Notes:
Definition of a limi:
Let $f\left(x\right)$ be a function defined near the fixed number a . Then the limit of $f\left(x\right)$ as a approaches x written $\lim_{x->a}f\left(x\right)$, equals number L if the values of $f\left(x\right)$ can be made arbitrarily close to L by having X be sufficiently close to a, but not equal to a.

Example:

- Suppose a car's given position function in meters is given by $s\left(t\right)\ =\ t^2$ for $0\ \le t\le3$. Find the instantaneous velocity at t+2 seconds (t=2).
    - Given:
        - $s\left(t\right)=t^2$ at our position
    - Wanted:
        - Velocity at t=2
        - Slope of the tangent line, so the average velocity near t=2
    - Expression for avg. velocity on $\left[x,2\right]$
        - $m_{\sec\ }=\ \frac{rise}{run}$
        - $\frac{s\left(2\right)-s\left(s\right)}{2-x}$
        - $\frac{4-x^2}{2-x}$
    - Limit:
        - $\lim_{x->2}\left(\frac{4-x^2}{2-x}\right)$
        - Approaches 4 as x approaches 2
- Key fact:
    - When you calculate a limit, if written standard, it is a TWO SIDED LIMT
        - So it only exists if the both go to the same value.