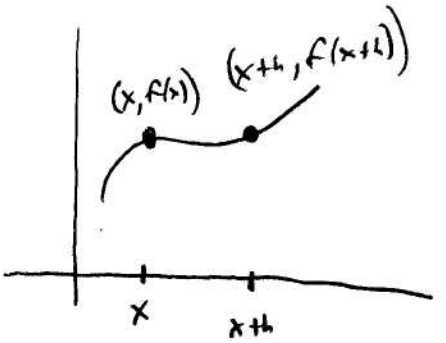
1. $y = 3x^2 + 2x$

$$y' = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h\to 0} \frac{3(x+h)^2 + 2(x+h) - 3x^2 - 2x}{h}$$

$$= \lim_{h\to 0} \frac{3x^2 + 6xh + 3h^2 + 2x + 2h - 3x^2 - 2x}{h}$$

$$= \lim_{h\to 0} (6x + 3h + 2) = \boxed{6x + 2}$$

2.



$$\text{slope} = \frac{f(x+h) - f(x)}{x+h-x}$$

$$\text{slope} = \frac{f(x+h) - f(x)}{h}$$

as $h \to 0$

$$\text{slope} = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$$

$$y = 3x^2 + 5x^{-4}$$

$$y' = 6x - 20x^{-5}$$

$$y' = 6x - \frac{20}{x^5}$$