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$$a) f(x) = \begin{cases} -x^2 - 4x - 2 & x < -1 \\ x^2 & x \geq -1 \end{cases}$$

$$y = -x^2 - 4x - 2 \quad x < -1$$

parábola cóncava $\cap$

$$V(x_v, y_v)$$

$$\underline{x_v} = \frac{-(-4)}{2 \cdot (-1)} = \frac{4}{-2} = -2 = -\frac{b}{2a}$$

$$\underline{y_v} = -(-2)^2 - 4 \cdot (-2) - 2 = -4 + 8 - 2 = 2$$

Entón, $V(-2, 2)$

$$\text{Cortes } x=0 \Rightarrow y = -2$$

$$y=0 \Rightarrow -x^2 - 4x - 2 = 0$$

$$x = \frac{4 \pm \sqrt{16 - 8}}{-2} =$$

$$= \frac{4 \pm 2\sqrt{2}}{-2} = -2 \pm \sqrt{2}$$

Entón, cortes $(0, -2)$ e $(-2 + \sqrt{2}, 0)$
 ≈ -0.59

<u>TÁBDA VALORES:</u>	
<u>x</u>	<u>y</u>
-1	$-1 + 4 - 2 = 1$
-2	$-4 + 8 - 2 = 2$
-3	$-9 + 12 - 2 = 1$
-4	$-16 + 16 - 2 = -2$
-3.5	0
-5	$-25 + 20 - 2 = -7$

$$\underline{x < -1}$$

$$y = x^2 \quad x \geq -1$$

parábola convexa $\cup$

$$V(x_v, y_v)$$

$$x_v = 0$$

$$y_v = 0$$

Entón $V(0, 0)$

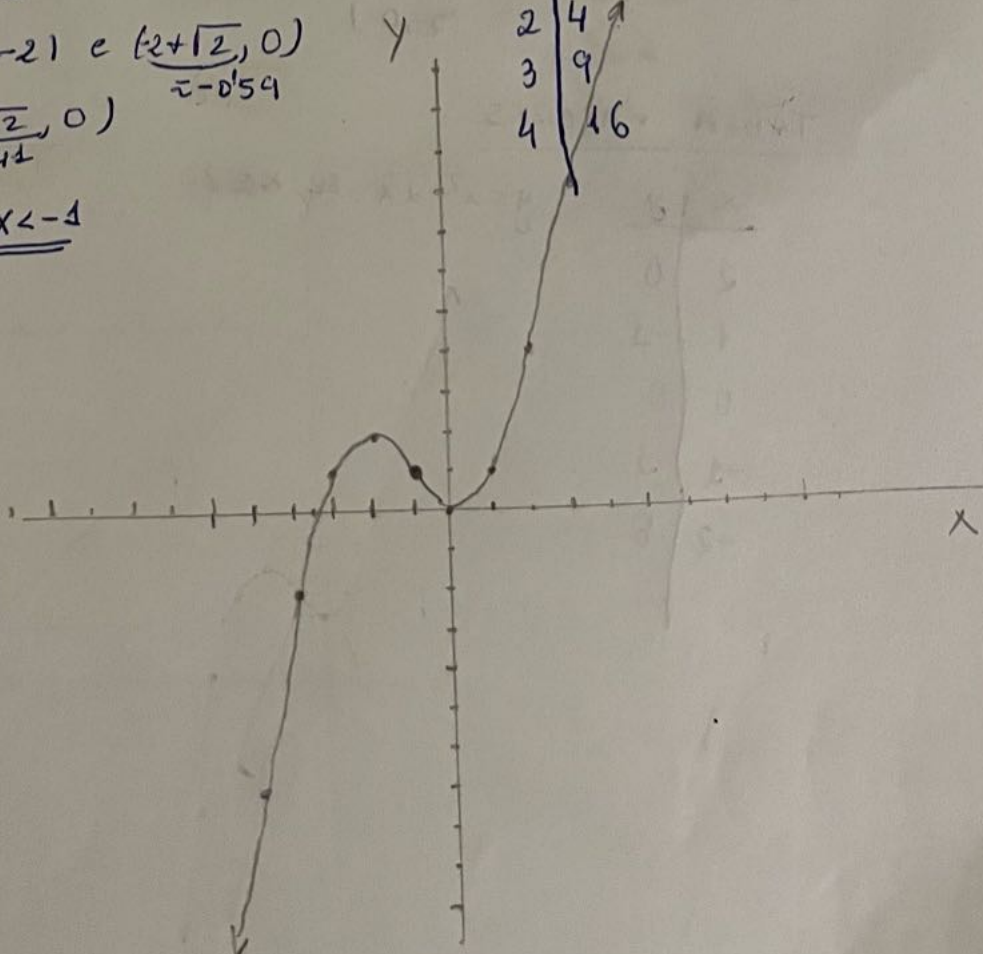
$$\text{Cortes } x=0 \Rightarrow y=0$$

$$y=0 \Rightarrow x^2=0 \Rightarrow x=0$$

Entón, cortes $(0, 0)$

<u>TÁBDA VALORES:</u>	
<u>x</u>	<u>y</u>
-1	1
0	0
1	1
2	4
3	9
4	16

$$\underline{y = x^2 \quad x \geq -1}$$



$$b) f(x) = \begin{cases} x^2 - 2x & x \leq 2 \\ 3 & x > 2 \end{cases}$$

$$\underline{y = x^2 - 2x \quad x \leq 2}$$

parábola convexa $\cup$

$$V(x_v, y_v)$$

$$x_v = -\frac{b}{2a} = -\frac{(-2)}{2 \cdot 1} = 1$$

$$y_v = 1^2 - 2 \cdot 1 = 1 - 2 = -1$$

Entón, $V(1, -1)$

$$\text{Cortes: } x=0 \Rightarrow y=0$$

$$y=0 \Rightarrow x^2 - 2x = 0 \Rightarrow$$

$$\Rightarrow x \cdot (x - 2) = 0 \Rightarrow$$

$$\boxed{x=0} \quad \boxed{x=2}$$

Entón, cortes: $(0, 0)$
 $(2, 0)$

TABLA VALORES

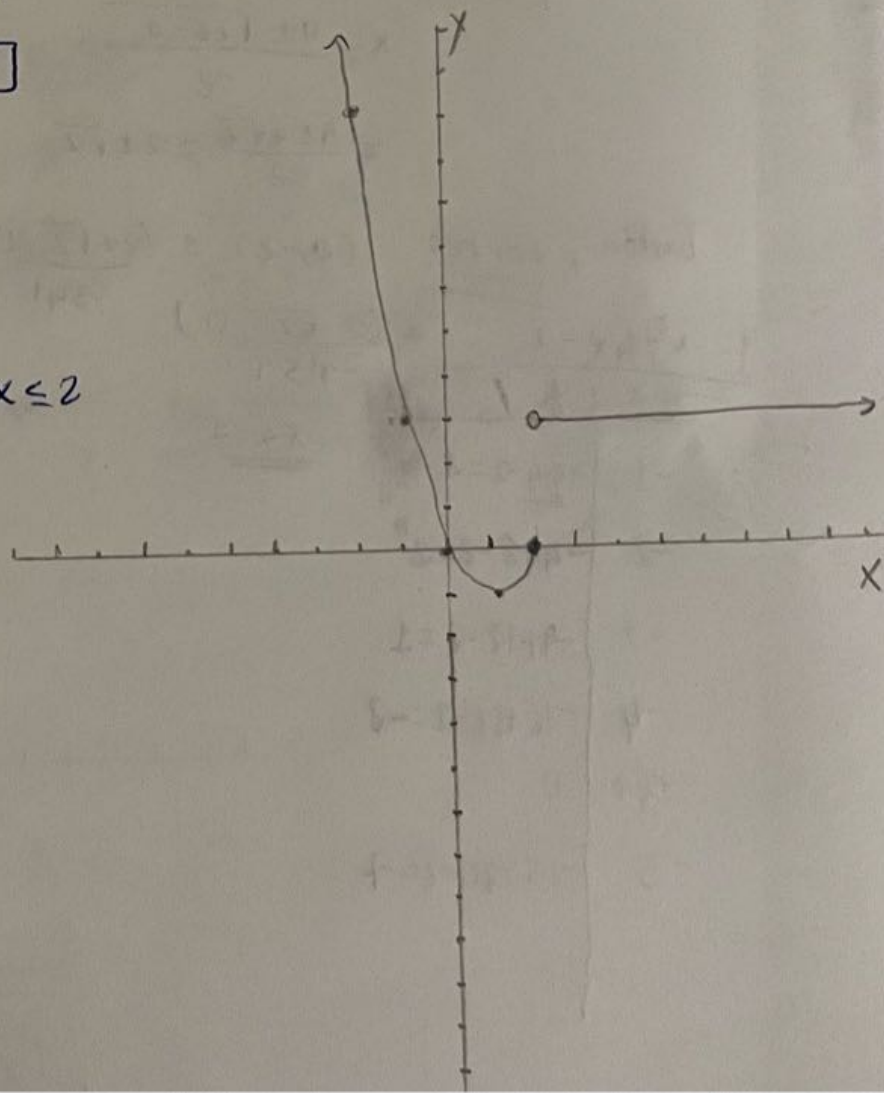
x	y
2	0
1	-1
0	0
-1	3
-2	8

$y = x^2 - 2x$ se $x \leq 2$

$$\underline{y = 3 \quad x > 2}$$

recta horizontal

x	y	<u>$x > 2$</u>
2	3	
3	3	
4	3	
5	3	
6	3	



$$c) f(x) = \begin{cases} -x-1 & x \leq -1 \\ 2x^2-2 & -1 < x < 1 \\ x-1 & x \geq 1 \end{cases}$$

$$y = -x-1 \text{ se } x \leq -1$$

recta

x	y
-1	0
-2	1
-3	2
-4	3
-5	4

$$y = x-1 \text{ se } x \geq 1$$

recta

x	y
1	0
2	1
3	2
4	3
5	4

$$y = 2x^2-2 \text{ se } -1 < x < 1$$

x	y
-1	$2 \cdot (-1)^2 - 2 = 0$
0	-2
1	0
-0.5	$2 \cdot (-0.5)^2 - 2 = -1.5$
0.5	$2 \cdot (0.5)^2 - 2 = -1.5$

parábola convexa $\cup$

$$V(x_v, y_v)$$

$$x_v = -\frac{b}{2a} = 0$$

$$y_v = 2 \cdot 0^2 - 2 = -2$$

$$\text{Entón } V(0, -2)$$

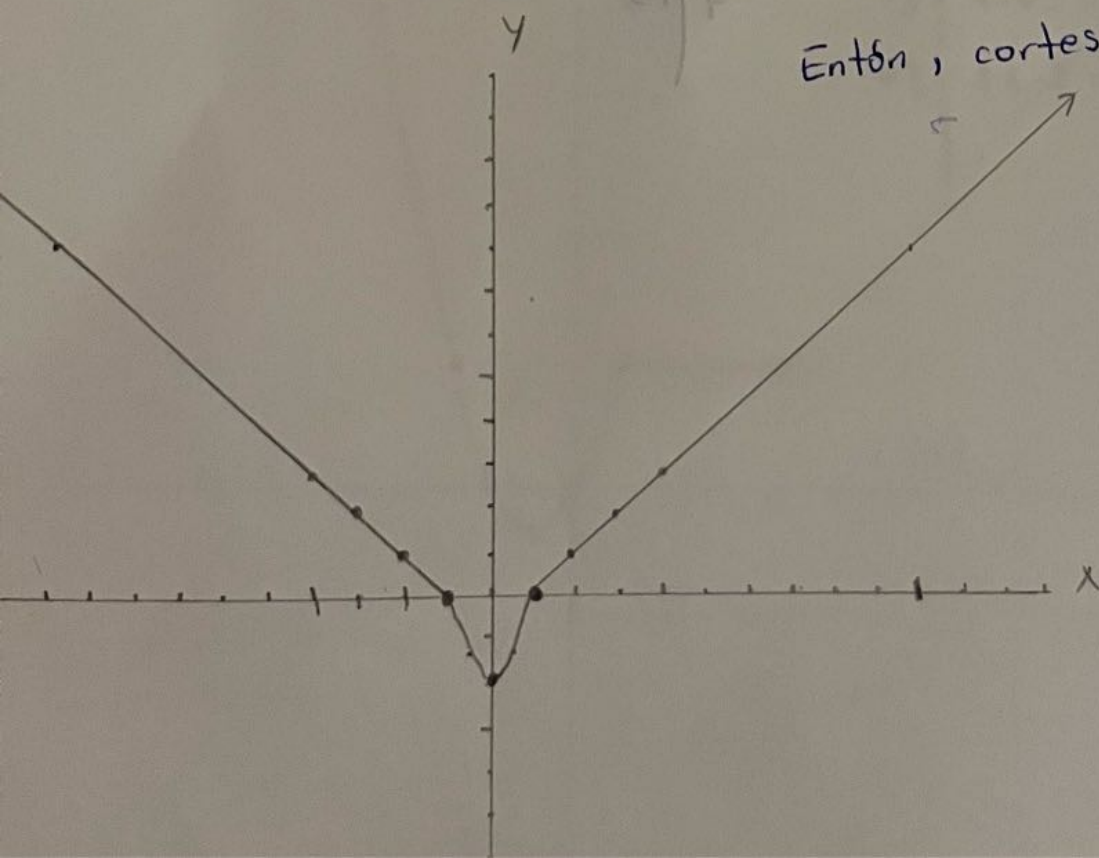
$$\text{Cortes: } x=0 \Rightarrow y=-2$$

$$y=0 \Rightarrow 2x^2-2=0$$

$$2x^2=2$$

$$x^2=1 \Rightarrow x=\pm 1$$

$$\text{Entón, cortes: } (0, -2), (1, 0), (-1, 0)$$



$$d) f(x) = \begin{cases} 2x+1 & x < 1 \\ x^2-1 & x \geq 1 \end{cases}$$

$$y = 2x + 1 \text{ se } x < 1$$

RECTA

x	y
1	3
0	1
-1	-1
-2	-3
-3	-5

$$y = x^2 - 1 \text{ se } x \geq 1$$

PARÁBOLA CONVEXA U

$$V(x_v, y_v)$$

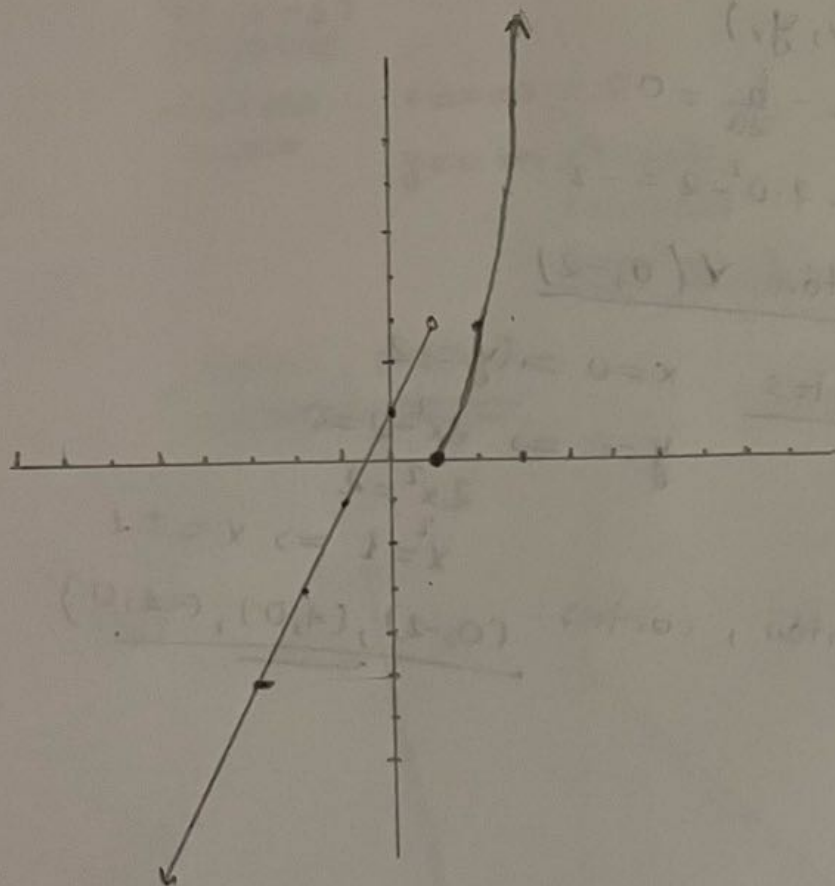
$$x_v = 0 \quad y_v = -1$$

$$\underline{V(0, -1)}$$

$$\underline{\text{CORTES : } x=0 \Rightarrow y=-1}$$

$$y=0 \Rightarrow x^2-1=0 \Rightarrow x^2=1 \\ \Rightarrow x=\pm 1$$

$$\underline{(0, -1) ; (1, 0) ; (-1, 0)}$$



x	y	$y = x^2 - 1 \text{ se } x \geq 1$
1	0	
2	3	
3	8	
4	15	

$$e) f(x) = \begin{cases} x^2 + 2x & x < 1 \\ 3 & 1 \leq x \leq 5 \\ x - 2 & x > 5 \end{cases}$$

$$y = x^2 + 2x \quad x < 1$$

• PARÁBOLA CONVEXA U

• V (x_v, y_v)

$$x_v = -\frac{2}{2} = -\frac{b}{2a} = -1$$

$$y_v = (-1)^2 + 2 \cdot (-1) = -1$$

$$\underline{\underline{V(-1, -1)}}$$

• CORTES : $x=0 \Rightarrow y=0$

$$y=0 \Rightarrow x^2 + 2x = 0$$

$$x(x+2) = 0$$

$$\underline{x=0} \quad \underline{x=-2}$$

$$\underline{\underline{(0,0) ; (-2,0)}}$$

$$y = 3 \quad 1 \leq x \leq 5$$

• RECTA HORIZONTAL

x	y
1	3
2	3
3	3
4	3
5	3

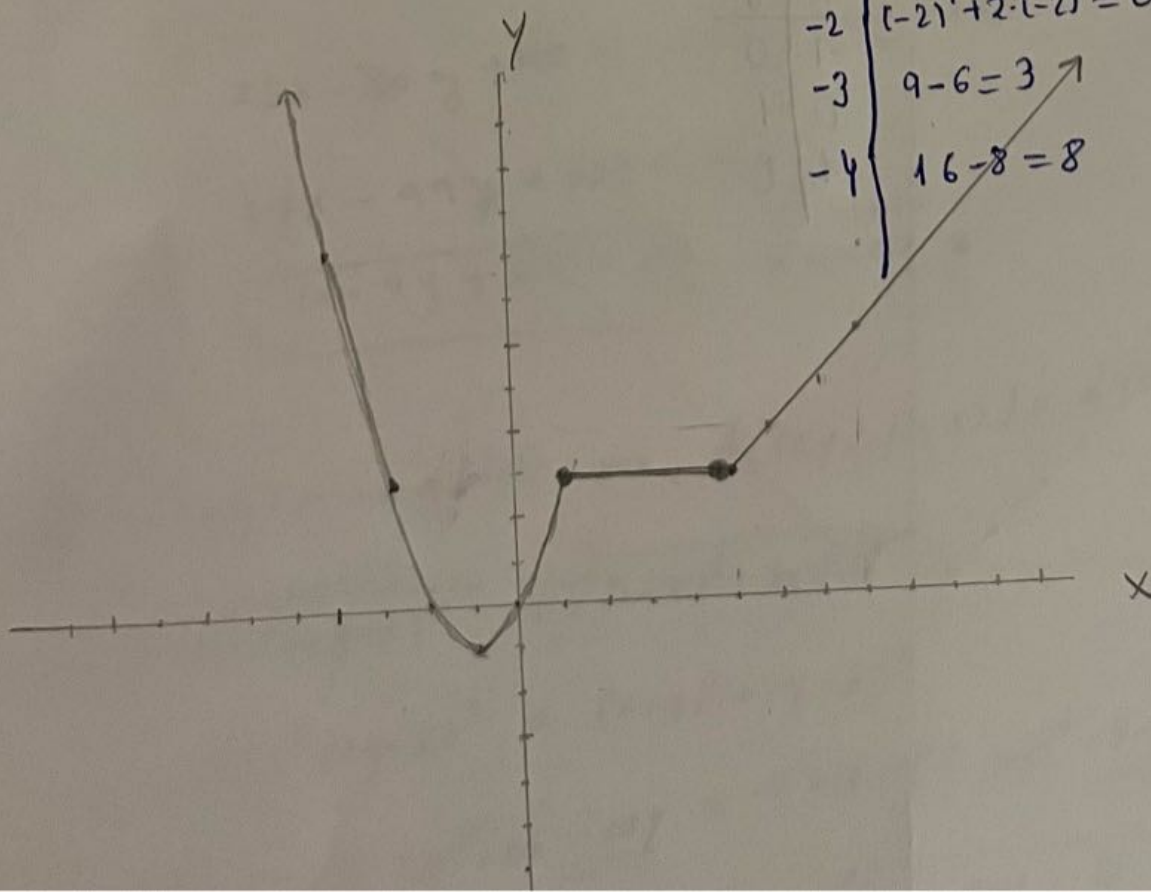
$$y = x - 2 \quad x > 5$$

• RECTA

x	y
5	3
6	4
7	5
8	6

$$y = x^2 + 2x \quad x < 1$$

x	y
1	$1^2 + 2 \cdot 1 = 3$
0	0
-1	$(-1)^2 + 2 \cdot (-1) = -1$
-2	$(-2)^2 + 2 \cdot (-2) = 0$
-3	$9 - 6 = 3$
-4	$16 - 8 = 8$



$$f) \quad f(x) = \begin{cases} -1-x & x < -1 \\ 1-x^2 & -1 \leq x \leq 1 \\ x-1 & x > 1 \end{cases}$$

$$y = -1-x \text{ se } x < -1$$

RECTA

x	y
-5	0
-2	1
-3	2
-4	3

$$y = 1-x^2 \text{ se } -1 \leq x \leq 1$$

PARÁBOLA

• CÓNCAVA $\cap$

• V (x_v, y_v)

$$x_v = 0$$

$$y_v = 1$$

$$\underline{\underline{V(0,1)}}$$

• CORTES

$$x=0 \Rightarrow y=1$$

$$y=0 \Rightarrow 1-x^2=0$$

$$x^2=1$$

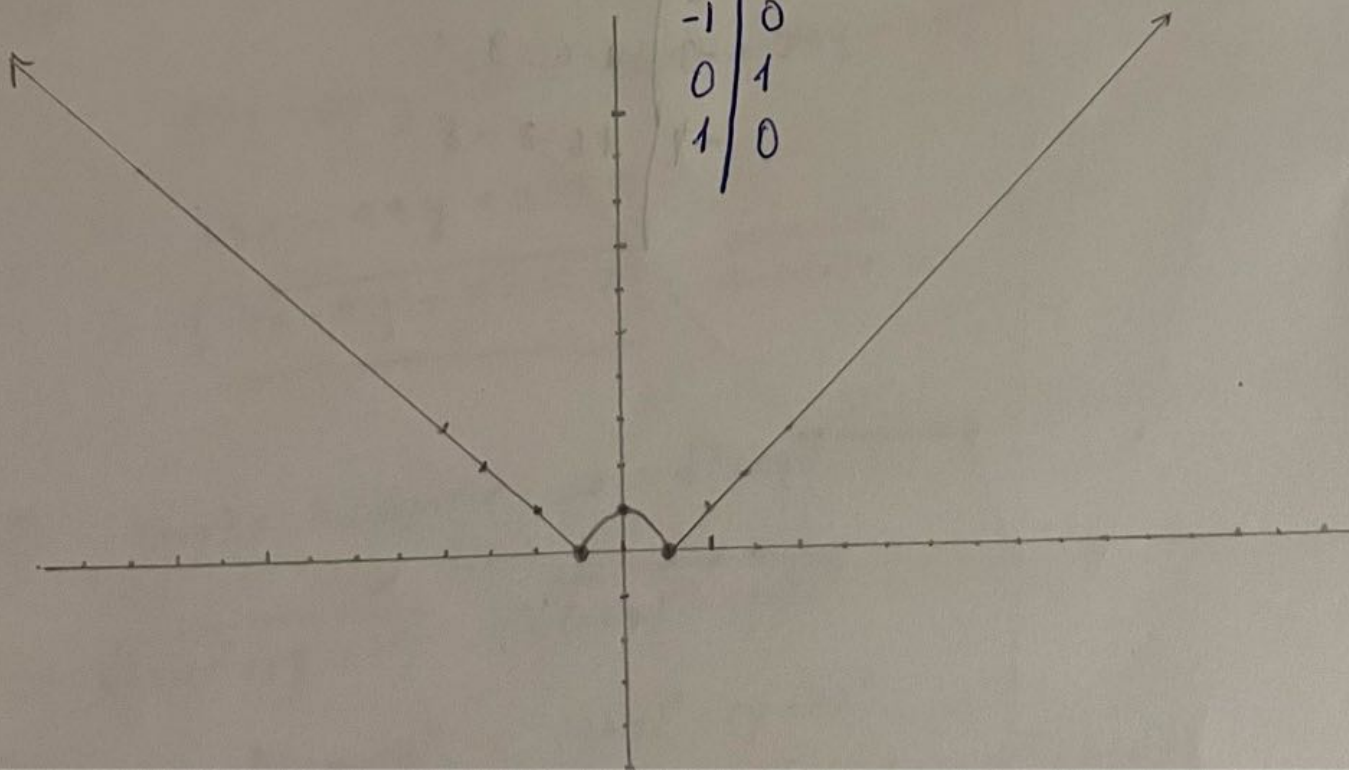
$$x = \pm 1$$

$$\underline{\underline{(1,0); (-1,0); (0,1)}}$$

$$y = x-1 \text{ se } x > 1$$

RECTA

x	y
1	0
2	1
3	2
4	3
5	4



x	y
-1	0
0	1
1	0