# Average Rate of Change & Secant Line

**Average Rate of Change** $= \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{f(x_1) - f(x_2)}{x_1 - x_2}$

Average Rate of Change is a single number indicating a rough amount computed for some measurablte entity that changes or varies with time.

A **Secant Line**, also simply called a secant, is a line passing through two points of a curve.

Therefore **slope of a secant line** is the same as the Average Rate of Change. Equation for Secant Line, if **A** indicates Average Rate of Change while **f(x)** indicates horizontal axis value for secant line computes as follows:
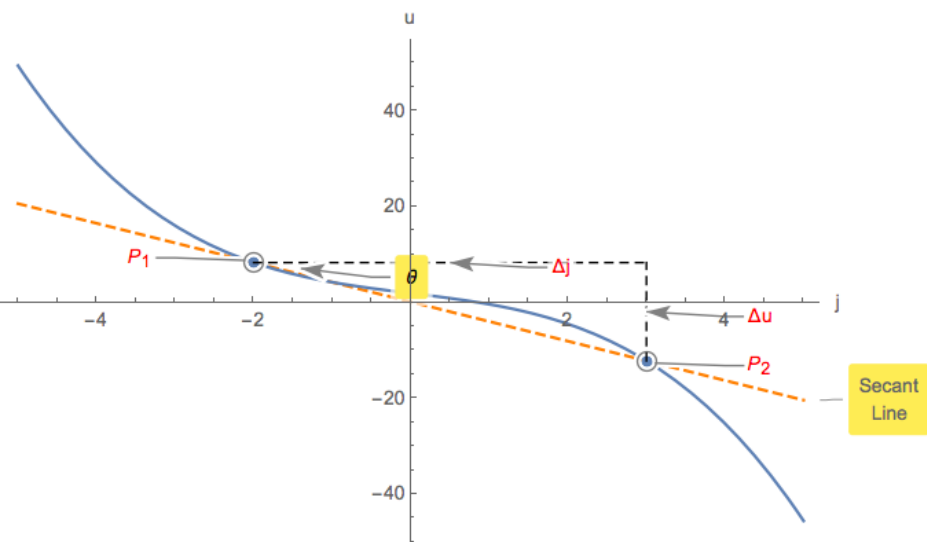
$A = \frac{f(x) - f(x_1)}{x - x_1} \Longrightarrow A(x - x_1) = f(x) - f(x_1) \Longrightarrow A(x - x_1) + f(x_1) = f(x)$

$$f(x) = Ax + (f(x_1) - Ax_1)$$

## Example 1.

$u = -\frac{3 j^3}{10} - 2j + \frac{19}{10}$ average between −2, 3



$\Delta u = u(3) - u(-2) = -\frac{3(3)^3}{10} - 2(3) + \frac{19}{10} - \left(-\frac{3}{10}(-2)^3 - 2(-2) + \frac{19}{10}\right) = -\frac{41}{2}$

**Secant Slope** $= \mathrm{Tan}(\theta) = \frac{u(3) - u(-2)}{3 - (-2)} = -\frac{41}{10}$

**Average Rate of Change** $= A = -\frac{41}{10}$

**Secant Line:** $u = -\frac{41}{10} j + \frac{1}{10}$

u could be temperature of a cup of tea and j time.
u could be speed of a car and j time.
u could be gasoline amount and j distance traveled.