

Find  $\frac{dy}{dx}$

Quiz  
Class Review 5.4-5.5

1)  $f(x) = 7^{\sqrt[3]{1-2x^2}}$

2)  $f(x) = (x^4)(\log \sqrt[4]{1-5x^3})$

3)  $f(x) = \ln \left[ \frac{(5-x)^3}{\sqrt{2+3x^4}} \right]$

a)  $\frac{d}{dx} \ln u =$

b)  $\frac{d}{dx} \log_a u =$

c)  $\frac{d}{dx} e^u =$

d)  $\frac{d}{dx} a^u =$

a)  $\frac{d}{dx} \ln u = \frac{u'}{u}$

b)  $\frac{d}{dx} \log_a u = \left( \frac{1}{\ln a} \right) \left( \frac{u'}{u} \right)$

c)  $\frac{d}{dx} e^u = e^u \cdot u'$

d)  $\frac{d}{dx} a^u = (\ln a) a^u \cdot u'$

$$1) f(x) = 7^{\sqrt[3]{1-2x^2}}$$

$$\frac{d}{dx} a^u = \ln a \cdot a^u \cdot u'$$

$$f(x) = 7^{(1-2x^2)^{1/3}}$$

$$f'(x) = (\ln 7) 7^{\sqrt[3]{1-2x^2}} \cdot \frac{1}{3} (1-2x^2)^{-2/3} (-4x)$$

$$= \frac{-4x(\ln 7) 7^{\sqrt[3]{1-2x^2}}}{3(1-2x^2)^{2/3}}$$

$$2) f(x) = (x^4) (\log \sqrt[4]{1-5x^3}) = (x^4) \log (1-5x^3)^{1/4} \\ = (x^4) \left( \frac{1}{4} \log (1-5x^3) \right)$$

$$f'(x) = \underbrace{(4x^3)}_{f'} \underbrace{\left( \frac{1}{4} \log (1-5x^3) \right)}_g + \underbrace{(x^4)}_f \underbrace{\left( \frac{1}{4} \right) \left( \frac{1}{\ln 10} \right) \left( \frac{-15x^2}{1-5x^3} \right)}_{g'}$$

$$= \frac{x^3 \log (1-5x^3) - \frac{15x^6}{(4 \ln 10)(1-5x^3)}}{(4 \ln 10)(1-5x^3)}$$

$$3) f(x) = \ln \left[ \frac{(5-x)^3}{\sqrt{2+3x^4}} \right]$$

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

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

$$f'(x) = 3 \left( \frac{-1}{5-x} \right) - \frac{1}{2} \left( \frac{12x^3}{2+3x^4} \right)$$

$$f'(x) = \boxed{\frac{-3}{5-x} - \frac{6x^3}{2+3x^4}}$$