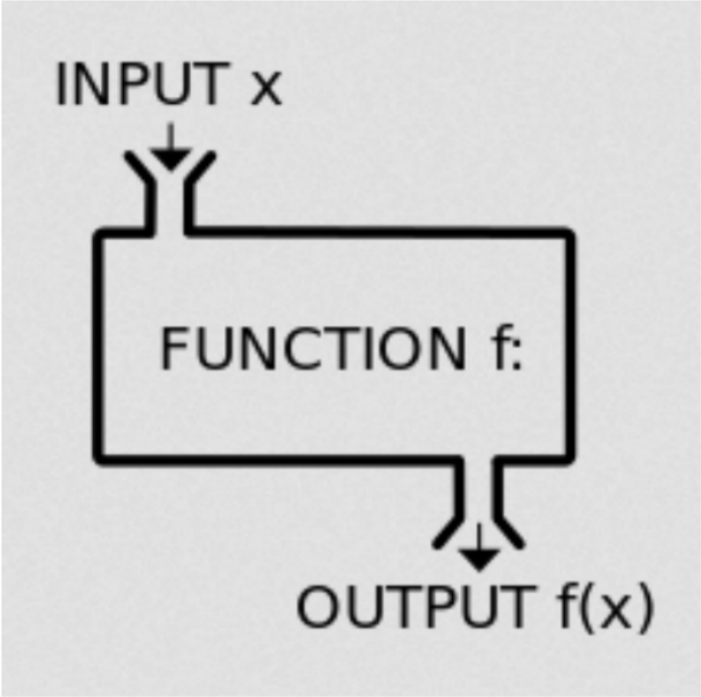
Unit 4: Piecewise Functions

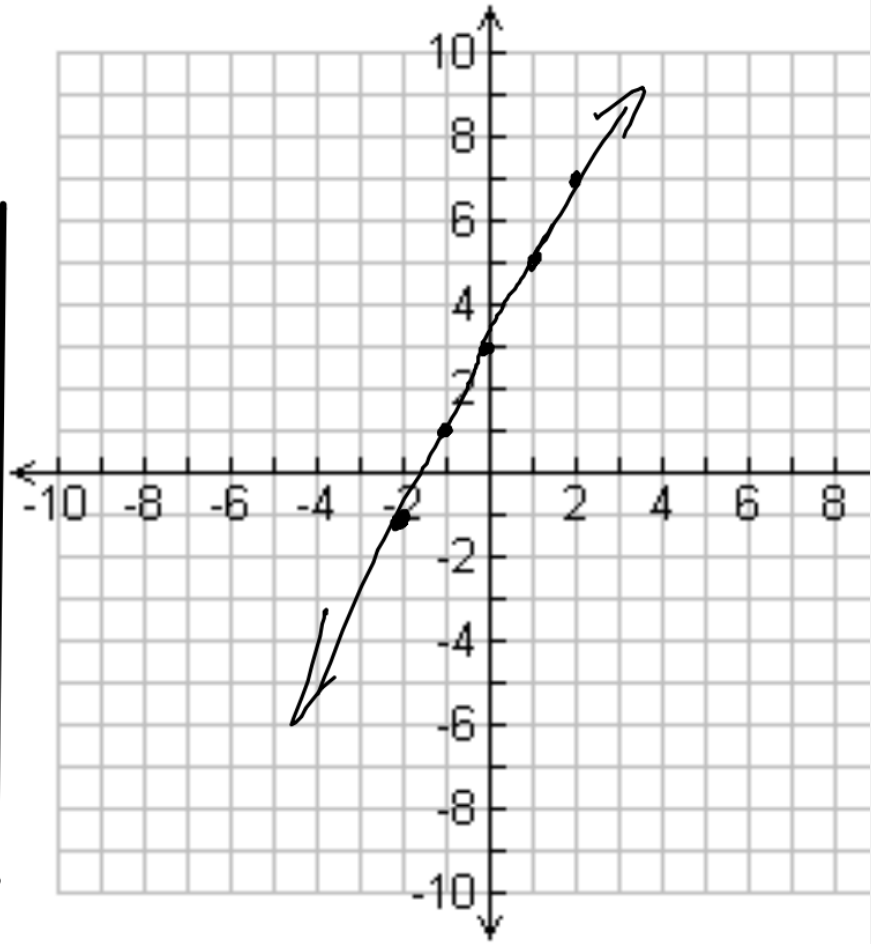
What is a function?

A *function* relates an input to an output.



Ex. 1 f(x) = 2x + 3

x	2x + 3	f(x)
-2	2(-2)+3	-1
-1	2(-1)+3	1
0	2(0)+3	3
1	2(1)+3	5
2	2(2)+3	7



Ex. 1 $f(x) = \begin{cases} x - 2 & x < 0 \\ x^2 + 2 & x \geq 0 \end{cases}$ $-2 < 0$ $0 \geq 0$

Find f(-2), f(0) and f(2)

$f(-2) = (-2) - 2 = -4$

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

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

Ex. 2 $f(x) = \begin{cases} -x^2 + 4x - 1 & x \leq 2 \\ -2x + 7 & x > 2 \end{cases}$

Find f(2) + f(0)

$f(2) = -(2)^2 + 4(2) - 1 = 3$

$= -4 + 8 - 1 = 3$

$f(0) = -(0)^2 + 4(0) - 1 = -1$

$3 + -1 = \boxed{2}$

Ex. 4 Given the following piecewise function, determine the value of g(-4).

$$g(x) = \begin{cases} 10^x & \text{if } x < -4 \\ x^4 + x^2 + x - 3 & \text{if } x \geq 4 \end{cases}$$

undefined

discontinuous at -4

x. 5 Graph the following piecewise defined function

$$f(x) = \begin{cases} x^2 & \text{if } x < 2 \\ 6 & \text{if } x = 2 \\ 10 - x & \text{if } x > 2 \text{ and } x \leq 6 \end{cases}$$

< > or

≤ ≥ clo

$2) = (2)^2 = 4$

$1) = (1)^2 = 1$

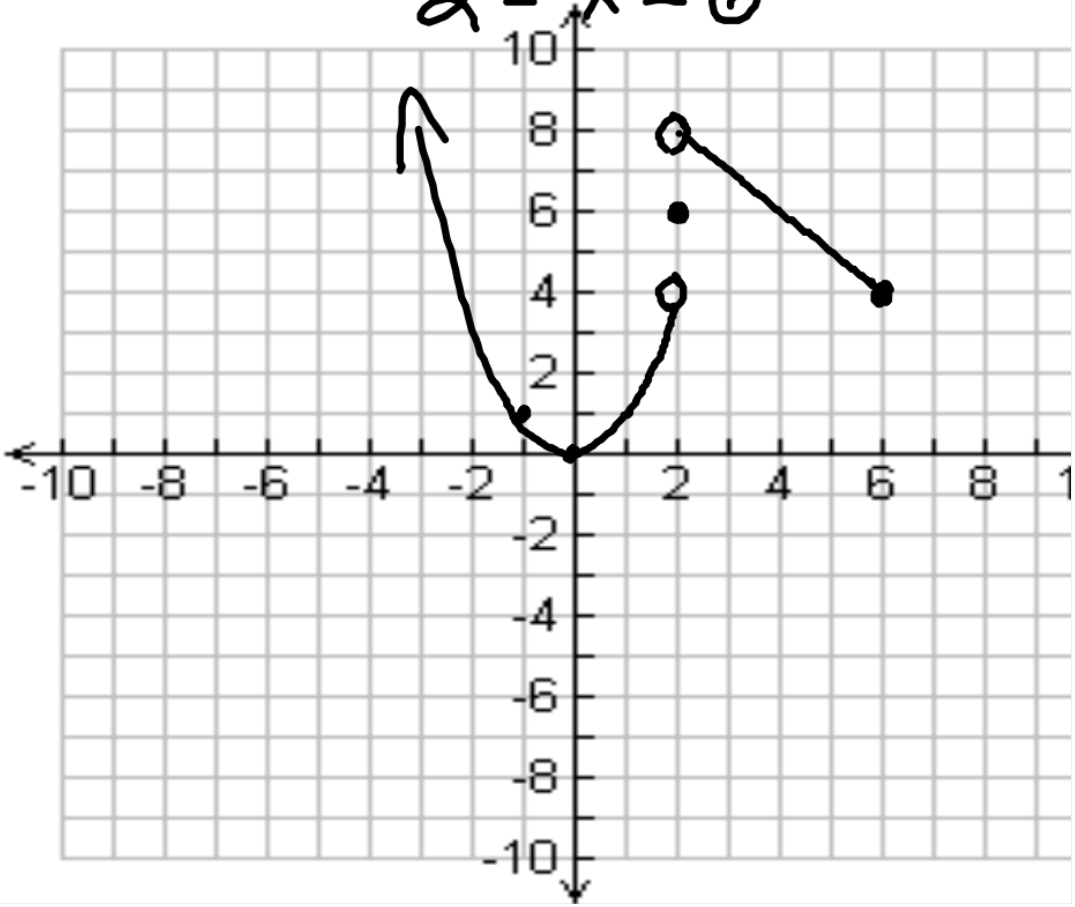
$0) = (0)^2 = 0$

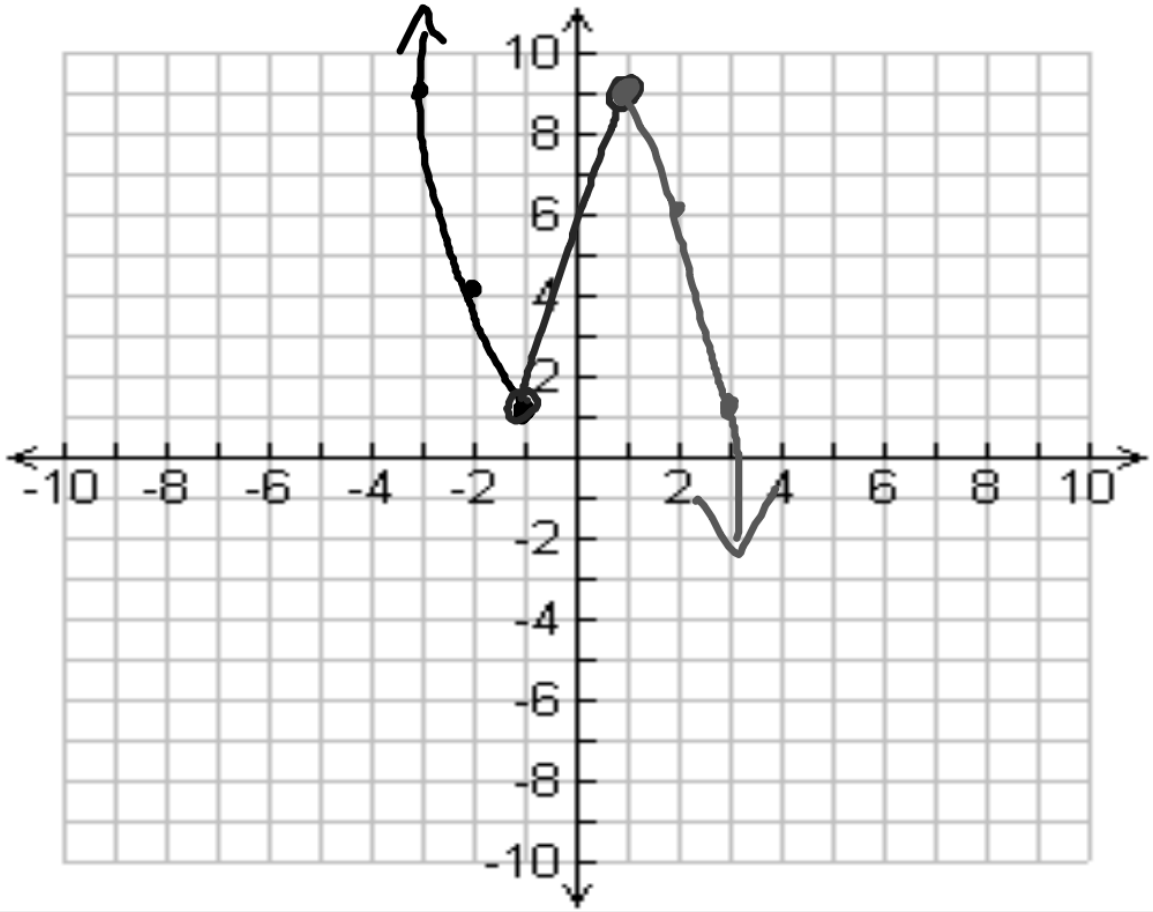
$-1) = (-1)^2 = 1$

$2) = 10 - (2) = 8$

$6) = 10 - (6) = 4$

$2 < x \leq 6$



x. 6 Graph the following piecewise defined function

$$h(x) = \begin{cases} x^2 & \text{if} \quad x \leq -1 \\ 4x + 5 & \text{if} \quad -1 < x < 1 \\ -x^2 + 10 & if \quad x \geq 1 \end{cases}$$