FRI 5-9-08

* DISCUSS L-1

- PAGE L-2 ANSWERS TO 1-10 ON THE BACK OF p.75
- DISCUSS/CORRECT IN GROUPS
- REVIEW FORMAL DEFN. OF LIMIT

L-1

13. $f(x) = \dfrac{|x|}{x}$, $a = 1$

TABLE

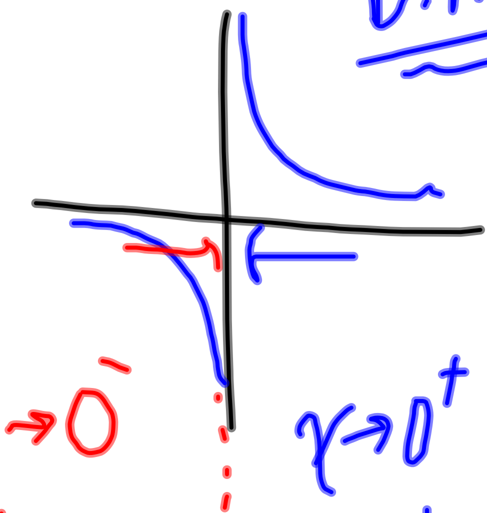
$x \to 1^-$

x	$\frac{\lvert x\rvert}{x}$
$\frac{1}{2}$	1
$\frac{3}{4}$	1
1	1
$1\frac{1}{4}$	1

$$\lim_{x \to 1} \frac{|x|}{x} = 1$$

6. $\displaystyle\lim_{x \to 0} \frac{1}{x}$

D.N.E.



$x \to 0^-$

$y \to -\infty$

$x \to 0^+$

$y \to +\infty$

⑦ $\lim_{x\to 2}\left(x - \frac{x^2-4}{x-2}\right)$

$= \lim_{x\to 2}\left(x - \frac{(x+2)\cancel{(x-2)}}{\cancel{x-2}}\right)$

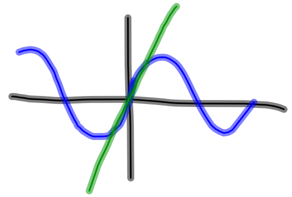
$= \lim_{x\to 2} x - x - 2$

$= \lim_{x\to 2}(-2)$

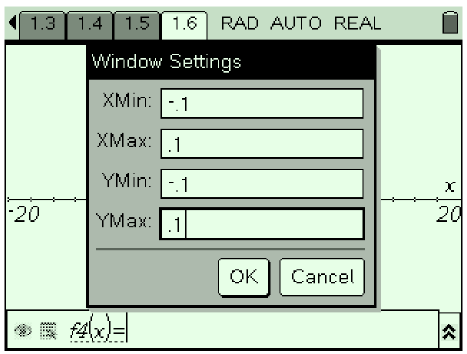
$= -2$

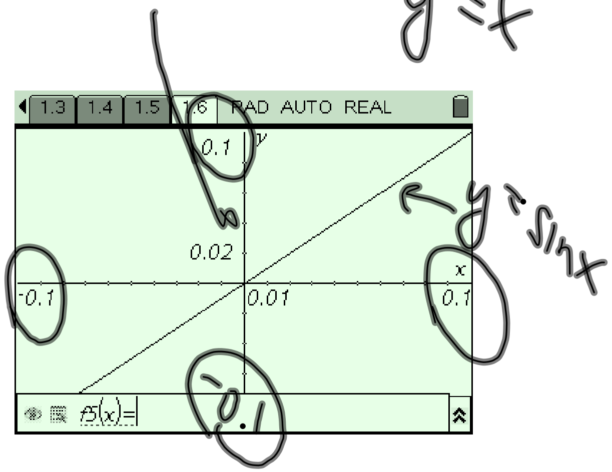
⑲ $\lim_{x\to 0} \frac{\sin x}{x} = 1$

$\sin x = x$?



LOOKS LIKE $y = x$





The Formal Definition of the Limit of a Function

Suppose that ***f*** is a function that is defined over an open interval containing a number ***a***, except possibly at ***a*** itself.

The limit of the function ***f*** at ***a*** is L,

$$\lim_{x \to a} f(x) = L$$

provided that for every $\varepsilon > 0$ given to me,
I can find a number $\delta > 0$ such that:
$|f(x) - L| < \varepsilon \quad whenever \quad 0 < |x - a| < \delta$
and ***x*** is in the domain of ***f***.

SO WHAT DOES THIS MEAN GRAPHICALLY?

The Formal Definition of the Limit of a Function

Suppose that f is a function that is defined over an open interval containing a number a, except possibly at a itself.

The limit of the function f at a is L,

$$\lim_{x \to a} f(x) = L$$

provided that for every $\varepsilon > 0$ given to me, I can find a number $\delta > 0$ such that: $|f(x) - L| < \varepsilon$ *whenever* $0 < |x - a| < \delta$ and x is in the domain of f.

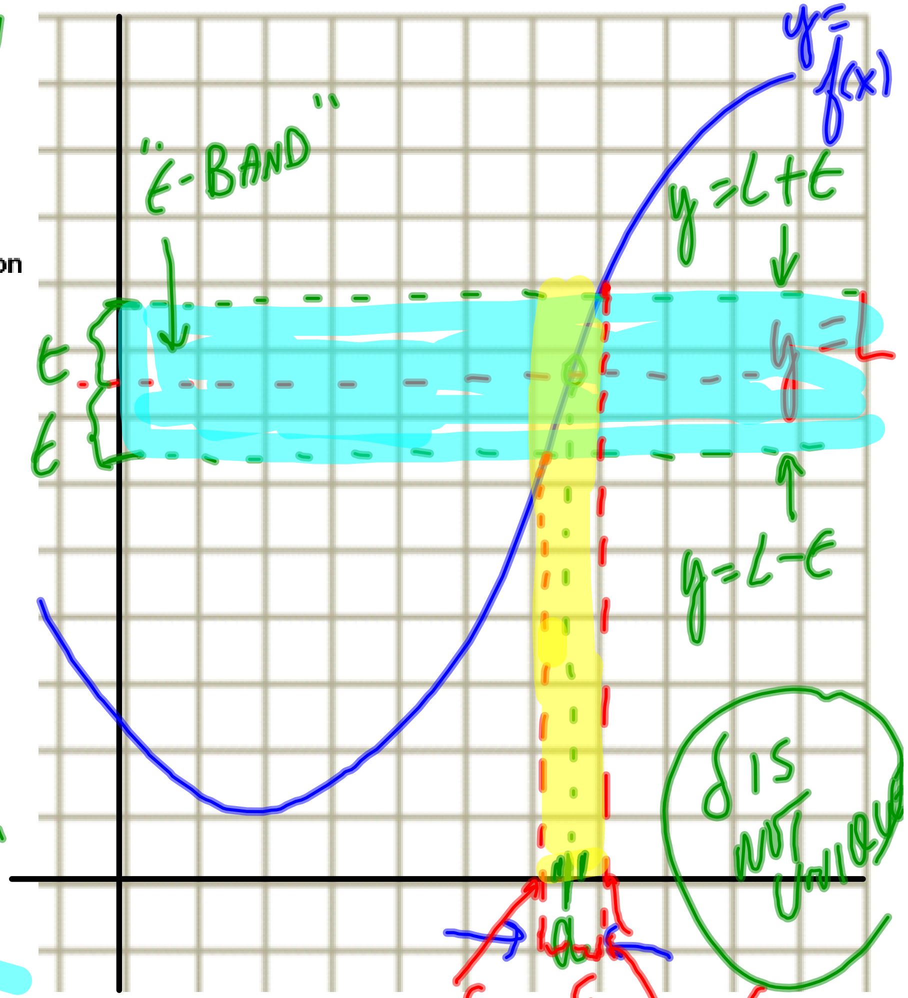
$-\epsilon < f(x) - L < \epsilon$

$L - \epsilon < f(x) < L + \epsilon$

"ε-BAND"

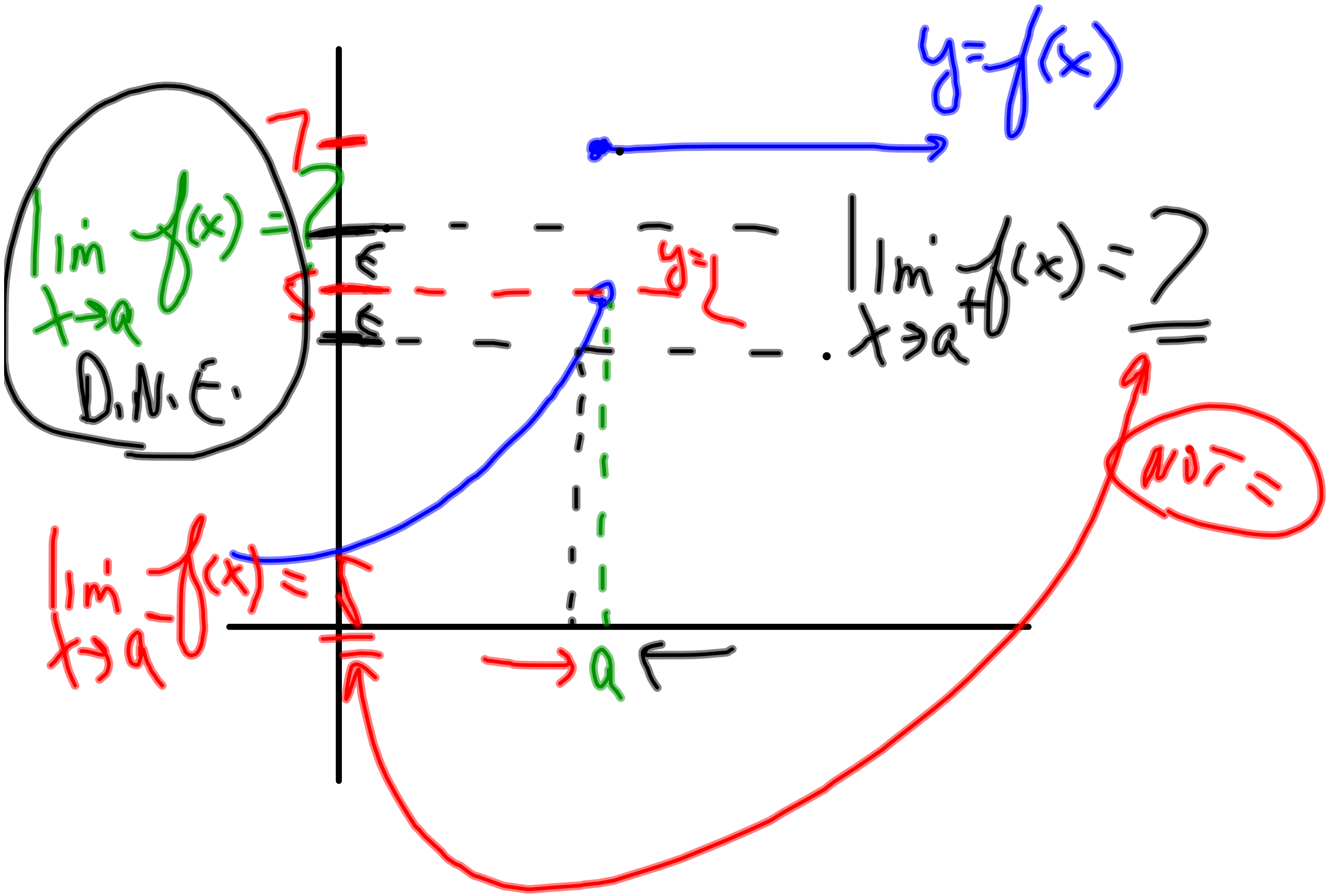
$-\delta < x - a < \delta$

$a - \delta < x < a + \delta$



"δ NEIGHBORHOOD"

COUNTER EXAMPLE

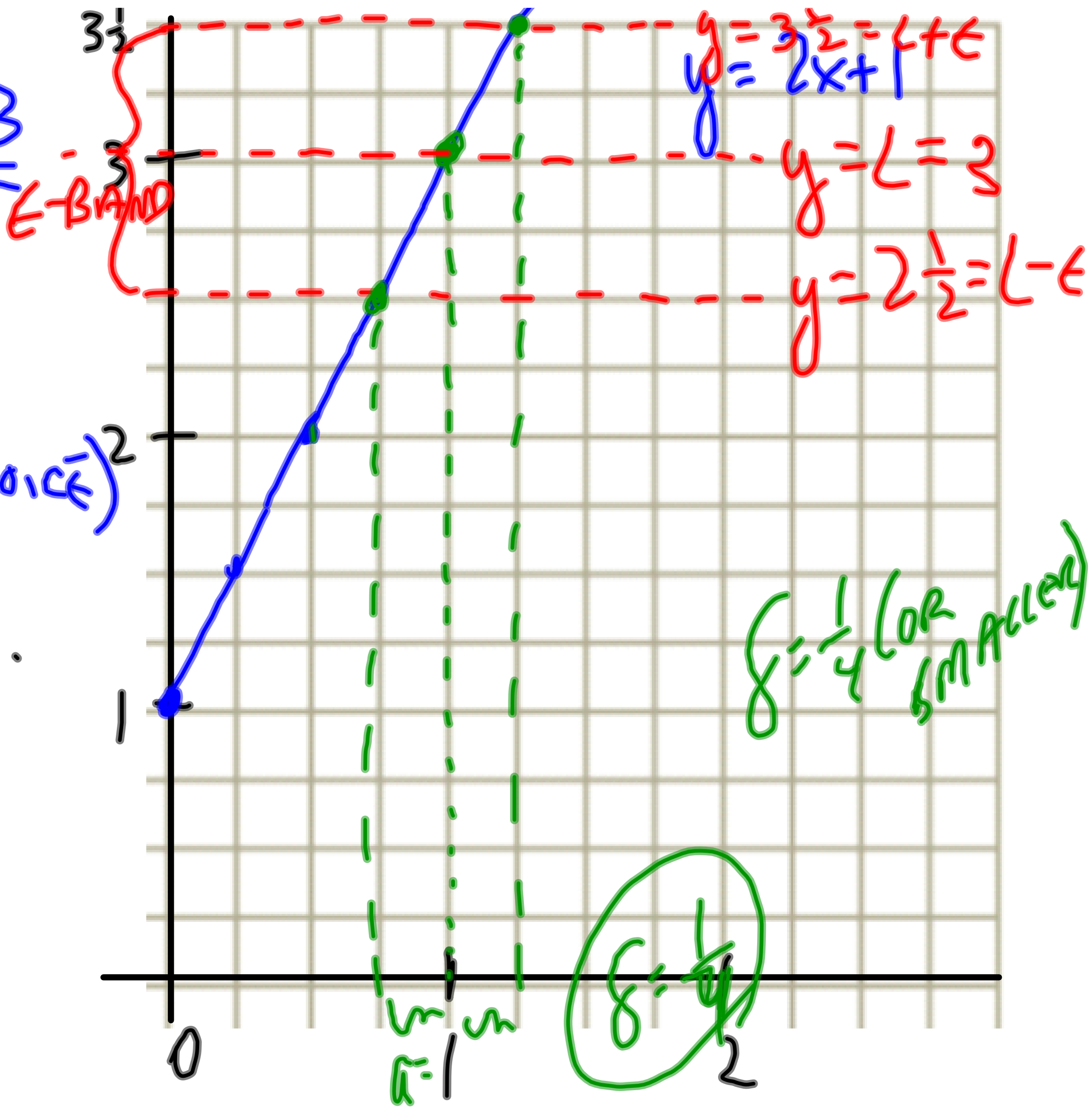


$$\lim_{x\to 1}(2x+1) = ?\ \underline{\underline{3}}$$

SHOW GRAPHICALLY.

$\epsilon = \frac{1}{2}$ (ADAM'S CHOICE)

$\delta = \frac{1}{4}$ OR SMALLER.



PROVE: $\lim_{x \to 1} (2x+1) = 3$.

proof: LET $\epsilon > 0$ BE GIVEN TO ME.

I MUST FIND $\delta > 0$ SUCH THAT:

$|2x+1-3| < \epsilon$ WHENEVER $0 < |x-1| < \delta$.

$|2x-2| < \epsilon$

$|2(x-1)| < \epsilon$

$2|x-1| < \epsilon$

$|x-1| < \frac{\epsilon}{2}$

LET $\delta = \frac{\epsilon}{2}$ (OR SMALLER)

ADAM'S CHOICE

$\epsilon = \frac{1}{2}$

$\delta = \frac{\frac{1}{2}}{2} = \frac{1}{4}$

O.T.L.

* DAY 7 PAGE L-2 1-14 (ALL)
* GET CAUGHT UP THRU DAY 7
* MEMORIZE THE LIMIT DEFN IN WORDS *
* PROG REPORTS RETURNED BY TUES.