

Wk 10 HW - Derivatives of e and logarithms

Date _____ Period _____

Differentiate each function with respect to x .

1) $y = e^{4x^2} \sqrt{3x^4 + 2}$

2) $y = \frac{e^{5x^2}}{\ln 2x^4}$

3) $y = \sqrt[5]{4 + e^{5x^5}}$

4) $y = (x^3 + 4)^3 \cdot e^{3x^4}$

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

$$6) y = \ln 4x^5 \cdot (5x^4 - 3)^5$$

$$7) y = \frac{\ln 3x^4}{e^{4x^2}}$$

$$8) y = \frac{\ln x^5}{\sqrt[3]{5x^3 + 4}}$$

$$9) y = \ln \ln x^3$$

$$10) y = \ln (x^2 - 3)^2$$

Answers to Wk 10 HW - Derivatives of e and logarithms (ID: 1)

$$1) \frac{dy}{dx} = e^{4x^2} \cdot \frac{1}{2} (3x^4 + 2)^{-\frac{1}{2}} \cdot 12x^3 + (3x^4 + 2)^{\frac{1}{2}} \cdot e^{4x^2} \cdot 8x$$

$$= \frac{2xe^{4x^2}(12x^4 + 8 + 3x^2)}{\sqrt{3x^4 + 2}}$$

$$2) \frac{dy}{dx} = \frac{\ln 2x^4 \cdot e^{5x^2} \cdot 10x - e^{5x^2} \cdot \frac{1}{2x^4} \cdot 8x^3}{(\ln 2x^4)^2}$$

$$= \frac{2e^{5x^2}(5x^2 \ln 2x^4 - 2)}{x \cdot (\ln 2x^4)^2}$$

$$3) \frac{dy}{dx} = \frac{1}{5} (4 + e^{5x^5})^{-\frac{4}{5}} \cdot e^{5x^5} \cdot 25x^4$$

$$= \frac{5x^4 e^{5x^5}}{\sqrt[5]{(4 + e^{5x^5})^4}}$$

$$4) \frac{dy}{dx} = (x^3 + 4)^3 \cdot e^{3x^4} \cdot 12x^3 + e^{3x^4} \cdot 3(x^3 + 4)^2 \cdot 3x^2$$

$$= 3x^2 e^{3x^4} \cdot (x^3 + 4)^2 (4x^4 + 16x + 3)$$

$$5) \frac{dy}{dx} = e^{(3x^4 - 2)^2} \cdot 2(3x^4 - 2) \cdot 12x^3$$

$$= 24x^3 e^{(3x^4 - 2)^2} (3x^4 - 2)$$

$$6) \frac{dy}{dx} = \ln 4x^5 \cdot 5(5x^4 - 3)^4 \cdot 20x^3 + (5x^4 - 3)^5 \cdot \frac{1}{4x^5} \cdot 20x^4$$

$$= \frac{5(5x^4 - 3)^4 (20x^4 \ln 4x^5 + 5x^4 - 3)}{x}$$

$$7) \frac{dy}{dx} = \frac{e^{4x^2} \cdot \frac{1}{3x^4} \cdot 12x^3 - \ln 3x^4 \cdot e^{4x^2} \cdot 8x}{(e^{4x^2})^2}$$

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

$$8) \frac{dy}{dx} = \frac{(5x^3 + 4)^{\frac{1}{3}} \cdot \frac{1}{x^5} \cdot 5x^4 - \ln x^5 \cdot \frac{1}{3} (5x^3 + 4)^{-\frac{2}{3}} \cdot 15x^2}{\left((5x^3 + 4)^{\frac{1}{3}} \right)^2}$$

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

$$9) \frac{dy}{dx} = \frac{1}{\ln x^3} \cdot \frac{1}{x^3} \cdot 3x^2$$

$$= \frac{3}{x \ln x^3}$$

$$10) \frac{dy}{dx} = \frac{1}{(x^2 - 3)^2} \cdot 2(x^2 - 3) \cdot 2x$$

$$= \frac{4x}{x^2 - 3}$$