Good afternoon: warm up in notebooks: find each limit, if d.n.e. explain why

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

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

3. $\lim_{x \to 5} \dfrac{2x - 10}{x - 5}$ = $\dfrac{2(x-5)}{x-5}$ = 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

5. $\lim_{x \to e} 4$ = 4

Will need textbook for a little while today

First Quarter Learning Targets:

AP Calculus AB – 1st Quarter Assessment Grades Name: _____

Key: F-L – Limits of Functions F-B – Behavior of Functions F-C Continuity
D-C Concept of the Derivative Most recent grade entered in PowerSchool. Each standard is assessed at least twice. Re-taking an assessment requires proof of completed homework.
Full state standards on web at: http://j.mp/tenncalc AP Course Description: http://bit.ly/apcalcccd

F-L1a Simple Limits: I can calculate limits algebraically, involving cancellation of terms or related manipulations.

Date						
Score						

F-L1b: One Sided and Infinite Limits: I can calculate one-sided limits and limits at and involving infinity.

Date						
Score						

F-L1c: Advanced Limits: I can calculate limits involving special trig properties and rationalization.

Date						
Score						

F-L2a Graphs and Tables: I can estimate limits of functions (including one-sided limits) from graphs or data.

Date						
Score						

F-B1: Asymptotes as Limits: I can describe asymptotic behavior (analytically and graphically) in terms of infinite limits and limits at infinity.

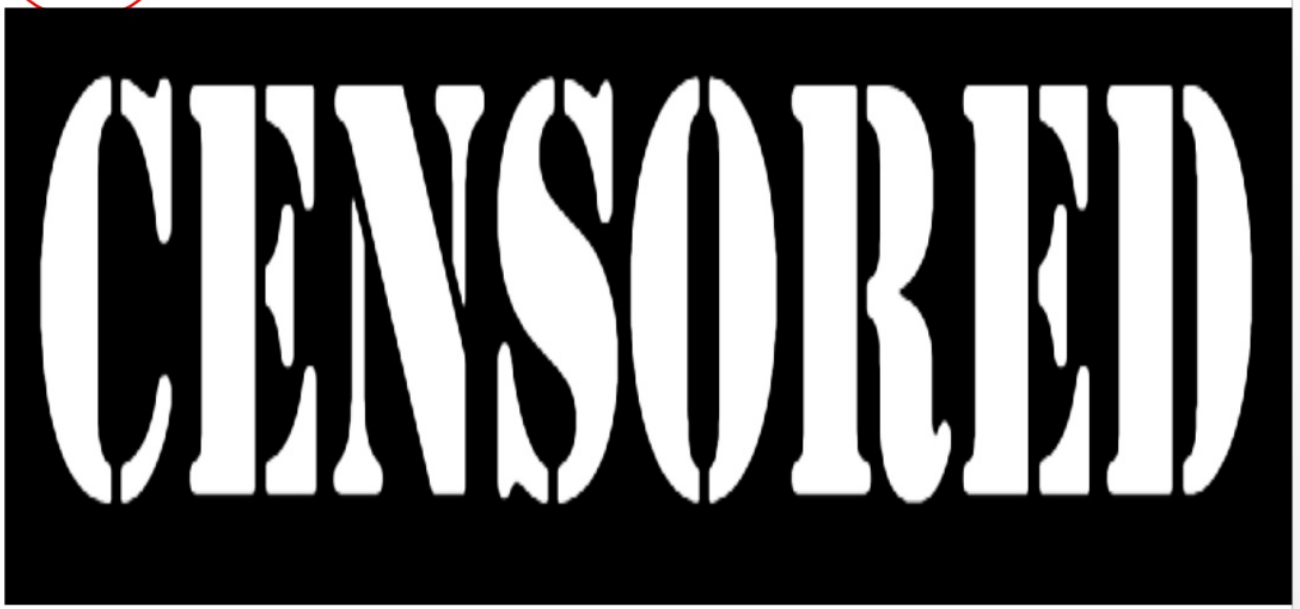
Date						

Name:

Self: _____ F-L1a: Evaluate each limit. Show all work. If a limit does not exist, show why.

Honor Pledge: I neither gave nor received assistance during this assessment. Initials: ____

Self: _____ F-L2a: Use the graph of $f(x)$ provided to evaluate each limit. If a limit does not exist, show why.



Assessment: clear tables, no calculator for this one, only pencil and cover sheet

- put name on it, sign honor pledge
- use your cover sheet
- self assess out of 4, then turn it into basket (next to calculators)
- copy down the table on p.59 (theorem 1.2) into your notes, then try p67 #40

Properties of Limits

NOTES

THEOREM 1.2 Properties of Limits

Let b and c be real numbers, let n be a positive integer, and let f and g be functions with the limits

$$\lim_{x\to c} f(x) = L \quad \text{and} \quad \lim_{x\to c} g(x) = K.$$

1. Scalar multiple: $\lim_{x\to c} [bf(x)] = bL$
2. Sum or difference: $\lim_{x\to c} [f(x) \pm g(x)] = L \pm K$
3. Product: $\lim_{x\to c} [f(x)g(x)] = LK$
4. Quotient: $\lim_{x\to c} \frac{f(x)}{g(x)} = \frac{L}{K}, \quad K \neq 0$
5. Power: $\lim_{x\to c} [f(x)]^n = L^n$

"factor" out a constant

Common Sense → "the limit of a Sum is the Sum of limits. (etc.)

40.

a. 3

b. 3/2

c. 729

d. 9

One-sided Limits, Infinity, and Asymptotes

A quick proof why 0.9999... $\equiv$ 1

$$10 = (N = 0.99999\ldots)\,10$$

$$10N = 9.99999\ldots$$

$$10N = 9 + 0.99999\ldots$$

$$10N = 9 + N$$

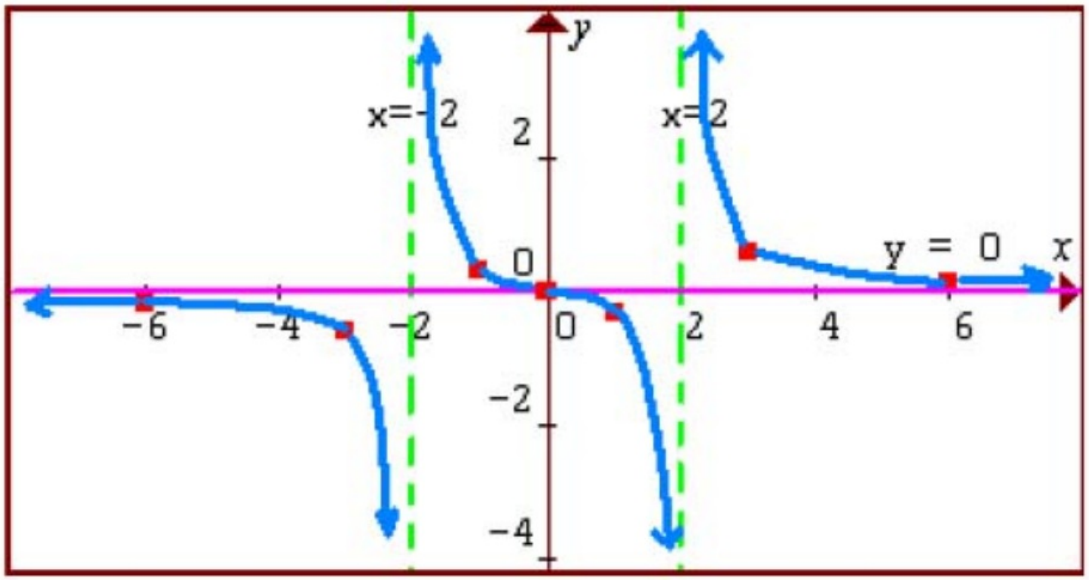
$$-N \qquad -N$$

$$9N = 9$$

$$\frac{9N}{9} = \frac{9}{9}$$

$$N = 1$$

What is a vertical asymptote? What is a horizontal asymptote?



$$\lim_{x \to 2} \frac{x}{x-2} = \frac{2}{0} \text{ !!}$$

A one sided limit:

$$\lim_{x \to 2^+} \frac{x}{x-2} = \frac{2^+}{2^+ - 2} = \frac{2^+}{0^+} = \infty$$

2.0001...

$$\lim_{x \to 2^-} \frac{x}{x-2} = \frac{2^-}{2^- - 2} = \frac{(+)\,2^-}{(-)\,0^-} = (-)\infty$$

1.999...

Basic things to remember:

$$\frac{+}{+} = +$$

$$\frac{+}{-} = -$$

$$\frac{\text{big}}{\text{small}} = \infty$$

$$\frac{\text{small}}{\text{big}} = 0$$

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

$$\frac{1}{99999999 \ldots}$$

+

$$\lim_{x\to -1} \frac{-3}{x^2+2x+1} = \frac{-3}{0} = -\infty$$

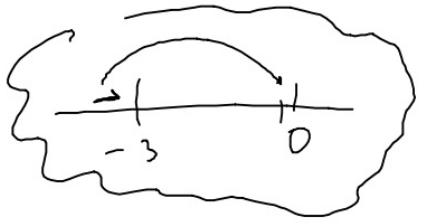
$$\lim_{x\to -1^+} \frac{-3}{(x+1)^2} = \frac{-3}{(-1^+ +1)^2} = \frac{-3}{(0^+)^2} = \frac{-3}{0^+} = -\infty$$

$-0.9999 + 1$

$$\lim_{x\to -1^-} \frac{-3}{(x+1)^2} = \frac{-3}{(-1^- +1)^2} = \frac{-3}{(0^-)^2} = \frac{-3}{0^+} = -\infty$$

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

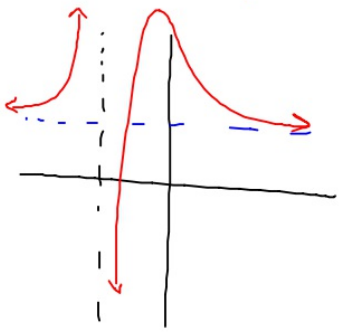
$$\lim_{x \to -3} \frac{-1(x-3)}{(x-3)(x+3)} \Rightarrow \lim_{x \to -3} \frac{-1}{x+3}$$

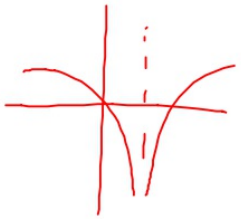


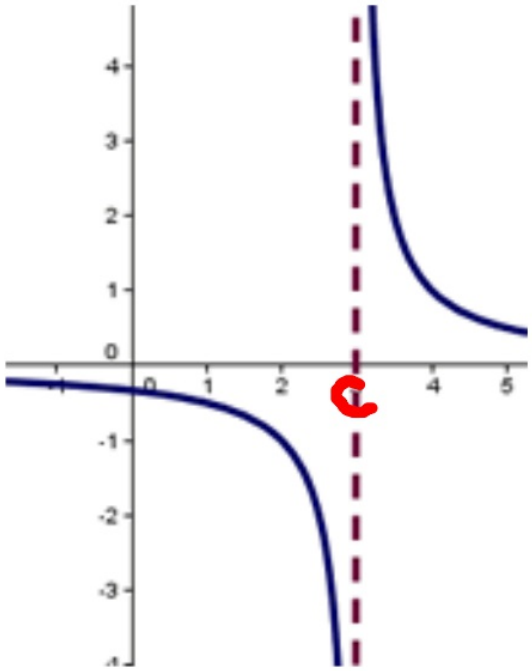
$$\lim_{x \to 3^-} \frac{-1}{x+3} = \frac{-1}{-3^- + 3} = \frac{-1}{0^-}$$

$$\lim_{x \to 3^+} \frac{-1}{x+3} = \frac{-1}{-3^+ + 3} = \frac{-1}{0^+} = -\infty$$

$= +\infty$



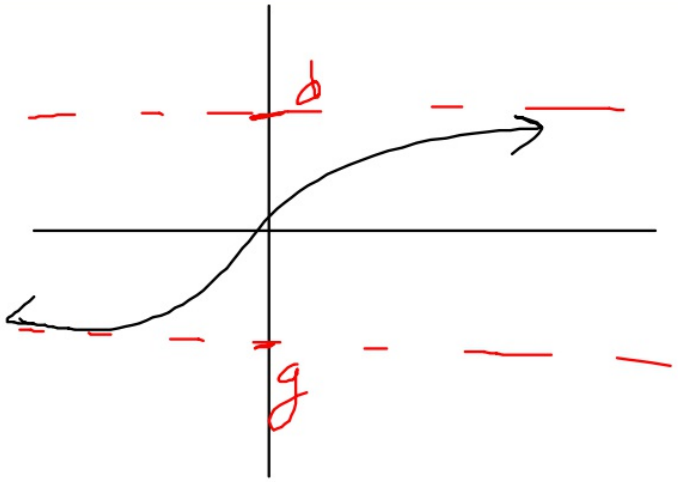




Definition of Vertical Asymptote

a function $f(x)$ has a V.A. $x = c$ if any of the following are true:

- $\lim_{x \to c^-} f(x) = \pm\infty$
- $\lim_{x \to c^+} f(x) = \pm\infty$



Definition of Horizontal Asymptote

A function $f(x)$ has a H.A. @ $y = d$ and/or $y = g$ if:

$$\lim_{x \to \infty} f(x) = d$$

$$\lim_{x \to -\infty} f(x) = g$$

HW:
p. 88
#17-24
#33-40

~~p. 202~~
~~#19-24~~

notes, help videos at mcalc.weebly.com
don't forget calcchat.com also!