DEf: A FUNCTION IS A RULE THAT ASSIGNS AN OUTPUT (NUMBER)

TO EVERY ACCEPTABLE INPUT (NUMBER)

We TYPICALLY USE LETTERS f & g FOR FUNCTIONS

(THOUGH ANY LETTER CAN BE USED)

e.g.
$$f(x) = x^2 + 1 \quad \text{"} f \text{ OF } x \text{"}$$
$$f(y) = y^2 + 1 \quad \text{"} f \text{ OF } y \text{"}$$
$$f(t) = t^2 + 1 \quad \text{"} f \text{ OF } t \text{"}$$

WHAT IS $f(5)$, $f(-3)$, $f(\sqrt{\pi})$?

THIS REPRESENTS THE INPUT

THIS SHOWS WHAT TO DO TO THE INPUT TO PRODUCE THE ASSIGNED OUTPUT.

THIS IS THE RULE.

ex. Let $f(x) = \sqrt{x-2}$. WHAT IS $f(11)$, $f\left(\frac{121}{36}\right)$, $f(83) - f(102)$?

$f(-11)$? UNDEFINED!

DEf: THE DOMAIN OF A FUNCTION IS THE SET OF ACCEPTABLE INPUT (NUMBERS).

We USE INTERVAL NOTATION TO DESCRIBE DOMAIN OF A FUNCTION.

ex. WHAT IS THE DOMAIN OF $f(x) = \sqrt{x-2}$?

ex. Let $f(x) = \dfrac{3|x-5|}{x-1}$.

(a) EVALUATE $f(3)$, $f(-9)$, $f(a)$, $f(-a)$, $f(a+1)$, $f(a+h)$, $f\left(\frac{1}{x}\right)$, $f(x-2)$

(b) FIND DOMAIN OF f.

ex. Let $f(x) = x^2 + 2x + 3$.

FIND & SIMPLIFY $\dfrac{f(a+h) - f(a)}{h}$.

ex. FIND THE DOMAIN OF $g(t) = \dfrac{\sqrt{t^2 - 16}}{t - 12}$

(1) EXPRESSIONS INSIDE $\sqrt{}$ MUST BE ≥ 0.

(2) EXPRESSIONS IN DENOMINATOR(s) MUST BE $\neq 0$.

PIECEWISE DEFINED FUNCTIONS

DIFFERENT RULES FOR DIFFERENT INPUTS

34. $f(x) = \begin{cases} 3x & \text{if } x < 0 \\ x + 1 & \text{if } 0 \leq x \leq 2 \\ (x - 2)^2 & \text{if } x > 2 \end{cases}$

$f(-5), f(0), f(1), f(2), f(5)$

NET CHANGE : GIVEN A FUNCTION $f(x)$ & TWO NUMBERS $a < b$ (IN DOMAIN OF f)

THE NET CHANGE IN f FROM a TO b IS

$$f(b) - f(a).$$

ex. Let $f(x) = 3x^2 + x$. FIND THE NET CHANGE FROM 2 TO 6.