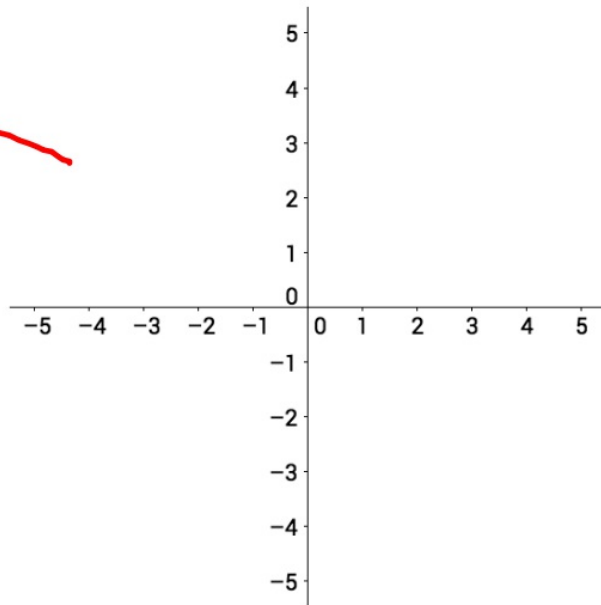
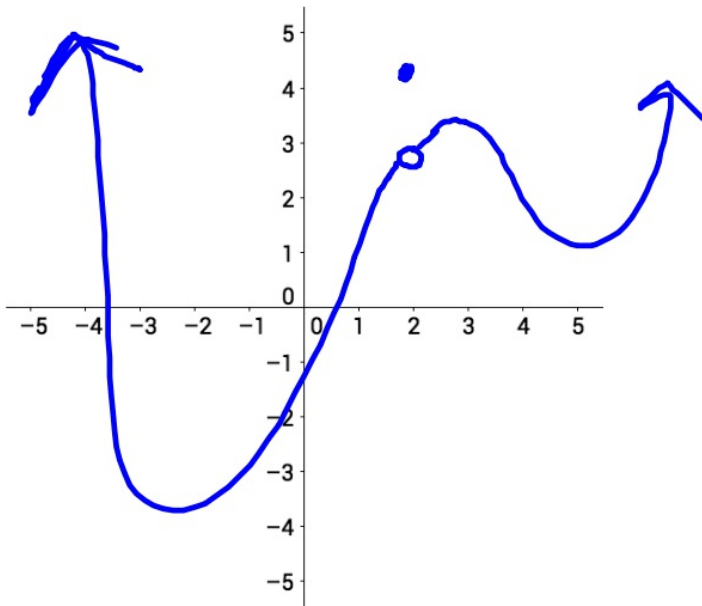


Good afternoon: Please get a whiteboard + color pen (at back table)  
Then use a ruler and draw a  $[-5, 5]$  x-y axes.

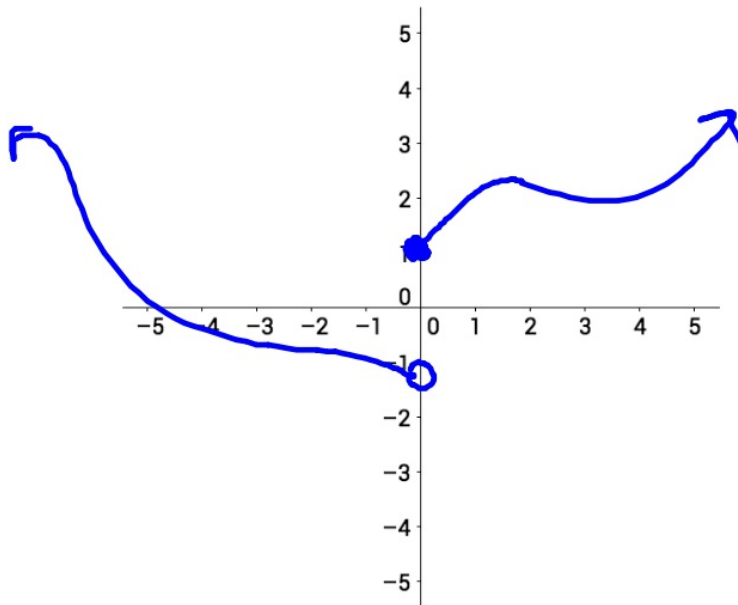


Reminder:  
Test on Monday  
  
Tutoring will be  
Tuesdays 4-5p

Sketch a function  $y=f(x)$  such that  $\lim_{x \rightarrow 2} f(x) = 3$  but  $f(2) \neq 3$

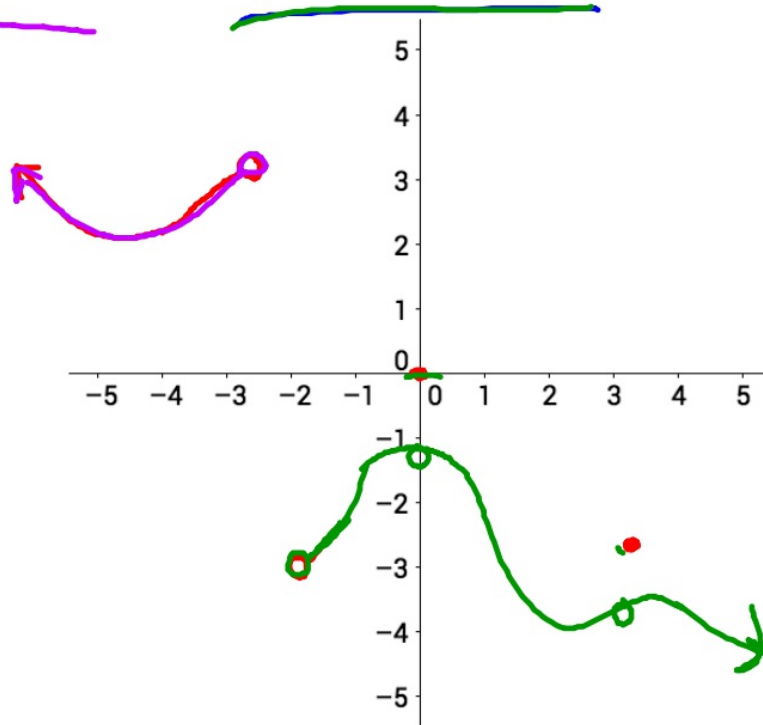


Sketch a function  $y=f(x)$  such that  $\lim_{x \rightarrow 0} f(x)$  does not exist and  $f(0)=1$ .



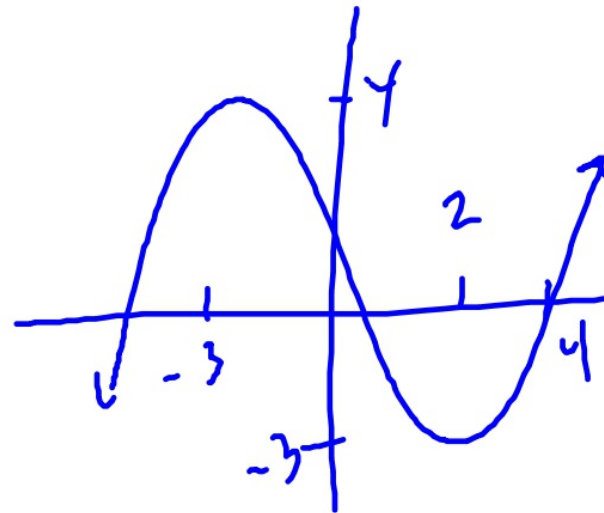
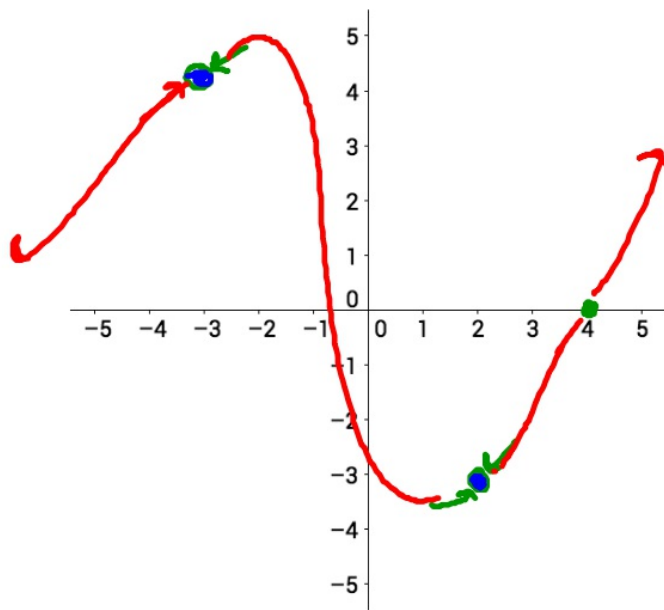
Sketch a function  $y=f(x)$  such that

$$\lim_{x \rightarrow -2^-} f(x) = 3 \quad \text{and} \quad \lim_{x \rightarrow -2^+} f(x) = -3 \quad \text{and } f(3) = -3 \text{ and } f(0) = 0.$$



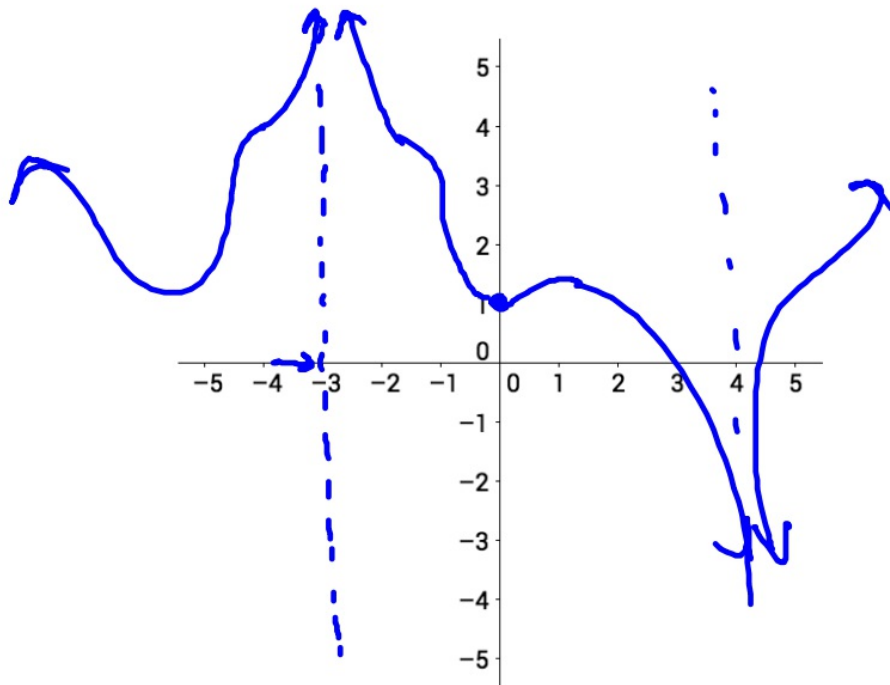
Sketch a function  $y=f(x)$  such that

$$\lim_{x \rightarrow -3^+} f(x) = 4 \quad \text{and} \quad \lim_{x \rightarrow 2^-} f(x) = -3 \quad \text{and } f(4) \text{ is a root.}$$



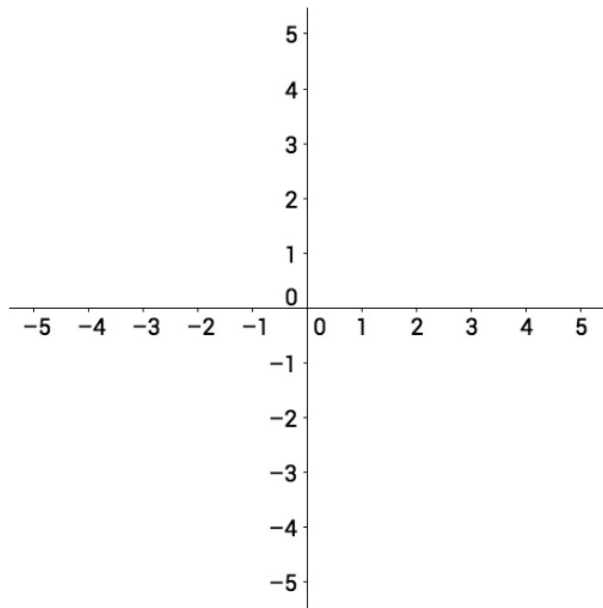
Sketch a function  $y=f(x)$  such that

$$\lim_{x \rightarrow -3} f(x) = \infty \quad \text{and} \quad \lim_{x \rightarrow 4} f(x) = -\infty \quad \text{and} \quad f(0)=1.$$



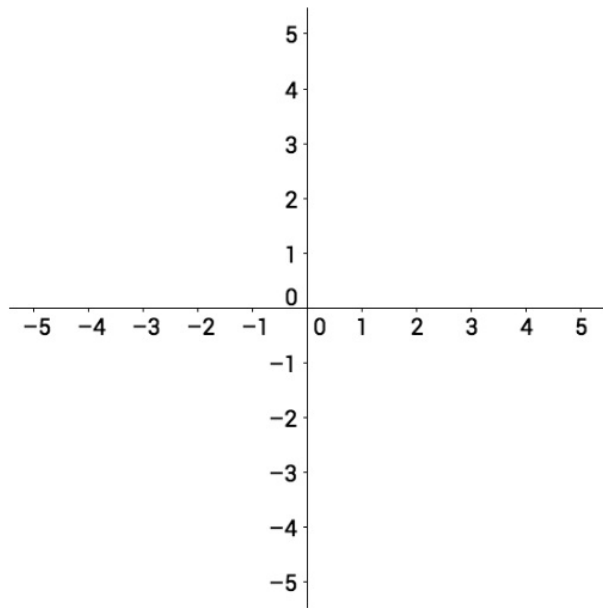
Sketch a function  $y=f(x)$  such that

$$\lim_{x \rightarrow -\infty} f(x) = 2 \quad \text{and} \quad \lim_{x \rightarrow \infty} f(x) = -3 \quad \text{and} \quad \lim_{x \rightarrow 0} f(x) \text{ does not exist.}$$



Sketch a function  $y=f(x)$  such that

$$\lim_{x \rightarrow -2^-} f(x) = \infty \quad \text{and} \quad \lim_{x \rightarrow 3^-} f(x) = -\infty \quad \text{and} \quad \lim_{x \rightarrow 3^+} f(x) = \infty \quad \text{and} \quad \lim_{x \rightarrow \infty} f(x) = 2$$





Homework sols: check, correct (don't erase!), ask questions of table/me

17. 2

18. 4

19. dne,  $-1 \neq 1$

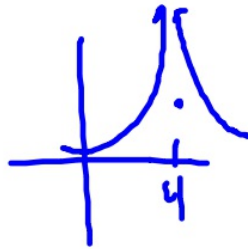
23.

a.  $f(1)=2$

b. dne.  $3.5 \neq 1$

c.  $f(4)$  undefined.

d.  $\lim f(x) = 2$



24. a.  $f(-2)$  undef

b. dne

c.  $f(0)=4$

d. dne,  $0.5 \neq 4$

e.  $f(2)$  undef

f.  $\lim f = 0.5$

g.  $f(4)=2$

h. dne  $\infty$

18.  $-5/2$

21. 7

24. a: 4    b: 16    c: 16

27. 1

30. 0

33.  $1/2$

41. 3

42. -5

43. -2

44. -7

\* 45. 12

46. 3

47. -1

$$x^3 - 2^3$$

$$\frac{x^3 - 8}{x - 2} =$$

48.  $1/2$

49.  $1/8$

50.  $-1/10$

Put this homework in the homework section of your binder!

It is your ticket to re-assess Monday's test if needed

Rationalizing to find a limit

(notes, continued)

$$\lim_{x \rightarrow 7} \frac{(\sqrt{x+2}-3)}{(x-7)} \cdot \frac{(\sqrt{x+2}+3)}{(\sqrt{x+2}+3)} = \frac{\cancel{x+2}-9}{(x-7)(\sqrt{x+2}+3)}$$

$$\lim_{x \rightarrow 7} \frac{1}{\sqrt{x+2}+3}$$

$$\frac{1}{\sqrt{9}+3} = \frac{1}{6}$$

$$\lim_{x \rightarrow 4} \frac{(x - \sqrt{3x+4})}{4-x} \cdot \frac{(x + \sqrt{3x+4})}{x + \sqrt{3x+4}}$$

$$\frac{x^2 - (3x+4)}{(4-x)(\quad)} \quad (-x+4)(-x-1)$$

$$\frac{x^2 - 3x - 4}{(4-x)(\quad)} \rightsquigarrow \frac{(x-4)(x+1)}{(4-x)(\quad)}$$

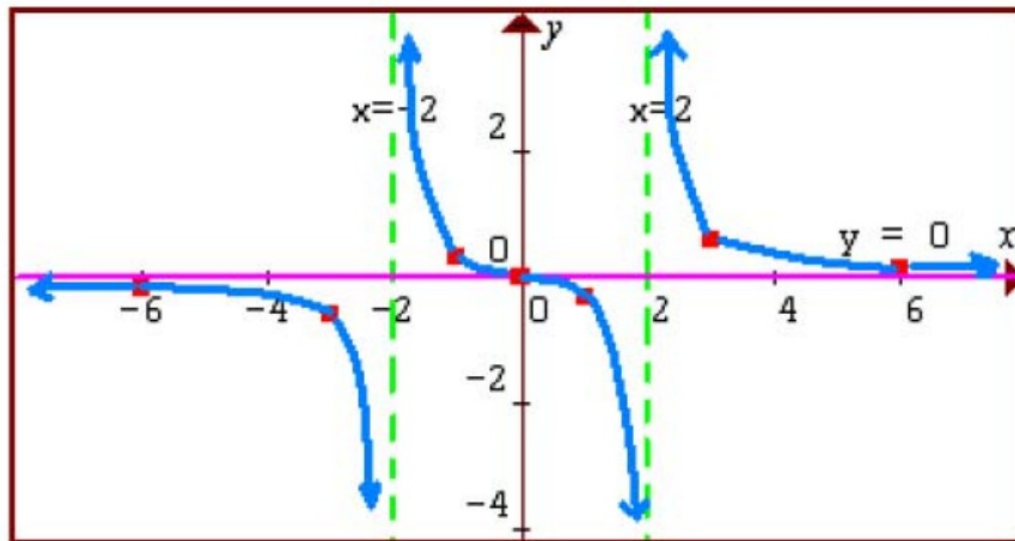
$$\frac{-1(-x+4)(x+1)}{(4-x)(\quad)} \quad \leftarrow$$

$$\frac{-1(x+1)}{x + \sqrt{3x+4}} \quad \left( \frac{-5}{8} \right)$$

$\lim_{x \rightarrow 4}$

## Asymptotes, One-Sided Limits, and Limits at Infinity

What is a vertical asymptote? What is a horizontal asymptote?  
Talk about it with your table.



One-sided limits

$0.999... = 1$

$$\lim_{x \rightarrow 2^-} \frac{x}{x-2}$$

$\frac{1.999... - 2}{2^- - 2}$

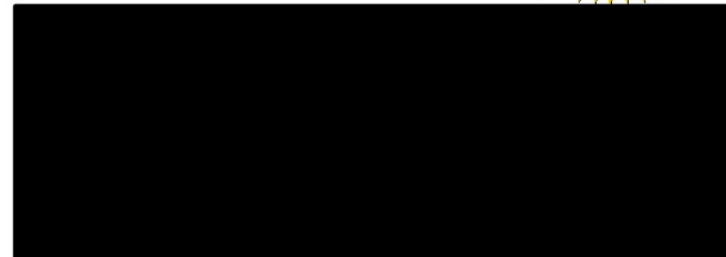
$\frac{2^-}{0^-}$

$\frac{+}{-}$

$= -\infty$



- direct substitution
- factoring/cancelling
- rationalization
- graph?? but no calculator?
- numerical methods!! **NEW!**



What is a small number divided by a ginormous number?

$$\frac{3}{99999\dots 9} = 0^+$$

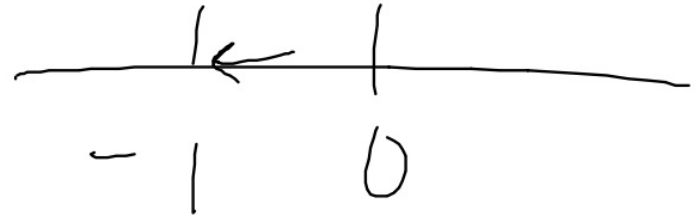
What is a positive big number divided by a negative ginormous number?

$$\frac{999\dots 9}{-9999999\dots 999} = 0^-$$

What is a negative number divided by a negative ginormous number?

$$\frac{-5}{-9\dots 9} = 0^+$$

$$\lim_{x \rightarrow -1^+} \frac{-3}{x^2 + 2x + 1}$$



$$\lim_{x \rightarrow -1^+} \frac{-3}{(x+1)^2}$$

-0.999...

$$\frac{-3}{(-1^+ + 1)^2}$$

$(-0.999... + 1)^2$

$$\frac{-3}{(0^+)^2}$$

$(0.000...-1)^2$

$$\frac{-3}{0^+} = -\infty$$

neg

pos



## Homework

p. 79 #7-12, 19, 20

p. 202 #19-26

Both pages align to  
[F-L1b and F-B1]

## Test on Monday!

- see warm up from yesterday, hw we went over today: factor and cancellation
- be able to identify limits from a graph (handout from Wed)
- be able to graph a function to meet criteria (whiteboards)
- website has everything!!!