

MATH 2301 (Barsamian) Day 1 Mon Aug 28, 2023

①

Pick up Calendar and Exercise List

Sit in rows below the railing, in the front of the room

Sign In when the sheet comes around

Diagnostic Test tomorrow (Tuesday) in Recitation.

(Practice Problems on Course Web Page)

Start Working on Homework Right Away!

Write solutions on paper before typing into WebAssign

I strongly recommend buying a print copy of the textbook at College Bookstore

Section 1.3 Limits

(2)

The Most Important Concept of 1st Month of Calculus

When can you cancel $\frac{\text{term}}{\text{term}}$ and why?

Consider $f(x) = \frac{x^2 - 2x - 3}{x - 3} = \frac{(x+1)(x-3)}{(x-3)}$

and $g(x) = x + 1$

Are they the same function?

Consider substituting in x values

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

2	$f(2) = \frac{(2+1)(2-3)}{(2-3)} = 3$
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3	$f(3) = \frac{(3+1)(3-3)}{(3-3)} = \frac{4 \cdot 0}{0} = \frac{0}{0}$ undefined
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cannot cancel $\frac{0}{0}$

x	$g(x) = x + 1$
1	$g(1) = 1 + 1 = 2$
2	$g(2) = 2 + 1 = 3$
3	$g(3) = 3 + 1 = 4$

Functions are not the same because they have different domains.

Limits

③

Definition of Limit (Informal Definition) (Original ~~set~~ Section 1.3 definition)

Symbol: $\lim_{x \rightarrow a} f(x) = L$

Spoken: The limit, as x approaches " a " of $f(x)$ is L .

Usage: The symbol " a " represents a real number
symbol L represents a real number

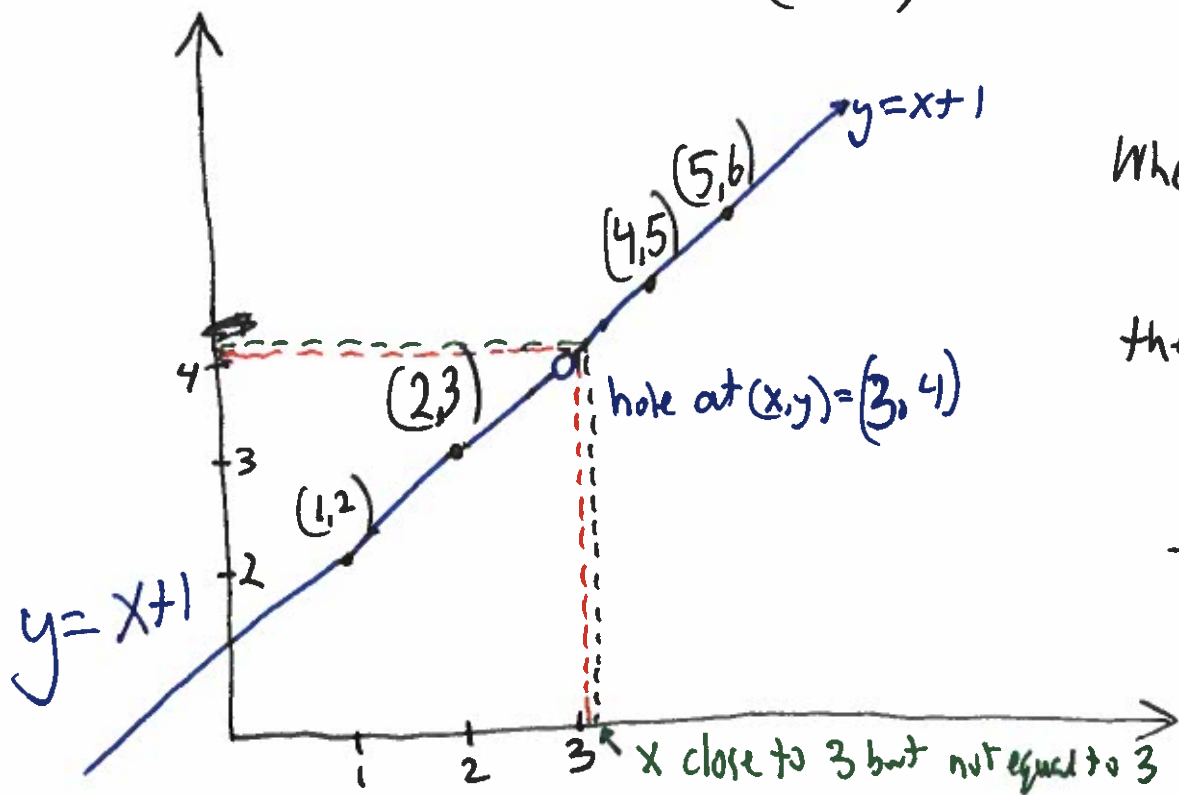
Meaning: When x gets closer + closer to a , but not equal to a ,
the values of $f(x)$ get closer + closer to L
(and may actually equal L)

Graphical Significance: The graph of f appears to be
heading for the location (a, L)
where a, L are real numbers.

Example for $f(x) = \frac{(x+1)(x-3)}{x-3}$, find the limit $\lim_{x \rightarrow 3} f(x)$ (4)

by using a graph of $f(x)$

Graph of $f(x) = \frac{x^2 - 2x - 3}{x - 3} = \frac{(x+1)(x-3)}{(x-3)}$



When x gets closer & closer to 3
but not equal to 3
the y values get closer & closer
to 4

That is

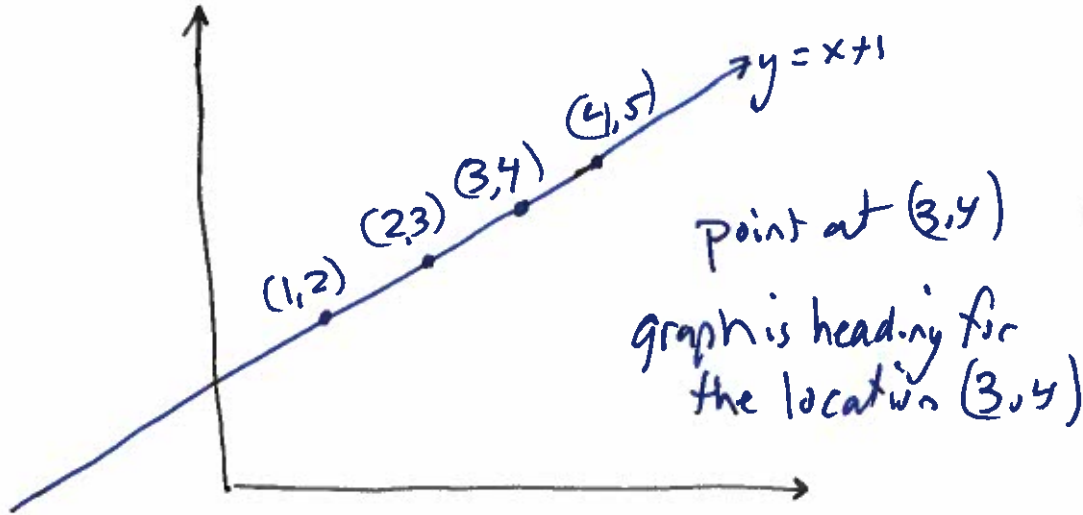
$$\lim_{x \rightarrow 3} f(x) = 4$$

remember $f(3)$ Does not exist

Graph appears to be heading for the
location (3, 4)

(5)

Compare to behavior of $g(x) = x + 1$



$$g(3) = 4$$

$$\lim_{x \rightarrow 3} g(x) = 4$$

end of meeting