

Domain is all valid inputs to a function.

Ex. What is the domain of $h(t) = \sqrt{t+3}$

$$t+3 \geq 0 \Rightarrow t \geq -3 \text{ (domain)}$$

↳ must be non-negative

Ex. What's the domain of $f(x) = \frac{1}{\sqrt{1-x}}$

$$1-x > 0$$

$$-x > -1 \quad \left. \begin{array}{l} \text{mult. by neg} \\ \text{arrow} \end{array} \right\}$$

$$x < 1$$

↑ domain

If my function has a square root, whatever is under the radical must be ≥ 0 .

Ex. $g(t) = \sqrt{|t|-2}$

$$|t|-2 \geq 0$$

$$|t| \geq 2$$

get rid of 1.1

$$t \geq 2$$

or

$$t \leq -2$$

negating the other side, switch the sign

$$\text{Domain: } (-\infty, -2] \cup [2, \infty)$$

Exercise $g(x) = \frac{\sqrt{x-3}}{x-5}$

① $x-5 = 0$? $x=5$
exclude 5 from my domain

② $x-3 \geq 0$
 $x \geq 3$

Domain: $[3, 5) \cup (5, \infty)$
↑ excluded 5!

$\sqrt{x+6}$, $x=-3 \Rightarrow \sqrt{-3+6} = \sqrt{3}$
 $x=-7 \Rightarrow \sqrt{-7+6} = \sqrt{-1}$ DNE

$\sqrt{(x-1)(x+3)} \geq 0$, $x \leq -3$ or $x \geq 1$

Exercise $h(x) = \frac{\sqrt{x}}{(x-1)(x+3)}$

When the denominator equals 0:

$(x-1)(x+3) = 0$

$(ab=0 \Leftrightarrow a=0 \text{ or } b=0)$

\Downarrow
 $x-1=0$ $x=1$
 $x+3=0$ $x=-3$

$a=(x-1)$ $b=(x+3)$
should exclude from domain

① when is denominator 0?
inputs where denominator is equal to 0 are not allowed.

② when the expression under the radical (sqrt symbol) is negative we exclude those pts. In other words, we look for when this expression is non-neg.

When is what's under the radical non-neg?

$$x \geq 0$$

Domain: all $x \geq 0$ except $x = 1$.

$[0, 1) \cup (1, \infty)$ ← always use open brackets on $\pm\infty$

↑ 0 is in the domain ↑ 1 is not in domain

$$f(t) = \sqrt{t-3}$$

$$t-3 \geq 0$$

$$t \geq 3$$

The range of a function is the set of all $y \in \mathbb{R}$ such that $f(x) = y$ for some x .

Ex. $h(x) = |x|$

$$h(1) = 1$$

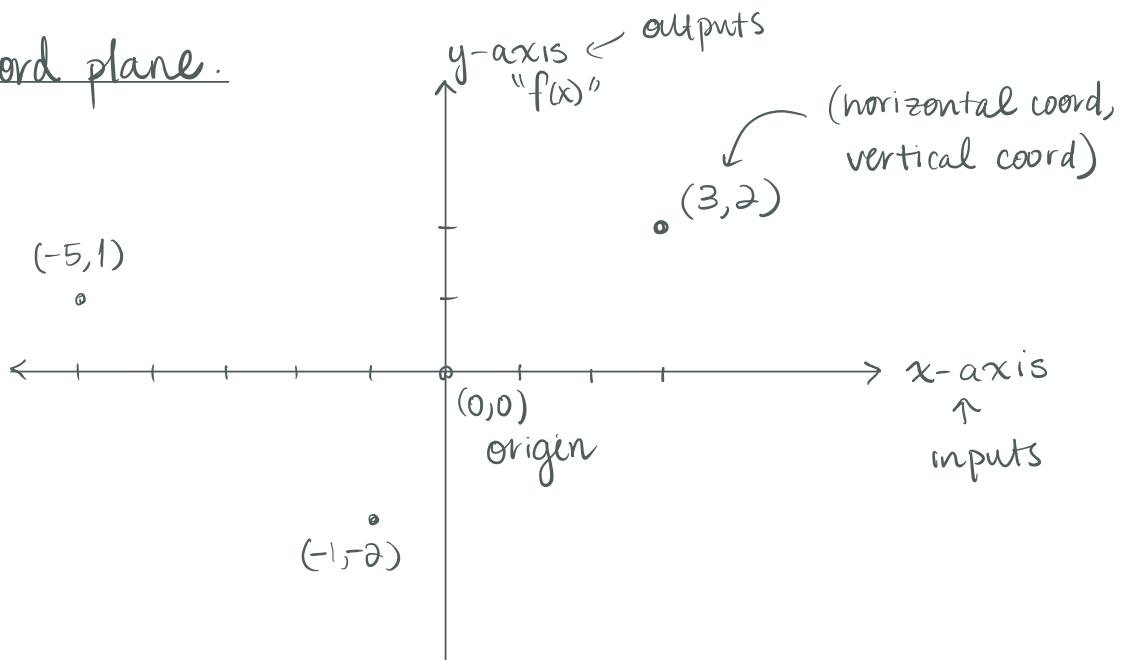
$$h(-20) = 20$$

Range of h $[0, \infty)$

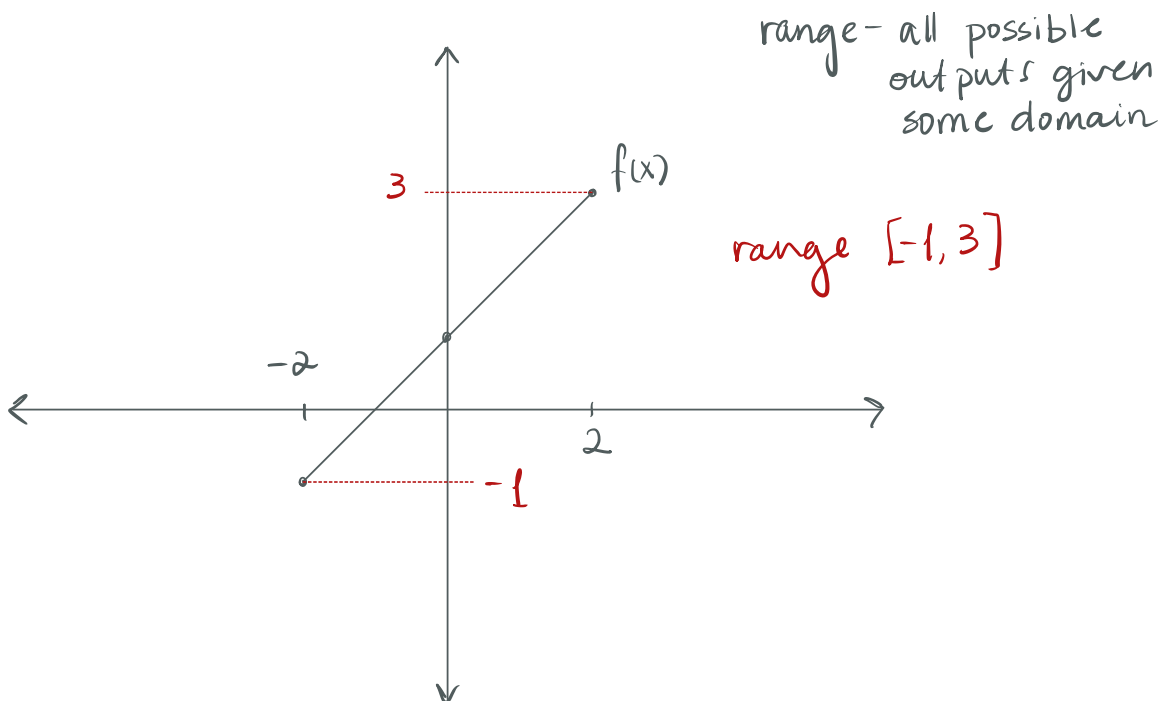
$$h(-1) = 1$$

$$h(0) = 0$$

1.2 Coord plane.



Ex. $f(x) = x + 1$ on the domain $[-2, 2]$



range: look at the y-values our graph attains

Ex $g(x) = 2x - 1$, domain $[0, 1]$
what is the range of g ?

Algebraically: g is an increasing function

$$x_1 < x_2 \Rightarrow g(x_1) < g(x_2)$$

$$g(0) = 2(0) - 1 = -1$$

$$g(1) = 2(1) - 1 = 1$$

range $[-1, 1]$

Graphically:

