§2.1 - The Limit of a Function, part 1

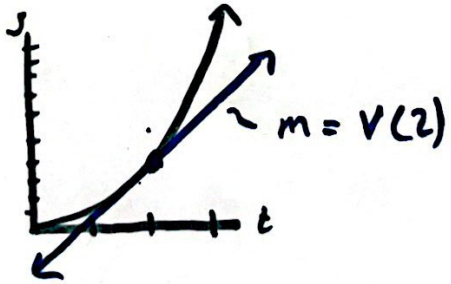
In this video, we will:

- Rephrase the velocity problem in terms of Limits
- Give an intuitive definition of a Limit
- Explore limits with technology.

Recall: If $s(t) = 3t^2$, what is the instantaneous velocity at $t=2$, $v(2)$

① The formula for average velocity, $V_{[t_1,t_2]} = \frac{s(t_2)-s(t_1)}{t_2-t_1}$ does not work $\Rightarrow$ $\frac{s(2)-s(2)}{2-2} = \frac{0}{0}$

② I can visualize $v(2)$ as the slope of the line tangent to $s(t)$ at $t=2$



③ How do we find the slope of the tangent line with only one point, $t=2$?

Idea we need to formalize:

t	Avg vel from 2 to t
3	15
2.5	13.5
2.1	12.3
2.01	12.03
2.001	12.003
⋮	⋮
2	UNDEFINED

- We need the value of $\frac{v(t)-v(2)}{t-2}$ as t gets really, Really, REALLY close to 2 but doesn't actually touch it.

The idea of a Limit: The limit of $f(x)$ as x approaches a:

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

- is the value $f(x)$ approaches as x approaches a.

So, $\lim_{t \to 2} \frac{s(t)-s(2)}{t-2} = 12$, we think!