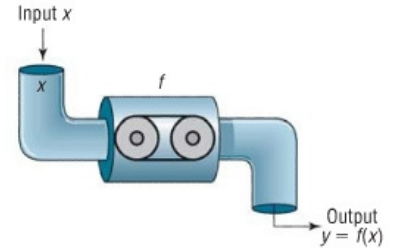


Objective: Use function notation to answer questions about graphs and to evaluate values of a function using its equation.

Function Notation

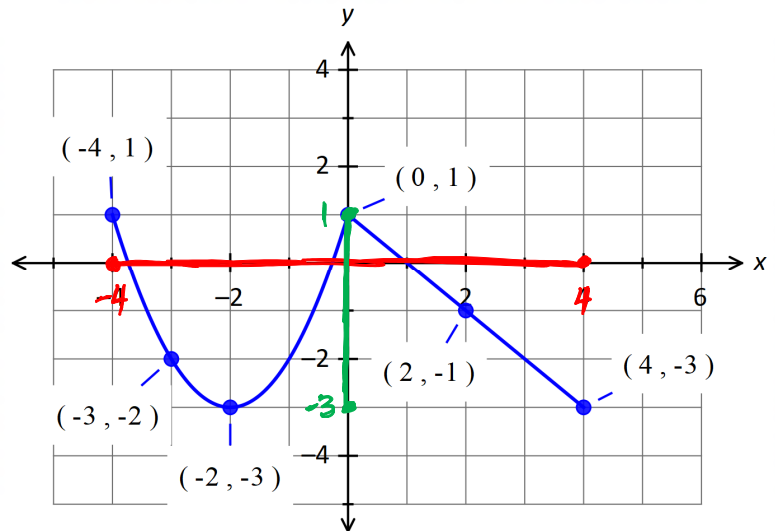
$f(x)$ is another way of writing y .

- $f(2)$ means the output from function f when $x = 2$.
 - If the function is represented by an equation, replace *all* the x 's with 2's and simplify.
 - If you have a graph of the function, find the point on the graph with an x -coordinate of 2 and give the y -coordinate of that point.
- If the problem tells you that $f(x) = 5$, that means that the output or y -value is 5 when you plug in some value of x .
 - If the function is represented by an equation, replace $f(x)$ or y with 5 and solve for x .
 - If you have a graph of the function, find the point(s) on the graph with a y -coordinate of 5 and give the x -coordinate(s).



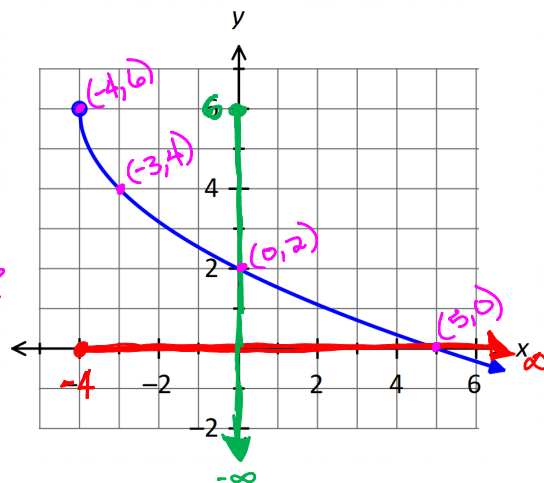
Example: The graph of $y = f(x)$ is shown below. Use it to answer the following.

- a) Find $f(-3)$. -2 *x = -3, what is y?*
The point was (-3, -2)
- b) Find $f(2)$. -1 *x = 2, what is y?*
The point was (2, -1)
- c) For what value(s) of x is $f(x) = 1$? -4 & 0
y = 1, what's x?
Points: (-4, 1) & (0, 1)
- d) For what value(s) of x is $f(x) = -3$? -2 & 4
y = -3, what's x?
Points: (-2, -3) & (4, -3)
- e) What is the domain of f ? [-4, 4]
- f) What is the range of f ? [3, 1]



Example: The graph of $y = g(x)$ is shown below. Use it to answer the following.

- a) Find $g(0)$. 2 *x = 0, what's y?*
- b) Find $g(-3)$. 4 *x = -3, what's y?*
- c) For what value of x is $g(x) = 0$? x = 5 *y = 0, what's x?*
- d) For what value of x is $g(x) = 6$? x = -4 *y = 6, what's x?*
- e) What is the domain of g ? [-4, ∞)
- f) What is the range of g ? (-∞, 6]



REVIEW: Order of Operations

"Please excuse my dear Aunt Sally"

P parentheses (or other grouping symbols → under $\sqrt{\quad}$, top or bottom of fraction, etc.)
E exponents

M or D multiply or divide in order from left to right
A or S add or subtract in order from left to right

Examples: Simplify the following expressions. Show each step.

a) -4^2
 \uparrow
 means $-1 \cdot 4^2$
 $-1 \cdot 4^2$ exponents before multiplying
 $= -1 \cdot 16$
 $= \boxed{-16}$

b) $(-4)^2$
 means $-4 \cdot -4$
 $= \boxed{16}$
 parentheses matter!

c) $-(1-3)^2$
 $= -(-2)^2 \leftarrow (-2)^2 = -2 \cdot -2 = 4$
 $= \boxed{-4}$

d) $-2(3)^2$
 $= -2(9)$
 $= \boxed{-18}$

e) $-3 \cdot (-2)^2 + 4$
 $= -3(4) + 4$
 $= -12 + 4 = \boxed{-8}$

f) $2|5-3|$
 $= 2|2| \leftarrow |2| = 2$
 $= 2(2)$
 $= \boxed{4}$

g) $|6-10|-2$
 $= |-4|-2$
 $\leftarrow |-4|=4$
 $= 4-2$
 $= \boxed{2}$

h) $\frac{2+6}{-4}$
 $= \frac{8}{-4}$
 $= \boxed{-2}$

i) $\frac{8}{2(5)+6}$
 $= \frac{8}{10+6}$
 $= \frac{8}{16} = \boxed{\frac{1}{2}}$

Examples: Find each value if $f(x) = x^2 - 2x + 3$, $g(x) = 3x - 5$, and $h(x) = \frac{x}{4-2x}$. Leave your answers as simplified fractions, if necessary. Show all your work.

Replace all x 's with # in (\quad) , then simplify

a) $f(2)$
 $= 2^2 - 2(2) + 3$
 $= 4 - 4 + 3$
 $= 0 + 3 = \boxed{3}$

b) $g(-1)$
 $= 3(-1) - 5$
 $= -3 - 5$
 $= \boxed{-8}$

c) $h(4)$
 $= \frac{4}{4-2(4)}$
 $= \frac{4}{4-8}$
 $= \frac{4}{-4} = \boxed{-1}$

d) $g\left(\frac{2}{3}\right)$
 $= 3\left(\frac{2}{3}\right) - 5$
 $= 2 - 5$
 $= \boxed{-3}$

e) $f(-5)$
 $= (-5)^2 - 2(-5) + 3$
 $= 25 + 10 + 3$
 $= \boxed{38}$

f) $h(-3)$
 $= \frac{-3}{4-2(-3)}$
 $= \frac{-3}{4+6}$
 $= \frac{-3}{10}$
 not necessary to show this $4-(-6)$

(\quad) are crucial! You are squaring -5 , not squaring 5 & making the answer negative
 If you write -5^2 instead of $(-5)^2$, you would get -12 as an answer!