

$$1) y = 2 \ln \left[ \frac{(3x - 2x^4)^{3/4}}{2x^3} \right]$$

$$y = 2 \ln(3x - 2x^4)^{3/4} - 2 \ln(2x^3)$$

$$y = 2 \cdot \frac{3}{4} \ln(3x - 2x^4) - 2 \ln(2x^3)$$

$$y' = \frac{3}{2} \left( \frac{3 - 8x^3}{3x - 2x^4} \right) - 2 \left( \frac{6x^2}{2x^3} \right)$$

$$y' = \frac{3(3 - 8x^3)}{2(3x - 2x^4)} - \frac{6}{x}$$

\* product Rule

$$2) y = x^3 \cdot e^{5x^2 + 3x}$$

$\underbrace{\quad}_f \quad \underbrace{\quad}_g$

$$y' = \frac{f'}{3x^2} \cdot \frac{g}{e^{5x^2 + 3x}} + \frac{f}{x^3} \cdot \frac{g'}{e^{5x^2 + 3x}} \cdot (10x + 3)$$

$$y' = 3x^2 e^{5x^2 + 3x} + x^3 (10x + 3) e^{5x^2 + 3x}$$

5.4-5.5  
Quiz Morning  
Review  
Key

$$3) \quad y = 2 \log_8 \sqrt{x - e^x}$$

$$y = 2 \log_8 (x - e^x)^{1/2}$$

$$y = 2 \cdot \frac{1}{2} \log_8 (x - e^x)$$

$$y = \log_8 (x - e^x)$$

$$y' = \left( \frac{1}{\ln 8} \right) \left( \frac{1 - e^x}{x - e^x} \right)$$

$$4) \quad y = 2^{3x} \cdot \log(2 - \sqrt{x})$$

$$y = 2^{3x} \cdot \log_{10}(2 - x^{1/2})$$

$$y' = (\ln 2) 2^{3x} \cdot 3 \cdot \log(2 - \sqrt{x}) + 2^{3x} \cdot \left( \frac{1}{\ln 10} \right) \cdot \frac{(-\frac{1}{2} x^{-1/2})}{2 - x^{1/2}}$$

$$y' = 3(2^{3x}) \ln 2 (\log(2 - \sqrt{x})) - \frac{2^{3x}}{2x^{1/2} (\ln 10) (2 - x^{1/2})}$$

$$5) \quad y = \log_2 \left( \frac{\sqrt{1-3x}}{x-5x^2} \right)$$

$$y = \log_2 \left( \frac{(1-3x)^{1/2}}{x-5x^2} \right)$$

$$y = \log_2 (1-3x)^{1/2} - \log_2 (x-5x^2)$$

$$y = \frac{1}{2} \log_2 (1-3x) - \log_2 (x-5x^2)$$

$$y' = \frac{1}{2} \left( \frac{1}{\ln 2} \right) \left( \frac{-3}{1-3x} \right) - \left( \frac{1}{\ln 2} \right) \left( \frac{1-10x}{x-5x^2} \right)$$

$$y' = \frac{-3}{2 \ln 2 (1-3x)} - \frac{(1-10x)}{\ln 2 (x-5x^2)}$$

$$6) \quad y = 11 \sqrt[3]{4x-5x^3-3e^2}$$

$$y = 11 (4x-5x^3-3e^2)^{1/3}$$

$$y' = (\ln 11) \cdot 11 \cdot \sqrt[3]{4x-5x^3-3e^2}$$

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

$$\cdot (4-15x^2 - 0)$$

chain Rule:  
out: ( )<sup>1/3</sup>  
in: 4x-5x<sup>3</sup>-3e<sup>2</sup>

$$y' = \frac{(\ln 11)(4-15x^2) 11 \sqrt[3]{4x-5x^3-3e^2}}{3(4x-5x^3-3e^2)^{2/3}}$$

