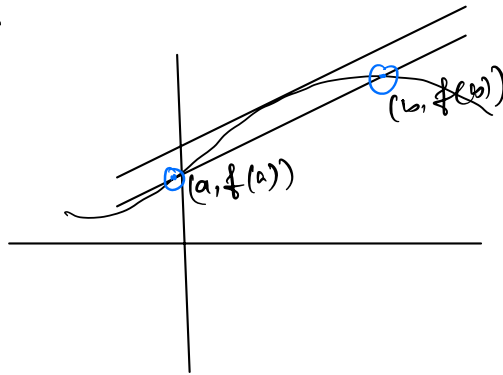A preview of Calculus:

Calculus is the math to measure changes, like:

- Velocities / Accelerations
- Areas / Volumes $\leadsto$ integration
- Tangent lines $\leadsto$ derivation
- Slopes
- Arc lengths

Tangent - Line problem:

First: What is Secant?

A linear function passing through two given pts, say $(a, f(a))$ & $(b, f(b))$

Slope of Secant: $m_{sec} = \dfrac{f(b) - f(a)}{b - a}$ at $x = b$

$m_{sec} = \dfrac{f(x) - f(a)}{x - a}$

Make b move towards a, then secant becomes tangent.

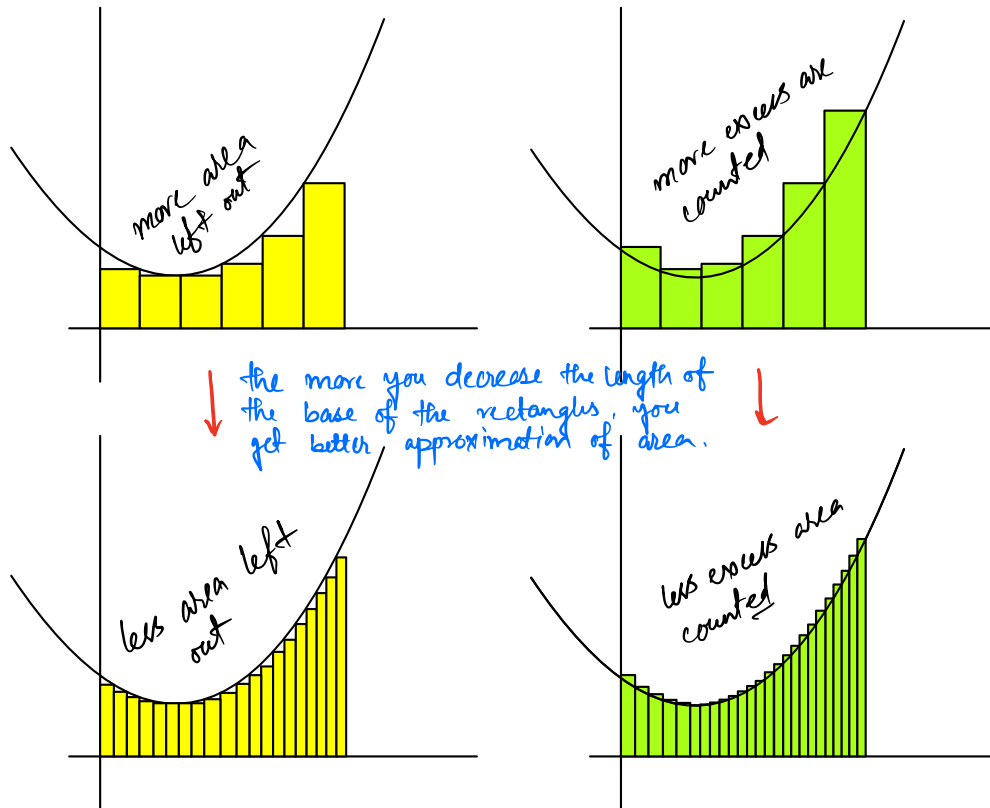Average Velocity: $s(t)$: position of an object along axis t.

$$v_{avg} = \dfrac{s(t) - s(a)}{t - a}$$

Eg. $s(t) = -16t^2 + 64$, between $[0.49, 0.5]$

$$V_{avg} = \frac{s(0.5) - s(0.49)}{0.5 - 0.49} = -15.84$$

$$= \frac{\Delta s}{\Delta t}$$

Area

more area
left out

more excess are
counted

↓   the more you decrease the length of
the base of the rectangles, you
get better approximation of area.   ↓

less area left
out

less excess area
counted

This is the main idea
behind getting the
area under
the
curve.