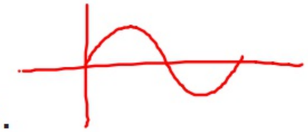
Good afternoon

Please complete the warmup in your notes.



1. $\lim_{x \to 5} e^x = e^5$

2. $\lim_{y \to 2\pi} \sin(y) = 0$

3. $\lim_{x \to 5} \frac{2x - 10}{x - 5} = 2.$

$\lim_{x \to 5} \frac{2\cancel{(x-5)}}{\cancel{x-5}}$

$\lim_{x \to 5} 2$

4. Let $f(x) = \begin{cases} x, & if\ x < 3 \\ 7 & if\ x > 3 \\ 0 & if\ x = 3 \end{cases}$

$\lim_{x \to 3^+} f(x)$

$= 7.$

A Mathematician's Lament

- Pick a passage/lines/excerpt from the essay that you liked/disliked
- Share it with your table, along with why it stood out to you
- The person closest to the door goes first, then go around

First test is Monday!!!!

What's gonna be on it?!?!?

(continuing last class' notes)

Let's try another!

$$\lim_{x \to 3} \frac{x^2-9}{x-3} = 6$$

You used a limit...

It's not very effective...

Graphically

Use your calculator

$$Y1 = \frac{x^2-9}{x-3}$$

Use the trace feature to approach 3.

So....

$$\lim_{x \to 3} \frac{x^2-9}{x-3} = 6$$

Algebraically?

$$\lim_{x\to3} \frac{x^2-9}{x-3}$$

$$\lim_{x\to3} \frac{(x+3)\cancel{(x-3)}}{\cancel{x-3}}$$

$$\lim_{x\to3} x+3 = 6$$

How to do limits:

- plug it in, plug it in

- "massage" the limit by cancellation, factoring, other manipulations; THEN plug in.

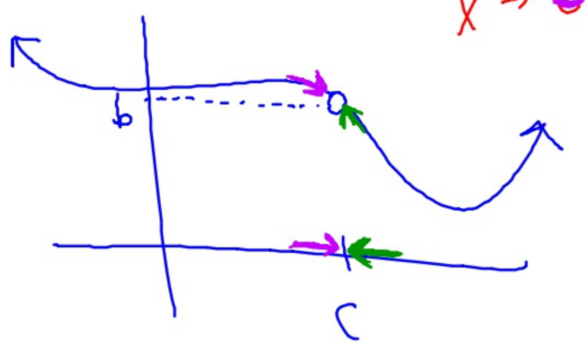
"Limit Existence" *

The last example: the limit existed, and was 6

NOTE: there is no actual value AT 6. A limit does not care what happens AT the value. Just near it.

A limit exists if and only if (iff)

$$\lim_{x \to c^+} f(x) = \lim_{x \to c^-} f(x) = b,$$ for a finite number b.



A limit exists when:

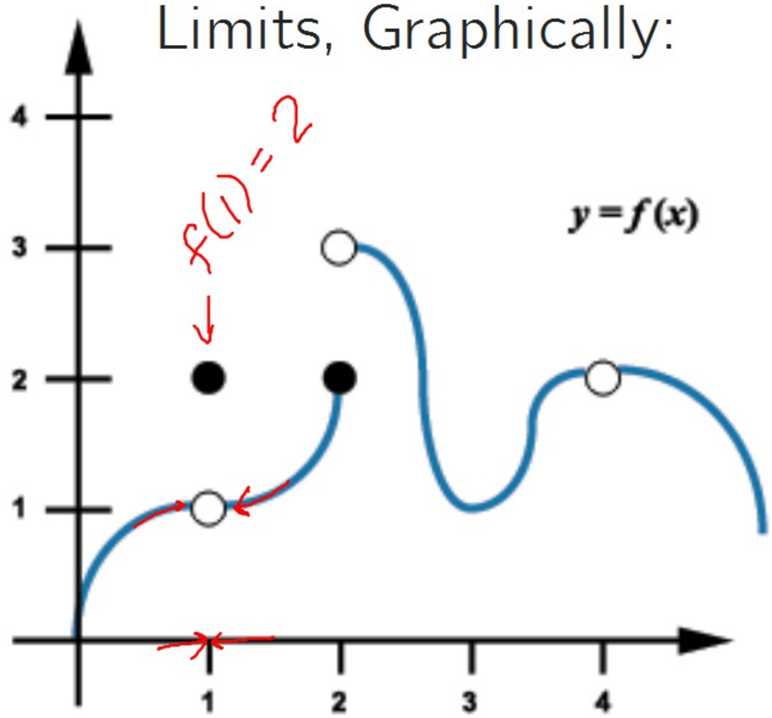
y value from the left = y value from the right = some number that is not infinity

If both sides approach the "same" infinity, we can say the limit = infinity, but it isn't technically "limited"

If both sides are not equal to the same finite number, then....

https://www.youtube.com/watch?v=Lck5_YoxxGI

Limits, Graphically:



16. The value of $\lim_{x\to 1} f(x) =$ 1.

17. The value of $\lim_{x\to 2} f(x) =$ d.n.e.

18. The value of $\lim_{x\to 2^+} f(x) =$ 3

19. The value of $\lim_{x\to 3} f(x) =$ 1

20. The value of $\lim_{x\to 4} f(x) =$ 2

Try #1-15. Skip around if you aren't sure.

Algebraic Limits

What if plugging in and factoring/cancellation both fail?

$$\lim_{x\to 0} \frac{\sqrt{x+1}-1}{x} \cdot \frac{\sqrt{x+1}+1}{\sqrt{x+1}+1}$$

Rationalization (Multiply by the Conjugate)

the radical part with the opposite sign.

$$\lim_{x\to 0} \frac{x+\cancel{1}-\cancel{1}}{x(\sqrt{x+1}+1)} \Rightarrow \lim_{x\to 0} \frac{\cancel{x}}{\cancel{x}(\sqrt{x+1}+1)}$$

$$\lim_{x\to 0} \frac{1}{\sqrt{x+1}+1} = \frac{1}{\sqrt{0+1}+1} = \frac{1}{2}$$

$$\lim_{x \to 7} \frac{\sqrt{x+2} - 3}{x - 7}$$

Homework

p 55: 17-19, 23, 24 [F-L2a]

p. 67: 18-33 (x3), 41-50 [F-L1a]

multiples of 3