

MAT 17A Section A02
Quiz 6 Fall 2009

NAME: _____ KEY _____

SID: _____

- Instructions:
1. Read each problem carefully, and show all work as neatly as possible.
 2. No credit will be given for correct answers without supporting work.
 3. Please circle your final answers. Make sure that you label your graphs as instructed.
 4. You may **NOT** use a calculator.

(6 points) 1. Find $\frac{dy}{dx}$.

a) $y = (3x^2 - 1)e^{1-x^2}$

$$\frac{dy}{dx} = (3x^2 - 1)(-2xe^{1-x^2}) + 6xe^{1-x^2}$$

$$\frac{dy}{dx} = -6x^3e^{1-x^2} + 8xe^{1-x^2}$$

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

b) $y = \frac{\ln x}{1+x^2}$

$$\frac{dy}{dx} = \frac{(1+x^2)1/x - (\ln x)(2x)}{(1+x^2)^2}$$

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

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

MAT 17A Section A02
Quiz 6 Fall 2009

(4 points) 2. Let $f(x) = x - \sin x$, $x \in \mathbb{R}$. Find $\frac{d}{dx} f^{-1}(\pi)$. [Note that $f(\pi) = \pi$.]

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

$$f^{-1}(\pi) = \pi$$

$$f'(\pi) = 1 - \cos \pi = 2$$

$$\frac{d}{dx} f^{-1}(\pi) = \frac{1}{2}$$

(5 points) 3. Let $f(x) = \ln(1 + 2x)$. Approximate $f(x)$ at $a = 0$ by the linear approximation $L(x) = f(a) + f'(a)(x - a)$.

$$f'(x) = \frac{2}{1 + 2x}$$

$$f'(0) = 2$$

$$f(0) = 0$$

$$L(x) = 0 + 2(x - 0) = 2x$$