Math 118 Calculus Ia **Quiz 5**

This is an open-book, open-notes quiz, and you may take as much time as you like. However, work alone; tutors, other students, internet, and so on are off limits. Write your answers on this quiz sheet and have it ready to turn in at the beginning of class on Tuesday, November 8th.

0. Sign below to indicate your pledge. If your signature is difficult to read, please print your name as well.

I pledge that I will not give, accept, or tolerate others' use of unauthorized aid in completing this work.

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(3 pt) 1. Suppose $f(x)$ is a differentiable function. What's the derivative of $x^2 \cdot f(x)$?
(Just circle the letter of your choice.)

a. $x^2 f'(x) + 2xf(x)$ b. $2xf'(x)$ c. $f'\left(x^2\right) f'(x)$ d. $x^2 f(x) + 2xf'(x)$ e. $2xf(1)$

product rule: left · (deriv. of right) + right · (deriv. of left)

(3 pt) 2. Suppose $d(x)$ is a differentiable function. What's the derivative of $\frac{1}{d(x)}$?
(Just circle the letter of your choice.)

a. $\frac{d'(1)}{d'(x)}$ b. $\frac{1}{d'(x)}$ c. $\frac{d(x) - d'(x)}{d(x)^2}$ d. ~~$\frac{-1}{d(x)^2}$~~ e. $\frac{1}{2d'(x)}$

this was supposed to be $\left[\frac{-d'(x)}{d(x)^2}\right]$ (from the quotient rule.)

(4 pt) 3. True/False.

Suppose f is differentiable on the interval $[1, 7]$. You also know that $f(1) = -3$, $f(4) = 5$, and $f(7) = 15$.

T a. f must also be continuous on the interval $[1, 7]$. Thm 4.1 Diff. implies Cont.

F b. There must be at least one number c in $(1, 7)$ where $f'(c) = 0$

F c. There must be at least one number c in $(4, 7)$ where $f'(c) = 10$

b. The Av. Rate of change over (1,7) is $\frac{15-(-3)}{7-1} = \frac{18}{6} = 3$, so the MVT says $f'(c) = 3$ for at least one c in $(1,7)$.

c. Similarly, the Av. Rate of Change over (4,7) is $\frac{15-5}{7-4} = \frac{10}{3}$ so there must be some "c" in (4,7) where $f'(c) = 10/3$. but not necessarily any point where f' is 10.