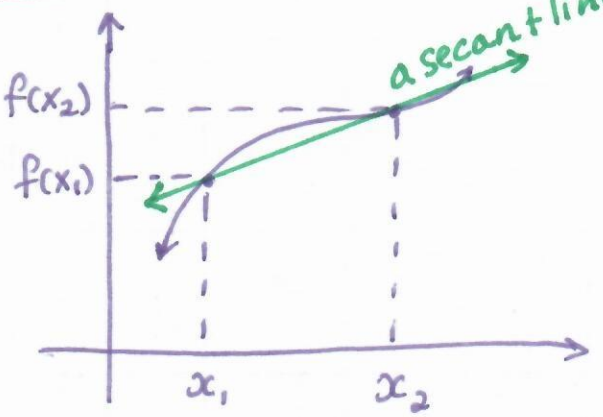
Average Rate of Change of a Function $y = f(x)$ (defining equation)

$x \in [x_1, x_2]$ (x_2: ending value; x_1: starting value) $\longrightarrow$ $x_1 \leq x \leq x_2$

$$\underset{[x_1, x_2]}{ARC} = \frac{\Delta Y}{\Delta X} = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

$$\boxed{\underset{[x_1, x_2]}{ARC} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}}$$



arbitrary fun-n

$y = f(x)$

$\underset{[x_1, x_2]}{ARC} = m_{\text{secant line that connects } (x_1, f(x_1)), (x_2, f(x_2))}$

$(x_1, f(x_1))$: 1st pt; $(x_2, f(x_2))$: 2nd pt.

Example! $f(x) = x^3 - 2x^2$ on $[1, 2]$

$$\underset{[1,2]}{ARC} = \frac{f(2) - f(1)}{2 - 1} \checkmark = f(2) - f(1) = \underbrace{(2)^3 - 2(2)^2 - [(1)^3 - 2(1)^2]}_{\text{substitution is a step!}}$$

$= 0 - (-1)$

$= 1$

Remark! In application problems, Rate entails. Units