Good afternoon
Warm up in notebooks:

fyi: first assessment is Weds!

Write the equation of the line that passes through (-2,1) and (2,-2).

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - -2}{-2 - 2} = \frac{3}{-4} \rightarrow -\frac{3}{4}$ (m)

$y = -\frac{3}{4}x + b$

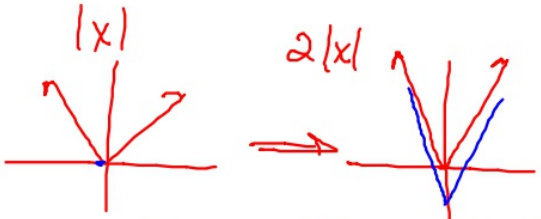
$y - y_1 = m(x - x_1)$

$y + 2 = -\frac{3}{4}(x - 2)$

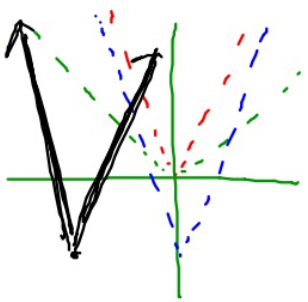
$y = |x + 4|$

$x + 4 = 0$

$x = -4$



Sketch the graph $y = 2|x+4| - 3$ and describe its domain and range using
interval notation (e.g. "(-3,5]")



D: $(-\infty, \infty)$ R: $[-3, \infty)$

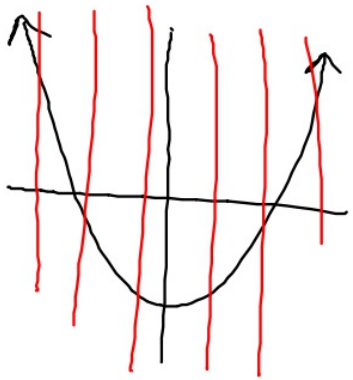
What is a function?

(NOTES)

→ the mathematical mapping of one set of numbers (domain) onto another set of numbers (range)

$f(x) = x + 3$

x	f(x)
1	4
2	5
3	6
5	8
7	10



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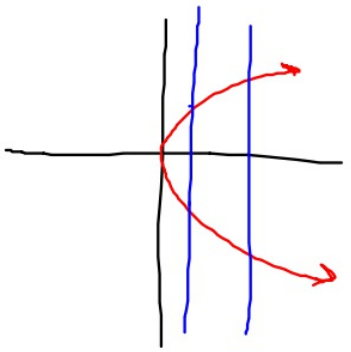

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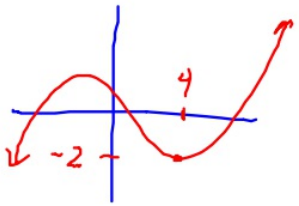
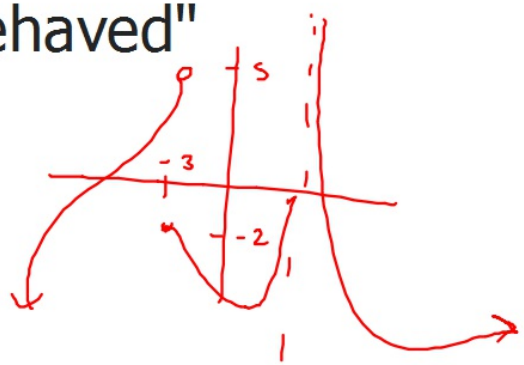
How do functions behave?

Some are predictable..."well behaved"

Others are not

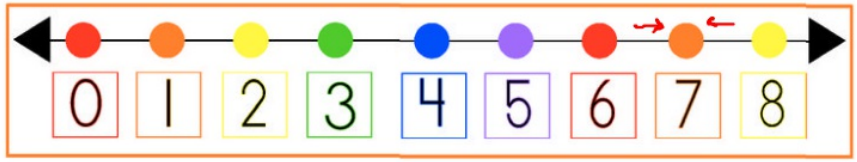




What does it mean to get "close" to ~~a number~~ 7?

6.999....

7.000.....1



What is a limit? $\lim_{x \to c} f(x) = b$

The limit as x approaches c (some number, as an x-value)
of a function $f(x)$ is some number, b (a y-value, output).

A limit is: - an operator, something done to math
other operators: +,-,x,÷, ln,√

- an output, or "y-value"

MY FIRST LIMIT

$$\lim_{x \to 3} (x + 4) = 7$$

Direct Substitution

Let's try another!

$$\lim_{x \to 3} \frac{x^2 - 9}{x - 3} = \frac{9-9}{3-3} = \frac{0}{0} \quad !!$$

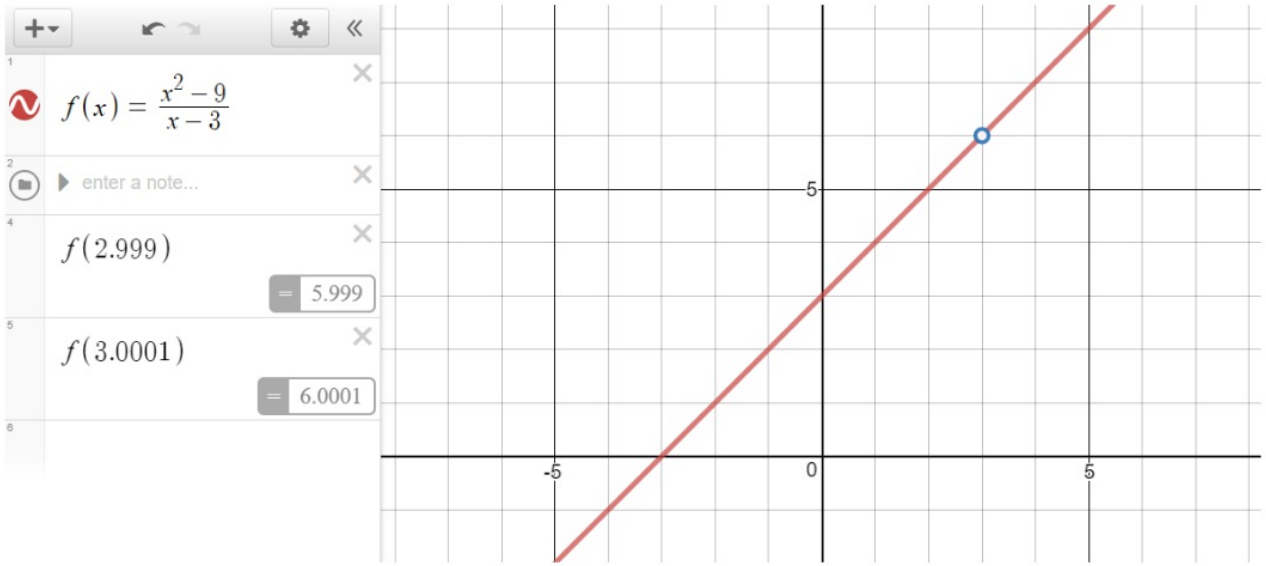
You used a limit...

Graphically

Use your calculator

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

Use the TRACE feature to approach 3 from both sides.



Algebraic Approach

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

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

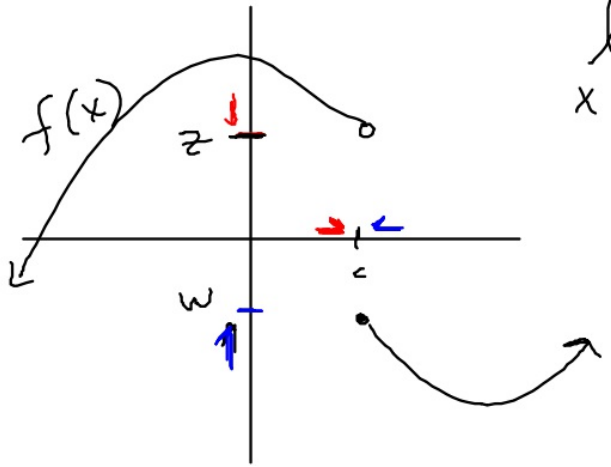
$$\lim_{x \to 3} x+3 = 6$$

<u>Limits Toolkit</u>

Direct substitution (plug it in, plug it in)
Factor, then cancel (give it a massage)
Look at graph, try nearby numbers

Keep in mind!!! there is no value AT 3. f(3) is undefined.

Will limits always work?



$\lim_{x \to c} f(x) = ?$

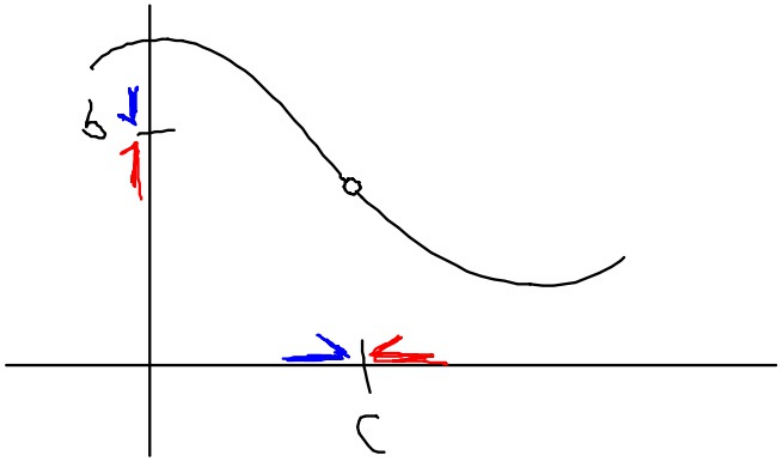
the limit does not exist.

Limit Existence Definition

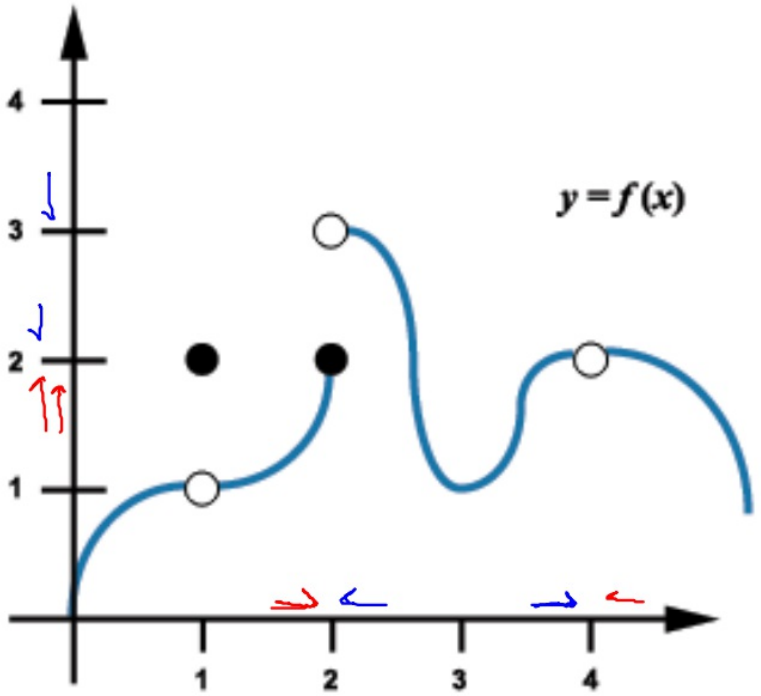
iff

The limit of f(x) as x approaches some number c exists if and only if

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



Limits, Graphically:



$\lim_{x \to 1} f(x) = 1$

$\lim_{x \to 2} f(x)$ d.n.e.

$\lim_{x \to 2^+} f(x)$ 3

$\lim_{x \to 3} f(x)$ 1

$\lim_{x \to 4} f(x) = 2$

$f(1) = 2$

$f(2) = 2$

$f(4) = \emptyset$

Homework:

p. 55 #17-24

p. 67 #41-50

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