AP Calculus 12 **1.2 Limits and Factoring** Name_____

Date_____

When evaluating limits, first try substituting in the number:

- if answer is a number, that's the limit!
- if answer is $\frac{number}{0}$, the limit may be ∞ or $-\infty$ (Check with a graph)
- if answer is $\frac{0}{0}$, this is an Indeterminate Form. → we will try to factor & simplify.

Example 1: find $\lim_{x\to 2}\frac{3x^2-12}{x-2}$ $= \frac{3(4)-12}{2-2} = \frac{0}{0}$

$\therefore = \lim_{x\to 2}\frac{3(x^2-4)}{x-2}$

$= \lim_{x\to 2}\frac{3(x+2)(x-2)}{x-2}$

$= \lim_{x\to 2} 3(x+2) = 3(2+2) = 12$

line with a 'hole' $\frac{3x^2-12}{x-2}$ line. $3x+6$ No!

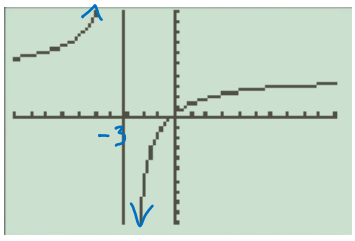
Is $\frac{3x^2-12}{x-2}$ equal to $3x+6$? These are called functions that agree at all but one point., and their limits are the same.

Example 2: find $\lim_{x\to -3}\frac{4x+1}{x+3}$ $= \frac{-12+1}{0} = \frac{-11}{0} = \infty$? $-\infty$?

Check with graph:

- different directions,

so No Limit.



Example 3: find $\lim_{x\to 1}\frac{3x^2+6x+3}{x+5}$ $\quad \frac{3+6+3}{6} = \frac{12}{6} = 2$

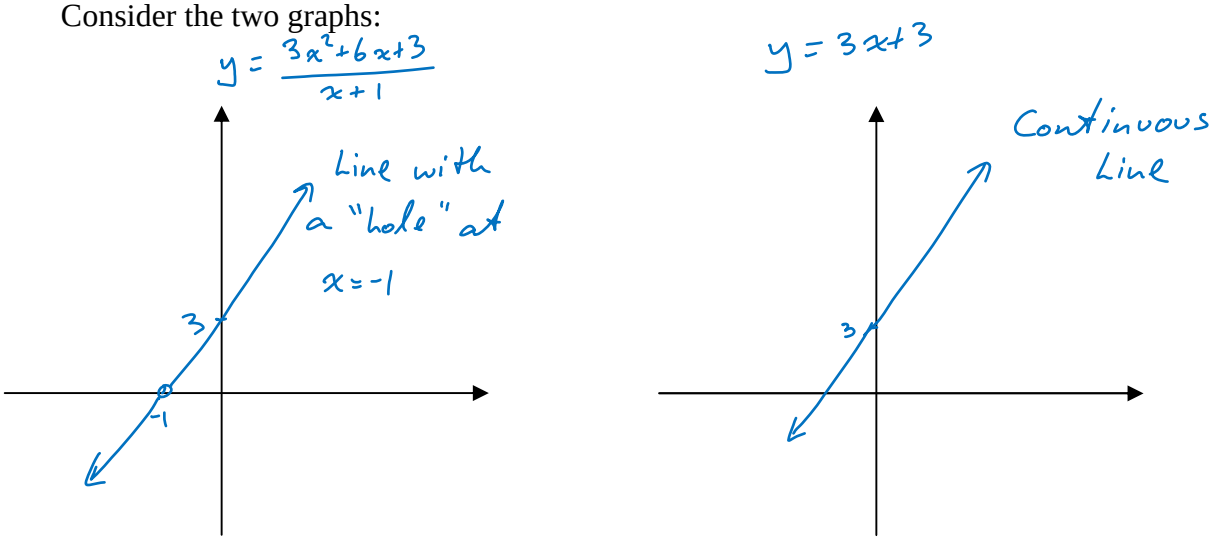
Example 4: find $\lim_{x\to -1}\frac{3x^2+6x+3}{x+1}$ $\quad \frac{3-6+3}{0} = \frac{0}{0}$

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

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

$$= \lim_{x\to -1} 3x+3 \quad \rightarrow \quad 3(-1)+3 = 0$$

Consider the two graphs:



Assignment: Worksheet: Moron Limits (#1-24)