

MATH 141 (Section 5 & 6)
Prof. Meade

University of South Carolina
Fall 2013

Quiz 7
October 7, 2013

Name: Key
Section: 005 / 006 (circle one)

1. (5 points) Find $\frac{dy}{dx}$ by implicit differentiation: $2x^3 + x^2e^y - y^2 = 2$.

$$2x^3 + x^2e^{y(x)} - y(x)^2 = 2.$$

$$\frac{d}{dx}: 6x^2 + x^2e^y \frac{dy}{dx} + 2xe^y - 2y \frac{dy}{dx} = 0$$

$$(6x^2 + 2xe^y) + (x^2e^y - 2y) \frac{dy}{dx} = 0$$

$$(x^2e^y - 2y) \frac{dy}{dx} = -(6x^2 + 2xe^y)$$

$$\frac{dy}{dx} = \frac{-(6x^2 + 2xe^y)}{x^2e^y - 2y}$$

2. (5 points) Differentiate the function $f(x) = \sqrt[5]{\log_3(x)}$. Simplify your answer.

$$= (\log_3(x))^{1/5}$$

$$f'(x) = \frac{1}{5} (\log_3(x))^{1/5-1} \cdot \frac{d}{dx} \log_3(x)$$

$$= \frac{1}{5} (\log_3(x))^{-4/5} \cdot \frac{1}{x} \frac{1}{\ln 3}$$

$$= \frac{(\log_3(x))^{-4/5}}{5x \ln 3}$$