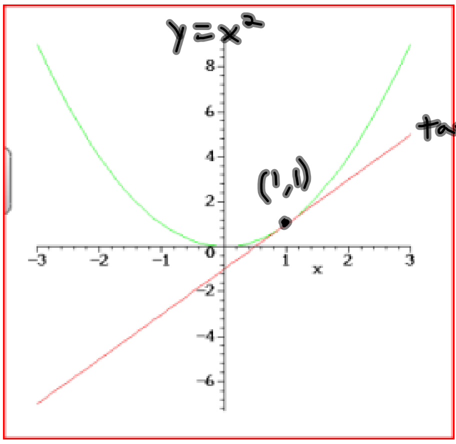
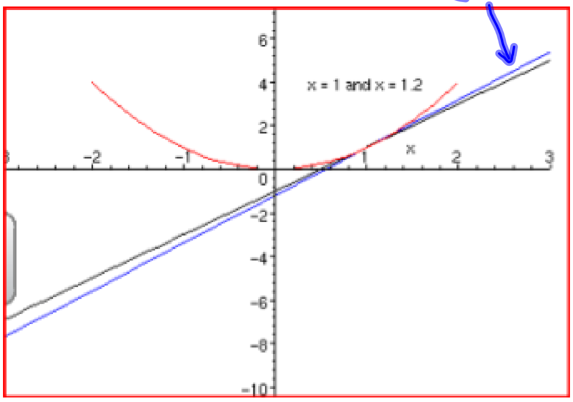
2.1 Intro to Calculus

to find slope of a line tangent to a curve.





Problem: only know one point (tangency point)

One point is always the tangency point, the second point moves closer and closer to first point.

2.2: Numerical and Graphical Understanding of Limits

Concept of a Limit: "The limit as x approaches a of f is L"

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

Meaning: as x gets closer to a
y gets closer to L

If the y values are not getting close to a unique number, we say the limit Does Not Exist.

Infinite Limits and Vertical Asymptotes:

If $\lim_{x \to a^-} f(x) = \pm\infty$ (Left Hand Limit)

or $\lim_{x \to a^+} f(x) = \pm\infty$ (Right Hand Limit)

then the graph of f has a vertical asymptote at x=a

NOTE: denom=0 does NOT guarantee a vertical asymptote.
but denom=0 and numer≠0 does.

Examples:

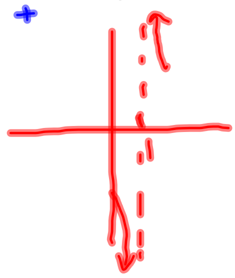
$\lim_{x\to 1}\frac{x^2+1}{x-1}$ $\frac{2}{0}$ Look at Left & Right Hand Limits (one-sided)

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

$x<1$

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

$x>1$



So $\lim_{x\to 1}\frac{x^2+1}{x-1}$ DNE

$\lim_{x\to 3}\frac{x^2+1}{(x-3)^2}$ $\frac{10}{0}$ $\frac{+}{+}$ $=+\infty$

(Can also do Left and Right as above)