

MA 109: August 24

Function Notation – Evaluating Functions

Start of Class

Instructor Information

Name:

Email:

Office Hours:

Warm-up Questions

Notes

What is a function?

a machine that turns inputs into outputs

name of function f input x output y

$$f(x) = y$$

"f of x"

Example: Suppose $f(x) = x + 4$. What is $f(-3)$?

x is a placeholder for the input input is -3

Strategy: replace all the x 's with -3

$$\begin{aligned} f(x) &= x + 4 \\ f(-3) &= (-3) + 4 \\ &= -3 + 4 \\ &= \boxed{1} \end{aligned}$$

Constant functions are functions that...

always have the same output

Example: Suppose $f(x) = 42$. What is $f(-1)$?

↑ input is -1

nowhere to put the
input in the formula,
so the input doesn't
matter

Answer: $f(-1) = 42$

Inputs can be anything!

Example: Suppose $f(x) = 3x^2 - 7$. What is $f(a+1)$?

↑
the input is $a+1$

Strategy: replace all x 's with $(a+1)$

$$f(x) = 3x^2 - 7$$

$$f(a+1) = 3(a+1)^2 - 7$$

Note: you do not need to simplify
unless told otherwise

The parentheses are essential:

$$3(a+1)^2 - 7 \quad \text{is NOT} \quad \text{the same as} \quad 3a+1^2 - 7$$

Piecewise Functions are functions that...

use different formulas for different inputs

$$p(x) = \begin{cases} 5-x & x > 2 \\ \pi & 0 \leq x \leq 2 \\ x^2 + 1 & x < 0 \end{cases}$$

how to know which formula to use,
START HERE

Example: Suppose $p(x)$ is given as above. What is $p(0)$?

First, figure out which formula to use. See which inequality works for $x = 0$

$$0 > 2 \quad \text{no}$$

$$0 \leq 0 \leq 2 \quad \text{yes!}$$

$$0 < 0 \quad \text{no}$$

So, we use the middle formula. It's a constant function, so we have our answer:

$$f(0) = \boxed{\pi}$$

Example: Suppose $h(x)$ is given in the table to the right. What is $h(2)$?

2 is the input

Strategy: find 2 in the input column, the answer is the number in the output column

inputs ↓ x	outputs ↓ $h(x)$
-1	-1
0	3
2	5
3	7

Answer: $h(2) = 5$

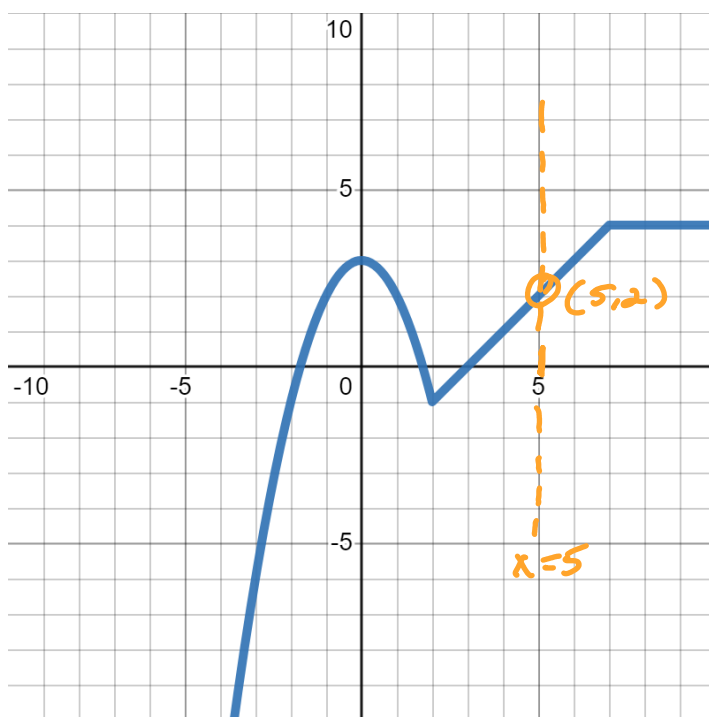
Example: Suppose $f(x)$ is given in the graph to the right. What is $f(5)$?

input is 5

On a graph:

- x-coordinates are inputs
- y-coordinates are outputs

Strategy: find $x=5$, look up/down to find the y-coordinate on the graph



Answer: $f(5) = 2$

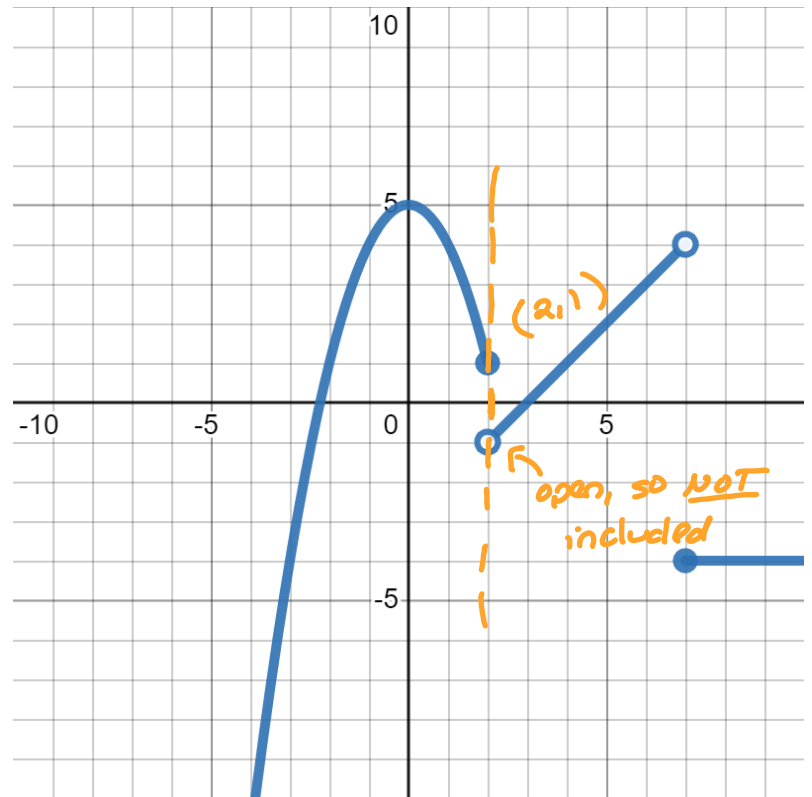
← 2 is the input

Example: Suppose $f(x)$ is given in the graph to the right. What is $f(2)$?

Same strategy as last time with added info:

- "closed" points: included
- "open" points: NOT included

Answer: $f(2) = \boxed{1}$



End of Class

Write a summary of what you learned today:

What questions do you have about the material from today?

What do you need to do between now and the next class meeting?