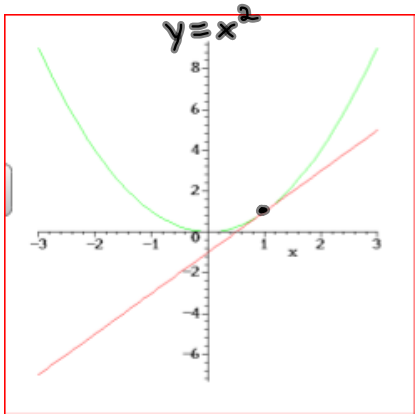
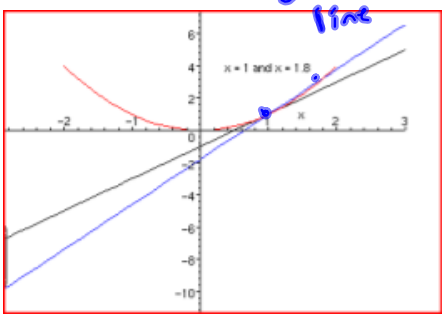
1 2.1/2.2: Intro to Calculus and Limits

Goal #1: To find the slope of a line tangent to a curve at a given point.





secant line (1,1) and (1.8, 3.24)

$m = \frac{\Delta y}{\Delta x}$

$= \frac{3.24 - 1}{1.8 - 1}$

$= \frac{2.24}{0.8}$

$m_{sec} = 2.8$

Concept of a Limit: Notation: $\lim_{x \to a} f(x) = L$

"The limit as x approaches a of f(x) is L"

As x-values "get close" to a, the y-values "get close" to L

Infinite Limits and Vertical Asymptotes:

Idea: as $x \to a$, y gets larger and larger

$$\lim_{x \to a} f(x) = \infty \quad \text{or} \quad \lim_{x \to a} f(x) = -\infty$$

When? denominator $= 0$, and numerator $\neq 0$

Examples:

$\lim_{x\to 1} \frac{x^2+1}{x-1}$ denom = 0 numer = 2

Signs:

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

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

Different, so limit DNE (Does Not Exist)

On Your Own: $\lim_{x\to 3}\frac{x^2+1}{(x-3)^2}$

numer = 10
denom = 0

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

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

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

Sep 11-12:34 PM