

# TALLER FUNCIONES REALES

1. En los ejercicios 1-4, determine si el conjunto es una función. Si es una función determine su dominio.

a)  $\{(x, y) \mid y = \sqrt{x-4}\}$

$$\begin{aligned} x &\geq 4 \\ x &\in \mathbb{R} \end{aligned}$$

$$\text{DOM} = x \in [4, \infty)$$

b)  $\{(x, y) \mid y = \sqrt{x^2 - 4}\}$

$$\text{DOM} = x \in (-\infty, -2] \cup [2, \infty)$$

c)  $\{(x, y) \mid y = \sqrt{4 - x^2}\}$

$$\text{DOM} = x \in [-2, 2]$$

d)  $\{(x, y) \mid x^2 + y^2 = 4\}$

NO ES UNA  
FUNCIÓN

3. a)  $\{(x, y) \mid y = x^2\}$

$$\text{DOM} = x \in \mathbb{R}$$

c)  $\{(x, y) \mid y = x^3\}$

$$\text{DOM} = x \in \mathbb{R}$$

b)  $\{(x, y) \mid x = y^2\}$

$$\text{DOM} = y \in \mathbb{R}$$

d)  $\{(x, y) \mid x = y^3\}$

$$\text{DOM} = y \in \mathbb{R}$$

5] Dada  $f(x) = 2x - 1$ , determine:

- a.  $f(3)$   $2(3) - 1 = 5$
- b.  $f(-2)$   $2(-2) - 1 = -5$
- c.  $f(0)$   $2(0) - 1 = -1$
- d.  $f(a+1)$   $2(a+1) - 1 = 2a + 2 - 1 = 2a + 1$
- e.  $f(x+1)$   $2(x+1) - 1 = 2x + 2 - 1 = 2x + 1$
- f.  $f(2x)$   $2(2x) - 1 = 4x - 1$
- g.  $f(x)$   $2(x) - 1 = 2x - 1$
- h.  $f(x+h)$   $2(x+h) - 1 = 2x + 2h - 1$
- i.  $f(x) + f(h)$

$$2(x) + (h) - 1 = 2x + 2h - 1$$

J.  $f(x+h) - f(x) \neq 0$

$$\frac{(2x + 2h - 1) - (2x - 1)}{h} = \frac{2h}{h} = 2$$

6] Dada  $f(x) = \frac{3}{x}$ , calcule:

- a)  $f(1)$   $\frac{3}{1} = 3$
- b)  $f(-3)$   $\frac{3}{-3} = -1$
- c)  $f(6)$   $\frac{3}{6} = \frac{1}{2}$
- d)  $f\left(\frac{1}{3}\right)$   $\frac{3}{\frac{1}{3}} = \frac{9}{1} = 9$
- e)  $f\left(\frac{3}{a}\right)$   $\frac{3}{\frac{3}{a}} = \frac{3a}{3} = a$
- f)  $f\left(\frac{3}{x}\right)$   $\frac{3}{\frac{3}{x}} = \frac{6x}{3} = x$



$$g) \frac{f(3)}{f(x)} = \frac{\frac{3}{1}}{\frac{3}{x}} = \frac{3x}{3} = x$$

$$j) f(x) - f(3) = \frac{3}{x} - \frac{3}{1} = \frac{3}{x} - \frac{3x}{x} = \frac{3-3x}{x}$$

$$j) \frac{f(x+h) - f(x)}{h}, h \neq 0$$

$$\frac{\left(\frac{3}{1} + \frac{3}{1}h\right) - \left(\frac{3}{1}\right)}{h} = \frac{3}{1}$$

7.] Dada  $f(x) = 2x^2 + 5x - 3$ , determine:

$$a. 2(-2)^2 + 5(-2) - 3 = 8 - 10 - 3 = -5 //$$

$$b. 2(-1)^2 + 5(-1) - 3 = 2 - 5 - 3 = -6 //$$

$$c. 2(0)^2 + 5(0) - 3 = 0 + 0 - 3 = -3 //$$

$$d. 2(3)^2 + 5(3) - 3 = 18 + 15 - 3 = 30 //$$

$$e. 2(h+1)^2 + 5(h+1) - 3 =$$

$$= 2(h^2 + 2h + 1) + 5h + 5 - 3$$

$$= 2h^2 + 4h + 2 + 5h + 5 - 3$$

$$= 2h^2 + 9h + 4 //$$

$$f. 2(2x^2)^2 + 5(2x^2) - 3 = 2(4x^4) + 10x^2 - 3$$

$$= 8x^4 + 10x^2 - 3.$$

$$g. 2(x^2-3)^2 + 5(x^2-3) - 3 = 2x^4 - 7x^2 + 18 - 3$$

$$= 2x^4 - 7x^2 + 15$$

$$h. 2(x+h)^2 + 5(x+h) - 3 = 2(x^2 + 2hx + h^2) + 5x + 5h - 3$$

$$= 2x^2 + 4hx + 2h^2 + 5x + 5h - 3$$

$$= 2x^2 + 4hx + 2h^2 + 5x + 5h - 3 //$$

$$i. 2(x)^2 + (h)^2 + 5(x) + (h) - 3$$

$$= 2x^2 + h^2 + 5x + h - 3$$

$$2x^2 + 5x - 3$$

$$J. \frac{f(x+h) - f(x)}{h} = \frac{2(x+h)^2 + 5(x+h) - 3 - (2x^2 + 5x - 3)}{h}$$

$$= \frac{2x^2 + 2h^2 + 5x + 5h - 3 - 2x^2 - 5x + 3}{h}$$

$$= \frac{2h^2 + 5h}{h} = 2h + 5 //$$

8]. Dada  $g(x) = 3x^2 - 4$ , calcule:

$$a. 3(-4)^2 - 4 = 44$$

$$b. 3\left(\frac{1}{2}\right)^2 - 4 = 3\left(\frac{1^2}{2^2}\right) - 4 = 3\left(\frac{1}{4}\right) - 4$$

$$= \frac{3}{4} - 4 = -\frac{13}{4}$$

$$c. 3(x^2)^2 - 4 = 3(x^{2 \times 2}) - 4 = 3x^4 - 4 //$$

$$d. 3(3x^2 - 4)^2 - 4 = 3(9x^4 - 24x^2 + 16) - 4$$

$$= 27x^4 - 72x^2 + 48 - 4$$

$$= 27x^4 - 72x^2 + 44 //$$

$$e. 3(x-h)^2 - 4(x-h) = 3(x^2 - 2hx + h^2) - 4x + 4h$$

$$= 3x^2 - 6hx + 3h^2 - 4x + 4h$$

$$f. (3x^2 - 4) - (3h^2 - 4)$$

$$= 3x^2 - 4 - 3h^2 - 4 = 3x^2 - 8 - 3h^2 //$$



$$9. \frac{3(x^2+h)^2 - 4(x+h) - 3x^2 - 4}{h}$$

$$= \frac{3x^4 + 6hx^2 + 3h^2 - 4x - 4h - 3x^2 - 4}{h}$$

12.]  $g(x) = 4 - x$

$$g(0) - 0 = 0 \quad g(1) = 4 - 1 = 3$$

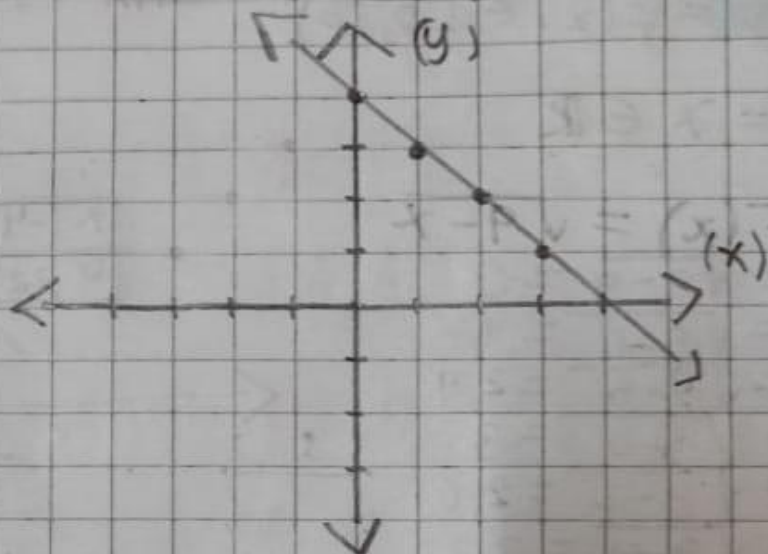
$$g(2) = 4 - 2 = 2$$

$$g(3) = 4 - 3 = 1$$

Rango =  $g(x) \in \mathbb{R}$

Dom =  $x \in \mathbb{R}$

x	0	1	2	3
y	4	3	2	1



14.]  $G(x) = x^2 + 2$

x	-6	-4	-2	0	2	4	6
y	38	18	6	2	6	18	38

$$G(0) = 0^2 + 2 = 2$$

$$G(-2) = -2^2 + 2 = 6$$

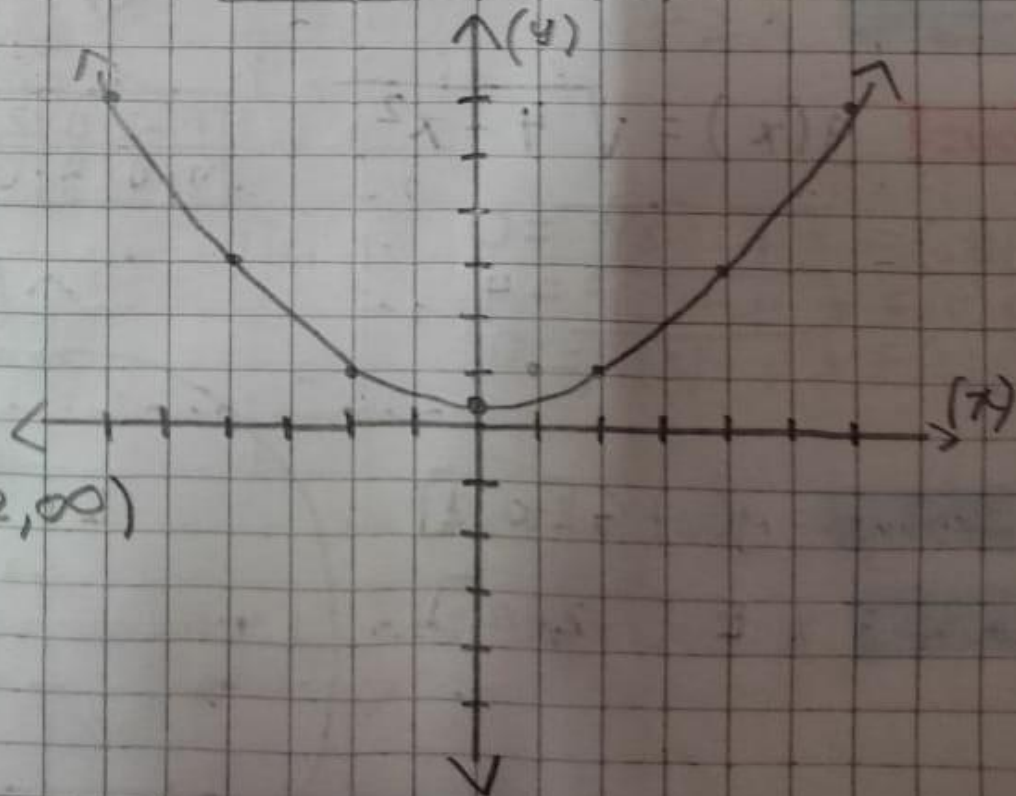
$$G(-4) = -4^2 + 2 = 18$$

$$G(-6) = -6^2 + 2 = 38$$

$$G(2) = 2^2 + 2 = 6$$

$$G(4) = 4^2 + 2 = 18$$

$$G(6) = 6^2 + 2 = 38$$



Rango =  $g(x) \in [2, \infty)$

Dom =  $x \in \mathbb{R}$

16.  $f(x) = (x-1)^2$

$f(0) = (0-1)^2 = 1$

$f(-3) = (-3-1)^2 = 16$

$f(-4) = (-4-1)^2 = 25$

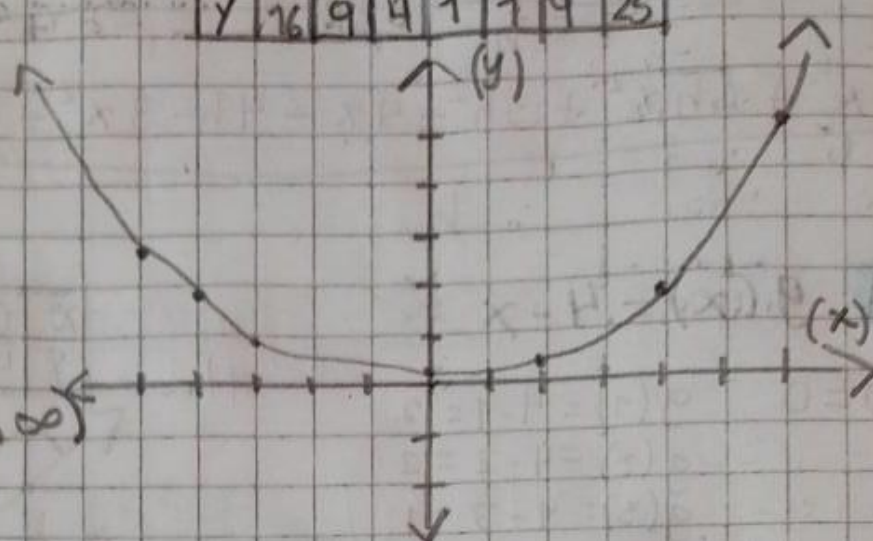
$f(-5) = (-5-1)^2 = 36$

$f(2) = (2-1)^2 = 1$

$f(4) = (4-1)^2 = 9$

$f(6) = (6-1)^2 = 25$

x	-5	-4	-3	0	2	4	6
y	36	25	16	1	1	9	25



Rango =  $f(x) \in [0, \infty)$

Dom =  $x \in \mathbb{R}$

18.  $F(x) = \sqrt{9-x}$

$F(9) = \sqrt{9-9} = 0$

$F(6) = \sqrt{9-6} = 1,7$

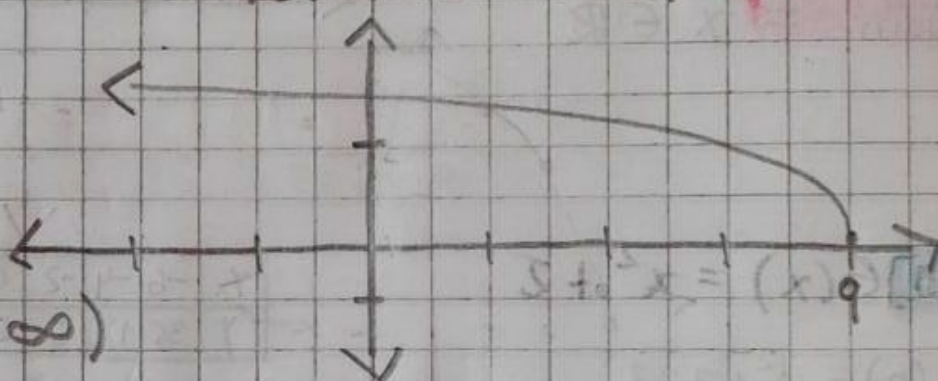
$F(3) = \sqrt{9-3} = 2,4$

$F(0) = \sqrt{9-0} = 3$

$F(-2) = \sqrt{9-2} = 2,6$

$F(-4) = \sqrt{9-4} = 2,2$

x	-4	-2	0	3	6	9
y	2,2	2,6	3	2,4	1,7	0



Rango =  $f(x) \in [0, \infty)$

Dom =  $x \leq 9$

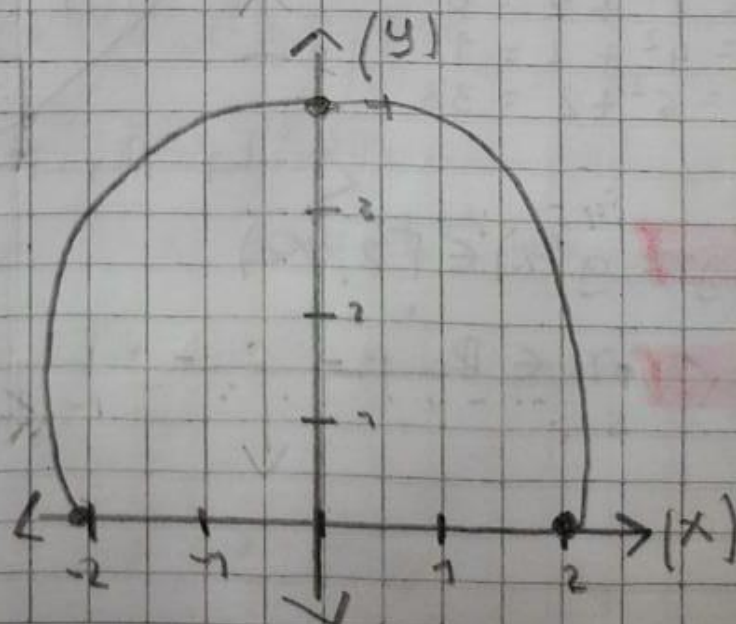
20.  $g(x) = \sqrt{4-x^2}$

x	-2	0	2
y	0	2	0

$g(-2) = \sqrt{4-(-2)^2} = 0$

$g(0) = \sqrt{4-(0)^2} = 2$

$g(2) = \sqrt{4-(2)^2} = 0$



Rango =  $g(x) \in [0, 2]$

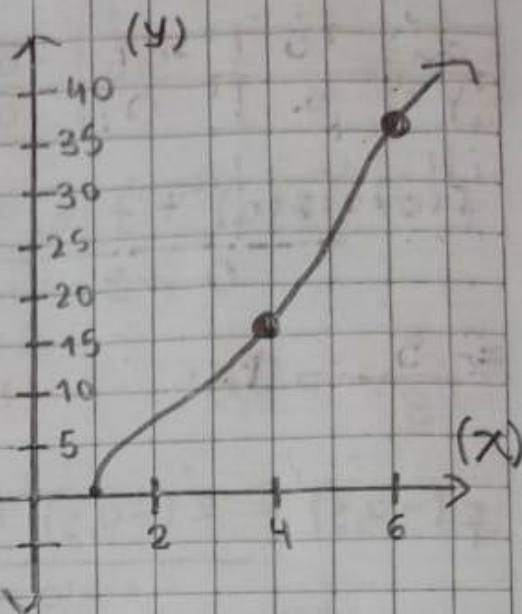
Dom =  $x \in [-2, 2]$



**22.**  $f(x) = \sqrt{x^2 - 1}$

x	-6	-4	-1	0	1	4	6
y	35	15	0	-1	0	15	35

$$\begin{aligned} f(-6) &= \sqrt{(-6)^2 - 1} = 35 \\ f(-4) &= \sqrt{(-4)^2 - 1} = 15 \\ f(-1) &= \sqrt{(-1)^2 - 1} = 0 \\ f(0) &= \sqrt{(0)^2 - 1} = -1 \\ f(1) &= \sqrt{(1)^2 - 1} = 0 \\ f(4) &= \sqrt{(4)^2 - 1} = 15 \\ f(6) &= \sqrt{(6)^2 - 1} = 35 \end{aligned}$$



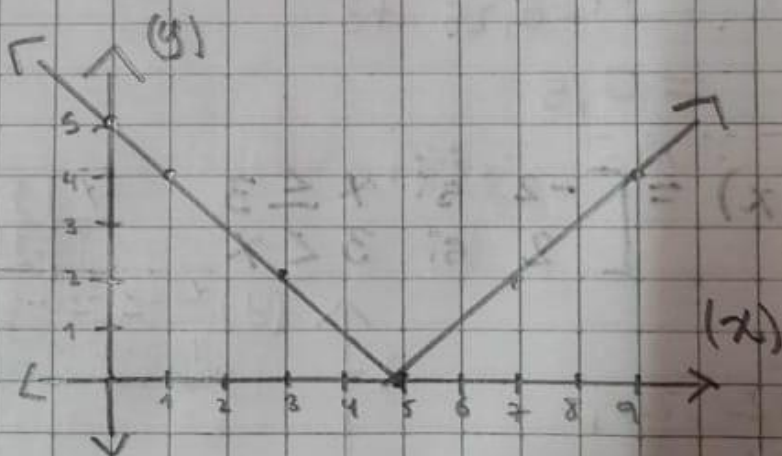
**Range** =  $(-1, 0) \cup (1, 0)$

**Dom** =  $x \in (-\infty, -1] \cup [1, \infty)$

**24.**  $H(x) = |5 - x|$

x	0	1	3	5	7	9
y	5	4	2	0	2	4

$$\begin{aligned} H(0) &= |5 - 0| = 5 \\ H(1) &= |5 - 1| = 4 \\ H(3) &= |5 - 3| = 2 \\ H(5) &= |5 - 5| = 0 \\ H(7) &= |5 - 7| = -2 \\ H(9) &= |5 - 9| = -4 \end{aligned}$$



**Range** =  $(5, 0)$

**Dom** =  $x \in \mathbb{R}$

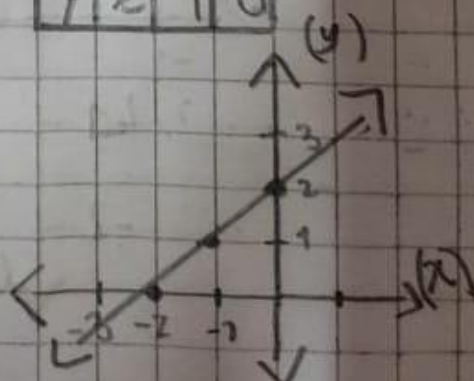
**26.**  $G(x) = \frac{x^2 - 4}{x - 2}$

x	0	-1	-2
y	2	1	0

$$G(0) = \frac{(0)^2 - 4}{(0) - 2} = 2$$

$$G(-1) = \frac{(-1)^2 - 4}{(-1) - 2} = \frac{-3}{-3} = 1$$

$$G(-2) = \frac{(-2)^2 - 4}{(-2) - 2} = \frac{0}{-4} = 0$$



**Range** =  $(-2, 0)$

**Dom** =  $x \neq 2$

28]  $f(x) = \frac{2x^2 + 7x + 3}{x + 3}$

x	0	-0,5	-0,25
y	1	0	0,5

$$f(0) = \frac{2(0)^2 + 7(0) + 3}{0 + 3}$$

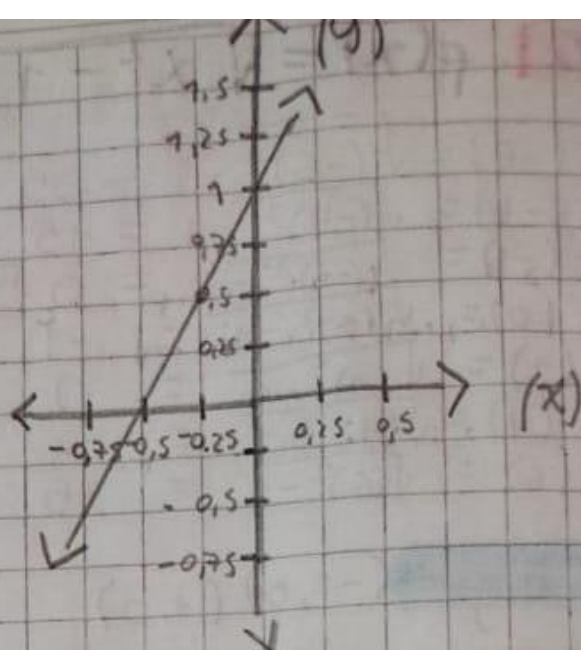
$$= \frac{3}{3} = 1$$

$$f(-0,5) = \frac{2(-0,5)^2 + 7(-0,5) + 3}{-0,5 + 3}$$

$$= 0$$

$$f(-0,25) = \frac{2(-0,25)^2 + 7(-0,25) + 3}{-0,25 + 3}$$

$$= 0,5$$



Rango =  $(-\frac{1}{2}, 0)$

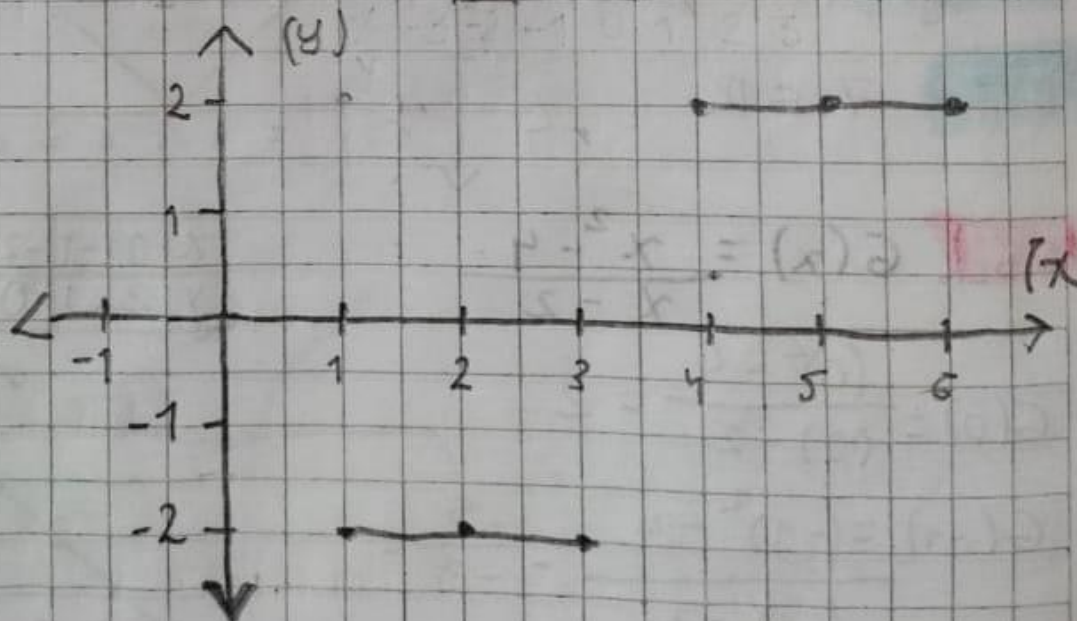
Dom =  $x \neq -3$

$|x - a| = (x) + 1$

31]  $f(x) = \begin{cases} -2 & \text{si } x \leq 3 \\ 2 & \text{si } 3 < x \end{cases}$

x	1	2	3	4	5	6
y	-2	-2	-2	2	2	2

$$\begin{aligned} f(1) &= -2 \\ f(2) &= -2 \\ f(3) &= -2 \\ f(4) &= 2 \\ f(5) &= 2 \\ f(6) &= 2 \end{aligned}$$





(34)  $f(x) = \begin{cases} 3x + 2 & \text{si } x \neq 1 \\ 8 & \text{si } x = 1 \end{cases}$

x	-3	-1	0	1	3	4
y	-7	-1	2	8	11	14

$f(-3) = 3(-3) + 2$   
 $= -7 //$

$f(-1) = 3(-1) + 2$   
 $= -1 //$

$f(0) = 3(0) + 2$   
 $= 0 + 2$   
 $= 2 //$

$f(1) = 8 //$

$f(4) = 3(4) + 2$   
 $= 14 //$

$f(3) = 3(3) + 2$   
 $= 11 //$

