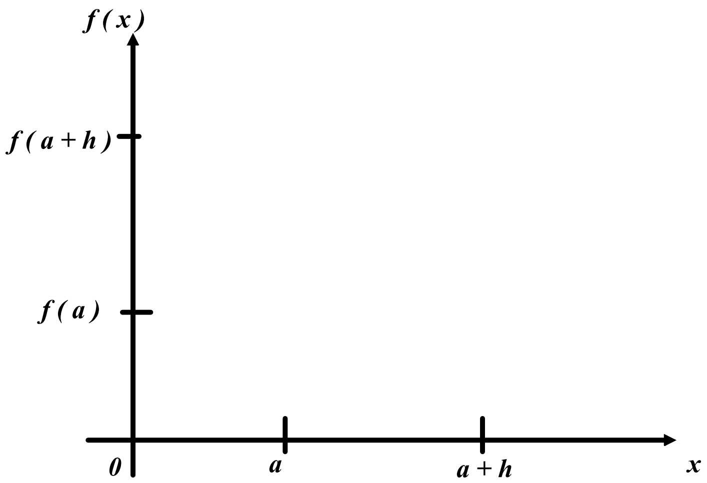
15.4 Geometric Interpretation



$$\frac{f(a+h)-f(a)}{(a+h)-a} \longrightarrow$$ slope of a ***secant line*** (chord)

By taking sufficiently small values for *h*, the slope can be made as close as desired to the slope of the tangent line

$$\lim_{h\to 0}\frac{f(a+h)-f(a)}{h} \longrightarrow$$ slope of the ***tangent*** to the curve at $x=a$

$$\lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$ → slope of the ***tangent*** to the curve at $x = a$

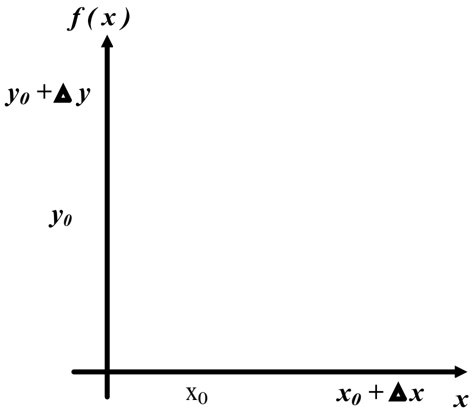
- **Value of $f'(a)$ is the slope of the curve at $x = a$**
- **The derivative DNE if $x = a$, then the slope of the curve is not defined at x = a**

We can replace *h* with Δx to show the change in some variable

Δx = the change or the increment in *x*

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$



Differential Notation

$$f'(x) = \frac{dy}{dx}$$

Find the slope and the equation of the tangent to the parabola

$$y = 3x^2 + 4x - 5 \quad at \quad (1, 2)$$