

The absolute value function $y = f(x) = |x|$ is defined by the formula

$$y = f(x) = |x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

$$* |x| = \sqrt{x^2}$$

To Find D_f and R_f for $|x|$?

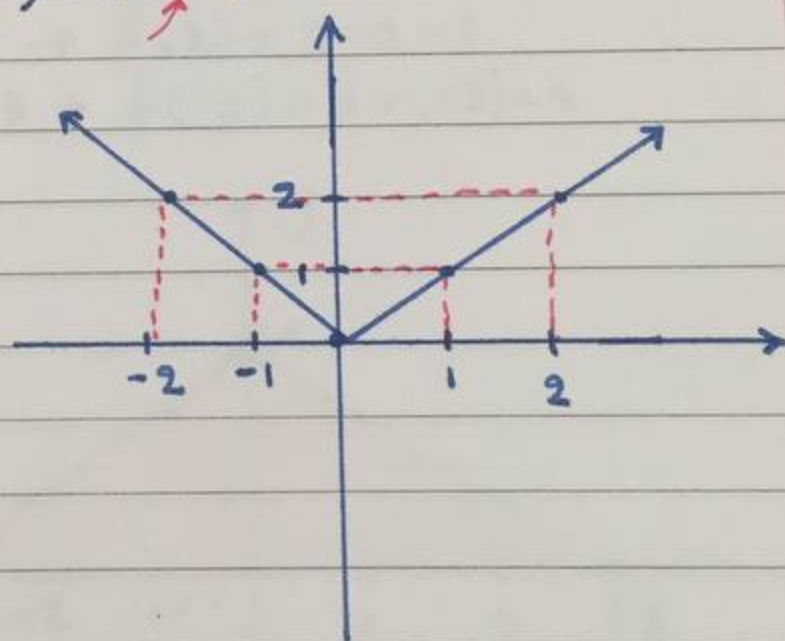
$$D_f = \mathbb{R}$$

الصفر محسوب

الفقر داخل لقطعة فقط

$$f(x) = |x| = \begin{cases} x & , x \geq 0 \rightarrow \{0, 1, 2, \dots, +\infty\} \\ -x & , x < 0 \rightarrow -\infty \dots (-3) = 2 \end{cases}$$

x	y
-1	1
-2	2
0	0
1	1
2	2



$$R_f = \{y : y \geq 0\} \text{ or } [0, +\infty)$$

$$f(-2) = -(-2) = 2$$

$$f(2) = +(2) = 2$$

H.W Graph the function $F(x) = -|x|$ and find D_f and R_f ?

Example 2:- Graph the function $g(x) = 3 - |x|$ and find D_g and R_g ?

Sol:-

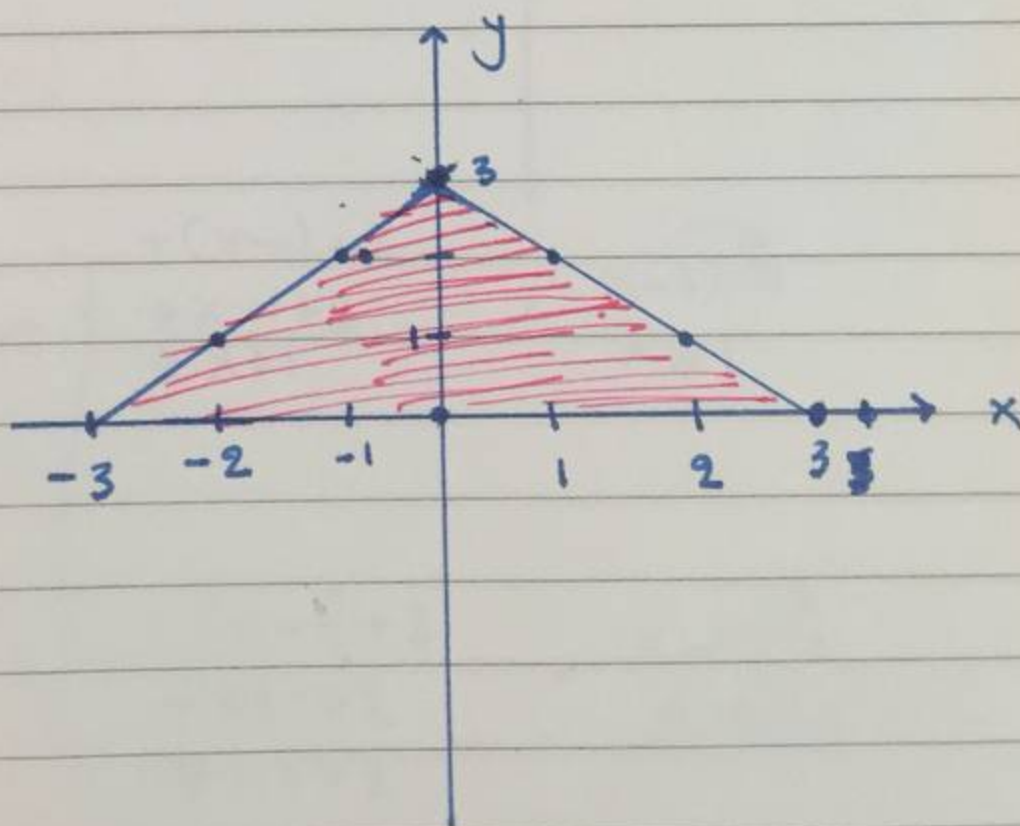
$$D_g = \mathbb{R}$$

$$g(x) = 3 - |x| =$$

$$\begin{cases} 3 - x & , x \geq 0 \\ 3 + x & , x < 0 \end{cases}$$

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

$$\begin{aligned} \rightarrow -2 &\rightarrow f(-2) = 3 + (-2) = 1 \\ -1 &\rightarrow f(-1) = 3 + (-1) = 2 \\ 0 &\rightarrow f(0) = 3 - 0 = 3 \\ 1 &\rightarrow f(1) = 3 - 1 = 2 \\ 2 &\rightarrow f(2) = 3 - 2 = 1 \\ -3 &\rightarrow f(-3) = 3 + (-3) = 0 \end{aligned}$$



$$R_g = \{y; y \leq 3\}$$

{Ex 3} 8- Graph the function $f(x) = |x-1|+2$ and Find D_f and R_f .

Solution:-

$$D_f = \mathbb{R}$$

x	y
-1	4
0	3
1	2 ← *
2	3
-2	5
3	4

$$f(x) = \begin{cases} x+1 & , x \geq 1 \\ -x+3 & , x < 1 \end{cases}$$

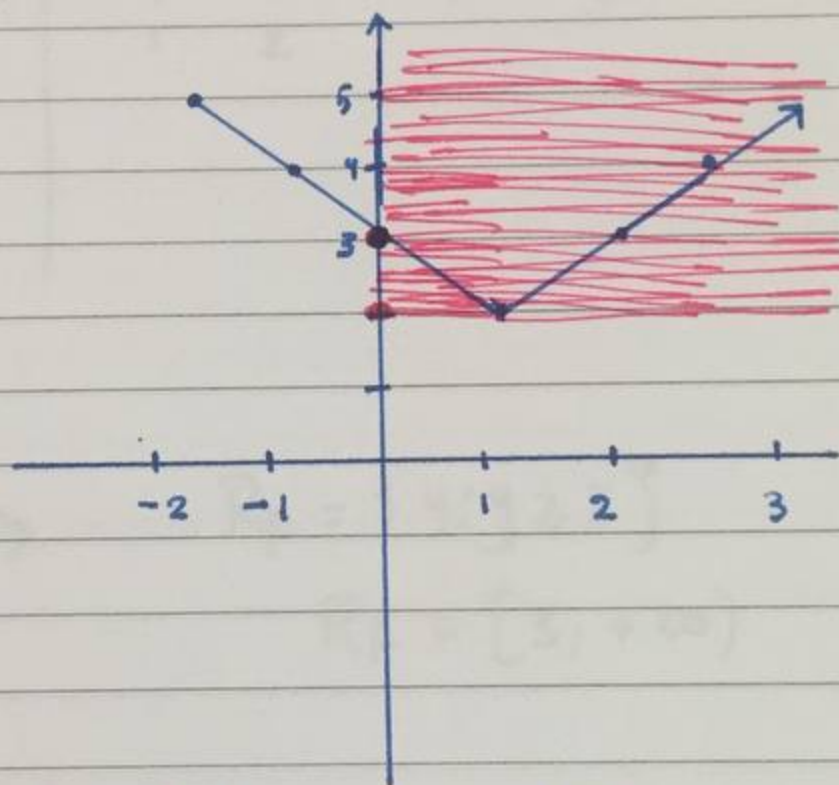
$$f(-1) = -(-1)+3 = 4$$

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

$$f(1) = 1+1 = 2$$

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

$$f(-2) = -(-2)+3 = 5$$



$$\therefore R_f = \{y; y \geq 2\}$$

$$R_f = [2, +\infty)$$

فلز فطلعه $\rightarrow f(x) = |x-1|+2 = \begin{cases} +(x-1)+2 & , x-1 \geq 0 \\ \rightarrow x-1+2 & , x \geq 1 \\ \rightarrow x+1 & , x \geq 1 \end{cases}$

$\begin{cases} -(x-1)+2 & , x-1 < 0 \\ -x+1+2 & , x < 1 \\ \rightarrow -x+3 & , x < 1 \end{cases}$