

Average Rate of Change & Secant Line

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

Average Rate of Change is a single number indicating a rough amount computed for some measurable 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

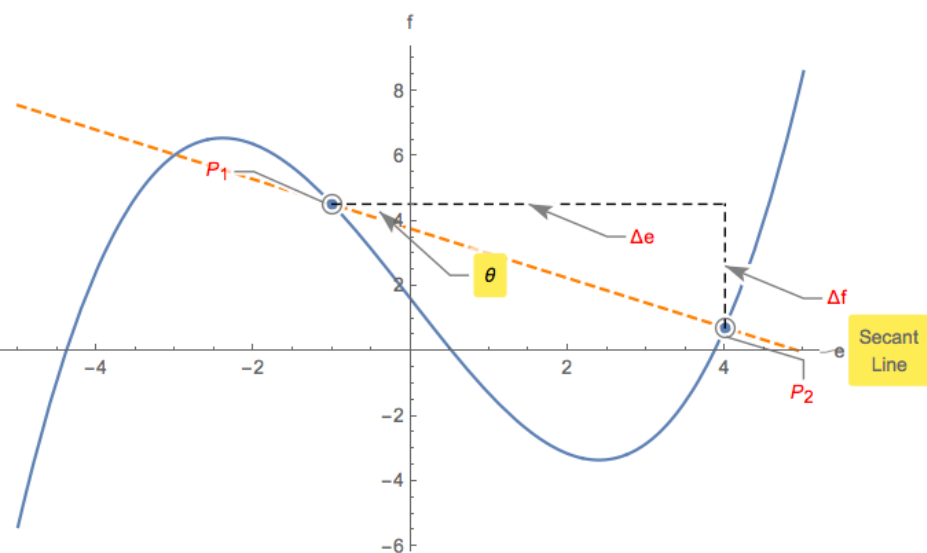
computes as follows:

$$A = \frac{f(x) - f(x_1)}{x - x_1} \Rightarrow A(x - x_1) = f(x) - f(x_1) \Rightarrow A(x - x_1) + f(x_1) = f(x)$$

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

Example 1.

$$f = \frac{9e^3}{50} - \frac{31e}{10} + \frac{8}{5} \text{ average between } -1, 4$$



$$\Delta f = f(4) - f(-1) = \frac{9(4)^3}{50} - \frac{31(4)}{10} + \frac{8}{5} - \left(\frac{9(-1)^3}{50} - \frac{31(-1)}{10} + \frac{8}{5} \right) = -\frac{19}{5}$$

$$\text{Secant Slope} = \tan(\theta) = \frac{f(4) - f(-1)}{4 - (-1)} = -\frac{19}{25}$$

$$\text{Average Rate of Change} = A = -\frac{19}{25}$$

$$\text{Secant Line: } f = -\frac{19}{25}e + \frac{94}{25}$$

f could be temperature of a cup of tea and e time.

f could be speed of a car and e time.

f could be gasoline amount and e distance traveled.