

## 1.4: Evaluating Functions and Domains

Ex 1: Find the following values for each function:

$$f(x) = \frac{x + 2}{3x + 4}$$

$$h(x) = |x + 1|$$

$$j(x) = x^2 - 7x$$

a)  $h(-5)$  ← input

↓  
name

$$= |(-5) + 1|$$

$$= |-4|$$

$$= \boxed{4}$$

b)  $f(4)$

$$= \frac{4 + 2}{3(4) + 4}$$

$$= \frac{6 \div 2}{16 \div 2}$$

$$= \boxed{\frac{3}{8}}$$

c)  $-j(x)$

$$= -\{(x^2 - 7x)\}$$

$$= \boxed{-x^2 + 7x}$$

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d)  $h(-x+3)$

$$= |(-x+3)+1|$$
$$= |-x+4|$$

e)  $f(x-1)$

$$= \frac{(x-1)+2}{3(x-1)+4}$$
$$= \frac{x+1}{3x-3+4}$$
$$= \frac{x+1}{3x+1}$$

f)  $j(x+1)$

$$= (x+1)^2 - 7(x+1)$$
$$= (x+1)(x+1) - 7x - 7$$
$$= x^2 + 2x + 1 - 7x - 7$$
$$= x^2 - 5x - 6$$

What is the domain of a function?

"the x-values"

the x-values that give us  
valid outputs (y-values).

↓  
Real  
#

Not Valid

$\sqrt{-1}$  → imaginary

$\frac{3}{0}$  → undefined

Ex: Determine if the following equations are functions. If yes, determine the domain.

$$y = x^2 - 3x + 1 \quad \text{F}$$

$$D: \mathbb{R}$$

$$y = \sqrt{x - 3} \quad \text{F}$$

$$x - 3 \geq 0$$

+3                  +3

$$D: \boxed{x \geq 3}$$

$$y = \pm \sqrt{x + 11}$$

Not a  
Function

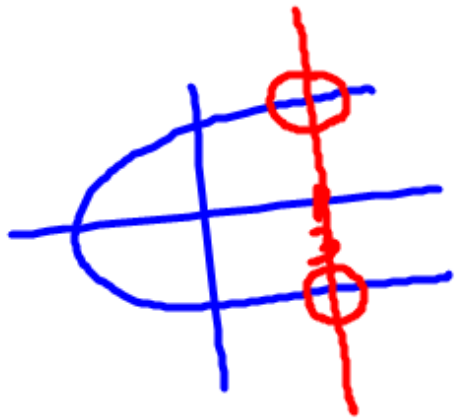
$$y = \frac{2x}{x + 2} \quad \text{F}$$

$$D: x + 2 \neq 0$$

-2                  -2

$$D: \boxed{x \neq -2}$$

Function : for every input you have one output.



NF



Ex: Determine if the following equations are functions. If yes, determine the domain.

$$y = \sqrt{5-x} \quad : F$$

$$\underset{-5}{5} - x \geq \underset{-5}{0}$$

$$\frac{-x}{-1} \geq \frac{-5}{-1}$$

$$D: \boxed{x \leq 5}$$

$$y = 3x + 59$$

$$D: \mathbb{R}$$

$$13x + y^2 = 7$$

N.F.

$$\underset{-13x}{-13x} \qquad \qquad \underset{-13x}{-13x}$$

$$\sqrt{y^2} = \sqrt{7-13x}$$

$$y = \pm \sqrt{7-13x}$$

$$y = \frac{x}{\sqrt{x+1}}$$

$$\underset{-1}{x+1} > \underset{-1}{0}$$

$$\boxed{D: x > -1}$$

# Finding Domain

① Square Root: no negatives inside square roots

$$\text{Ex: } y = \sqrt{x+4} \rightarrow x+4 \geq 0 \\ x \geq -4$$

② Division: Can't  $\div$  by 0.

$$\text{Ex: } y = \frac{1}{x+2} \rightarrow x+2 \neq 0 \\ x \neq -2.$$

③ Both: Ex:  $\frac{x}{\sqrt{x-1}}$   $\rightarrow$   $x-1 > 0$   
 $x > 1$

④ Neither:  $\mathbb{R}$



$$y = \sqrt{x+1}$$

$$x+1 \geq 0$$

$$y = \sqrt{3x-12}$$

$$3x-12 \geq 0$$