

Find the indicated derivatives. Clearly indicate your answers. You do not need to simplify your answers. (4 points each)

(a)  $f(x) = \sec 4x$

note:  $\frac{d}{dx} \sec u = \sec u \tan u \cdot \frac{du}{dx}$

$$f'(x) = \boxed{4 \sec 4x \tan 4x}$$

(b)  $y = (t^3 - 3t + 1)^5 \cos 3t$

$$\frac{dy}{dt} = \boxed{5(t^3 - 3t + 1)^4 (3t^2 - 3) \cos 3t + (t^3 - 3t + 1)^5 (-3 \sin 3t)}$$

(c)  $f(x) = \left( \frac{1}{x^2 - 3x} \right)^{-2} = (x^2 - 3x)^2$

$$\frac{d}{dx} f(x) = \boxed{2(x^2 - 3x)^1 (2x - 3)}$$

(d)  $y = \sin^3(6x) = (\sin(6x))^3$

$$D_x y = 3(\sin(6x))^2 \frac{d}{dx} (\sin 6x)$$

$$= 3 \sin^2 6x \cdot 6 \cos 6x = \boxed{18 \sin^2 6x \cos 6x}$$

(e)  $y = \frac{1}{\sqrt{1-x}} = (1-x)^{-1/2}$        $\frac{dy}{dx} = -\frac{1}{2} (1-x)^{-3/2} (-1)$

$$\frac{d^2 y}{dx^2} = -\frac{3}{4} (1-x)^{-5/2} (-1) = \frac{3}{4} (1-x)^{-5/2}$$

$$= \boxed{\frac{3}{4} (1-x)^{-5/2}}$$