$f(x) = 4x^3 - 7x^2 + 5x - 1$

$f'(x) = \left(4x^3 - 7x^2 + 5x - 1\right)'$

$= \left(4x^3 + (-7)x^2 + 5x + (-1)\right)'$ a giant sum!

sum of the derivatives $= (4x^3)' + ((-7)x^2)' + (5x)' + (-1)'$

constant multiple rule ....

$= 4(x^3)' + (-7)(x^2)' + 5(x^1)' + (-1)'$

the power rule:

$= 4 \cdot 3x^2 + (-7)2x^1 + 5 \cdot 1 + 0$

$= 12x^2 - 14x + 5$

Let $F(x) = a^x \quad a > 0$

$$F'(x) = \lim_{h \to 0} \frac{F(x+h) - F(x)}{h}$$

$$= \lim_{h \to 0} \frac{a^{(x+h)} - a^x}{h}$$

$$= \lim_{h \to 0} \frac{a^{x+h} - a^x}{h}$$

$$= \lim_{h \to 0} \frac{a^x \cdot a^h - a^x}{h}$$

$$= \lim_{h \to 0} \frac{a^x(a^h - 1)}{h}$$

$$= a^x \left(\lim_{h \to 0} \frac{a^h - 1}{h} \right)$$

$$= a^x \left(\lim_{h \to 0} \frac{a^h - a^0}{h} \right)$$

$$= a^x \cdot \underbrace{F'(0)}_{\text{just a number!}}$$

slope of the tangent line at $x = 0$.

Note: let $x = 0$:

$$F'(0) = \lim_{h \to 0} \frac{a^{0+h} - a^0}{h}$$

$$= \lim_{h \to 0} \frac{a^h - a^0}{h}$$

$$= \lim_{h \to 0} \frac{a^h - 1}{h}$$