

MAT 17A Section A02
Quiz 4 Fall 2009

NAME: _____

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.

(5 points) 1. Find the equation of the normal line to the curve $y = -3x^2$ at the point $(-1, -3)$.

$$\begin{aligned}y' &= -6x & y + 3 &= -\frac{1}{6}(x + 1) \\y'|_{x=-1} &= m_T = 6 & y &= -\frac{1}{6}x - \frac{1}{6} - 3 \\m_n &= -1/m_T = -\frac{1}{6} & y &= -\frac{1}{6}x - \frac{19}{6}\end{aligned}$$

(5 points) 2. Use the formal definition of the derivative to find the derivative of $y = 5x^2$ at $x = -1$.

$$\begin{aligned}f'(c) &= \lim_{x \rightarrow c} \frac{f(x) - f(c)}{x - c} \\ \lim_{x \rightarrow -1} \frac{5x^2 - 5(-1)^2}{x + 1} &= \lim_{x \rightarrow -1} \frac{5x^2 - 5}{x + 1} = \lim_{x \rightarrow -1} \frac{5(x + 1)(x - 1)}{x + 1} = \\ \lim_{x \rightarrow -1} 5(x - 1) &= -10\end{aligned}$$

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(5 points) 3. Differentiate the functions with respect to the independent variables.

a. $f(s) = s^2e^3 + 3e$

$$\frac{df}{ds} = 2se^3$$

b. $f(x) = 2^3x^3 - \frac{1}{2^3} + \frac{x}{2^3}$

$$\frac{df}{dx} = 2^3 \cdot 3x^2 + \frac{1}{2^3} = 24x^2 + \frac{1}{8}$$