

201 § 2.1 #s 1, 3, 4, 7, 8, 11, 12, 13, 33, 35, 53B, 54B

(1) Write an eq'n for the secant line's slope through $P(3, f(3))$ and $Q(x, f(x))$:

$$(2) \quad m = \frac{y_2 - y_1}{x_2 - x_1} = \boxed{\frac{f(x) - f(3)}{x - 3} = m_{\text{sec}}}$$

(b) Write expression for slope of tan. line

(a) $x=3$:

$$m_{\text{tan}} = f'(3) = \lim_{x \rightarrow 3} \frac{f(x) - f(3)}{x - 3}$$

(3) Find slope of tan. line to $y = 4x - x^2$

(a) (a) $(x_1, y_1) = (1, 3)$:

$$m_{\text{sec}} = \frac{f(x) - f(1)}{x - 1} = \frac{4x - x^2 - (4(1) - 1^2)}{x - 1}$$

$$= \frac{4x - x^2 - 3}{x - 1} = \frac{-x^2 + 4x - 3}{x - 1} = -\frac{(x^2 - 4x + 3)}{x - 1}$$

$$= -\frac{(x-1)(x-3)}{x-1} = -(x-3) \xrightarrow{x \rightarrow 1} -(1-3) = \boxed{2 = m_{\text{tan}}}$$

201 § 2.1 #5 3, 4, 7, 8, 11, 12, 13, 33, 35, 53B, 54B

Alternate:

$$(a) f'(1) = \lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h}$$

$$\frac{f(1+h) - f(1)}{h} = \frac{4(1+h) - (1+h)^2 - (3)}{h}$$

$$= \frac{4+4h - (1+2h+h^2) - 3}{h} = \frac{4+4h-1-2h-h^2-3}{h}$$

$$= \frac{2h-h^2}{h} = 2-h \xrightarrow{h \rightarrow 0} \boxed{2 = m_{\text{tan}}}$$

(b) Find eq'n of tan. line

$$y = m(x - x_1) + y_1$$

$$\boxed{y = 2(x-1) + 3}$$

(c) $4x - x^2 = -x(x-4)$

Sketch

