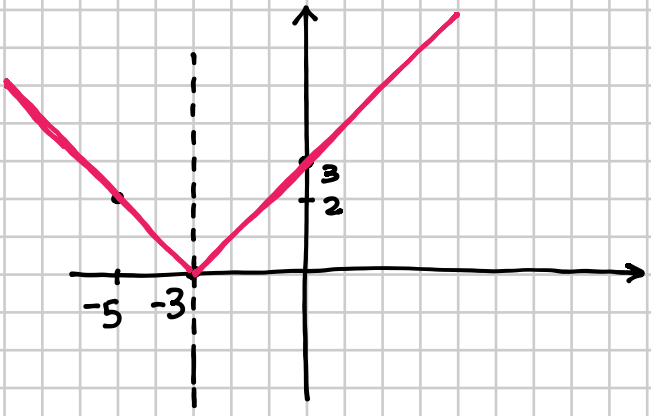
$$y = \begin{cases} -x-3 & \text{se } x \le -3 \\ x+3 & \text{se } x > -3 \end{cases}$$

$y = -x-3$

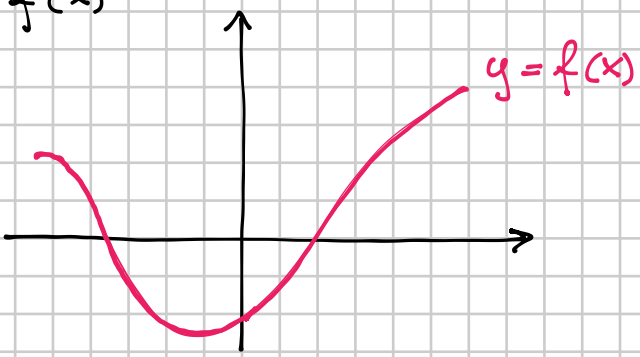
x	y
-3	0
-5	2

$y = x+3$

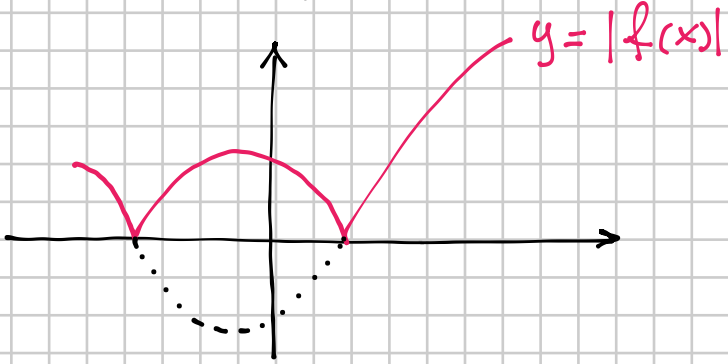
x	y
-3	0
0	3



In generale, se ho che $y = f(x)$



per disegnare $y = |f(x)|$ devo riportare simmetricamente la parte sotto l'asse x (cioè il semipiano delle y negative)



156 $y = |x^2 - 2x - 2|$ Disegnare il grafico

Disegno prima $y = x^2 - 2x - 2$ $\quad V\left(-\frac{b}{2a}, -\frac{\Delta}{4a}\right)$

$x_V = -\frac{b}{2a} = -\frac{-2}{2} = 1 \quad y_V = 1^2 - 2\cdot 1 - 2 = -3 \quad V(1, -3)$

x	y
0	-2
2	-2
3	1