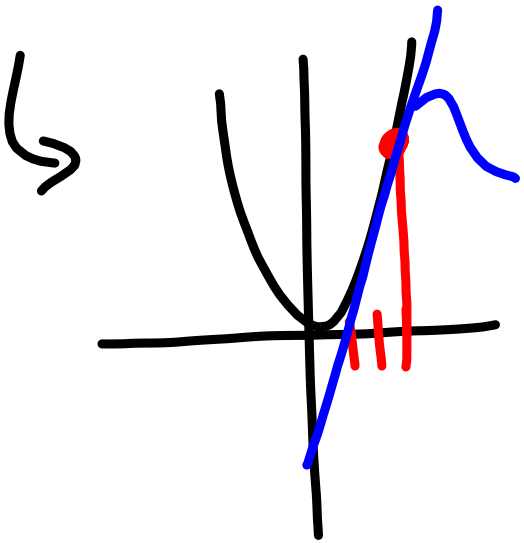
Success!

ex: $F(x) = 4x^2$ What is the Slope @ $x=3$?



tangent at $x=3$

Slope = Slope at $x=3$

$$\text{Slope} = \frac{\Delta Y}{\Delta X} = \frac{Y_f - Y_i}{X_f - X_i} = \frac{\square - 36}{(3+\Delta x) - 3}$$

$F(3) = 36$

$$F(3+\Delta x) = 4(3+\Delta x)^2 = 4(3+\Delta x)(3+\Delta x)$$

$$= 4(9 + 6\Delta x + \Delta x^2)$$

$$= 36 + 24\Delta x + 4\Delta x^2$$

$$\frac{\Delta y}{\Delta x} = \frac{(36 + 24\Delta x + 4\Delta x^2) - 36}{(3+\Delta x) - 3}$$

$$= \frac{24\Delta x + 4\Delta x^2}{\Delta x} = 24 + 4\Delta x \rightarrow \text{to Zero!}$$

$$= 24$$

or: $F(x) = 4x^2$

derivative of F(x) ← $F'(x) = 8x^1$

↳ $F'(3) = 8(3)^1 = 24$ ✓

or: Function for the Slope at a point

Derivatives Practice

① $F(x) = 3x^4 - 7x^2$

$F'(x) = 12x^3 - 14x^1$

② $f(x) = \frac{3x^2+9x}{x} \rightarrow \frac{3x^2}{x} + \frac{9x}{x} \rightarrow 3x^1 + 9$

$3x^0 = 3$

③ $F(x) = \frac{3}{x^3}$ → $\frac{1}{x^3}$ or: x^{-3}

$F(x) = 3x^{-3}$

$= -9x^{-4}$ or: $\frac{-9}{x^4}$ or: $-\frac{9}{x^4}$

$f'(x) = \frac{-9}{x^4}$

$f'(7) = \frac{-9}{7^4} = \frac{-9}{2401} = -0.00375$

④ $F(x) = -2t^2 + 4t + 2$