Kuta Software - Infinite Calculus

Name Key

Differentiation - Logs and Exponentials

Date _____ Period ____

Differentiate each function with respect to x.

1) $y = 4^{4x^4}$

$\frac{dy}{dx} = x^3 \cdot 4^{4x^4+2} \ln 4$

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

$\frac{dy}{dx} = \frac{15x^2 \ln 4}{4^{5x^3}}$

3) $y = \log_3 3x^2$

$\frac{dy}{dx} = \frac{2}{x \ln 3}$

4) $y = \log_2 4x^2$

$\frac{dy}{dx} = \frac{2}{x \ln 2}$

5) $y = \log_3 (3x^5 + 5)^5$

$\frac{dy}{dx} = \frac{75x^4}{\ln 3 \cdot (3x^5+5)}$

6) $y = \log_5 (-5x^3 - 2)^3$

$\frac{dy}{dx} = \frac{-45x^2}{\ln 5 (-5x^3-2)}$

7) $y = (4^{x^3} + 2)^3$

$\frac{dy}{dx} = 9x^2(4^{x^3}+2)^2 \cdot 4^{x^3} \ln 4$

8) $y = 3^{(x^4+1)^3}$

$\frac{dy}{dx} = 4x^3 \cdot 3^{(x^4+1)^3+1} \cdot (x^4+1)^2 \ln 3$

9) $y = 3^{\cos 3x^4}$

$\frac{dy}{dx} = -4x^3 \cdot 3^{\cos 3x^4+1} \sin 3x^4 \cdot \ln 3$

10) $y = \log_5 \tan 4x^4$

$\frac{dy}{dx} = \frac{16x^3 \cdot \sec^2 4x^4}{\tan 4x^4 \cdot \ln 5}$