

MATH 1271 Spring 2013, Midterm #2
Handout date: Thursday 4 April 2013

PRINT YOUR NAME:

PRINT YOUR TA'S NAME:

WHAT RECITATION SECTION ARE YOU IN?

Closed book, closed notes, no calculators/PDAs; no reference materials of any kind. Turn off all handheld devices, including cell phones.

Show work; a correct answer, by itself, may be insufficient for credit. Arithmetic need not be simplified, unless the problem requests it.

I understand the above, and I understand that cheating has severe consequences, from a failing grade to expulsion.

SIGN YOUR NAME:

I. Multiple choice

A. (5 pts) (no partial credit) Compute $[d/dx][\sin^2(xy)]$. Circle one of the following answers:

- (a) $[\cos^2(xy)][y + xy']$
 - (b) $2[\sin(xy)][y + xy']$
 - (c) $2[\sin(xy)][\cos(y + xy')]$
 - (d) $2[\sin(xy)][\cos(xy)]$
 - (e) NONE OF THE ABOVE
-

B. (5 pts) (no partial credit) The Quotient Rule says that $(f/g)'$ is equal to what? Circle one of the following answers:

- (a) $(gf' - fg')/g^2$
 - (b) $(fg' - gf')/g^2$
 - (c) g'/f'
 - (d) f'/g'
 - (e) NONE OF THE ABOVE
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C. (5 pts) (no partial credit) Let f be a function such that $f'(x) = 6e^{4x}$. Suppose, also, that $f(0) = 1$. Which of the following is an equation of the tangent line to the graph of f at $(0, 1)$. Circle one of the following answers:

- (a) $y = 1 + 6x$
- (b) $y = 6(x - 1)$
- (c) $y - 1 = 6e^{4x}x$
- (d) $y = 6e^{4x}(x - 1)$
- (e) NONE OF THE ABOVE

D. (5 pts) (no partial credit) Compute $\frac{d}{dx} [\ln |(2x + 1)(3x - 4)|]$. Circle one of the following answers:

(a) $\left| \frac{2}{2x + 1} + \frac{3}{3x - 4} \right|$

(b) $\left| \frac{6}{(2x + 1)(3x + 4)} \right|$

(c) $\frac{2}{2x + 1} + \frac{3}{3x - 4}$

(d) $\frac{6}{(2x + 1)(3x + 4)}$

(e) NONE OF THE ABOVE

E. (5 pts) (no partial credit) Suppose $f'(x) = -2(x - 1)^5(x - 2)^6(x - 3)^8$. Which of the following is a maximal interval of increase for f ? Circle one of the following answers:

(a) $(-\infty, 1]$

(b) $(-\infty, 2)$

(c) $[1, \infty)$

(d) $[2, \infty)$

(e) NONE OF THE ABOVE

F. (5 pts) (no partial credit) Compute $\lim_{x \rightarrow \infty} (2x^2 + 4x - 3e^x)e^{-x}$. Circle one of the following answers:

(a) ∞

(b) 2

(c) 0

(d) -3

(e) NONE OF THE ABOVE

II. True or false (no partial credit):

a. (5 pts) Let f and g be any two functions such that $\lim_{x \rightarrow 5} f(x) = 1$ and $\lim_{x \rightarrow 5} g(x) = 0$.

Then $\lim_{x \rightarrow 5} \frac{f(x)}{g(x)} = \infty$.

b. (5 pts) Let u be any expression of x . Then $(d/dx)(e^u) = e^u$.

c. (5 pts) If $f' > 0$ on an interval I , then f is increasing on I .

d. (5 pts) Let g be any function such that $\lim_{x \rightarrow \infty} [g(x)] = \infty$. Then $\lim_{x \rightarrow \infty} [(1/x)^{g(x)}] = 0$.

e. (5 pts) Let f and g be any two functions such that $\lim_{x \rightarrow a} [f(x)] = \infty$ and $\lim_{x \rightarrow a} [g(x)] = \infty$.
Then $\lim_{x \rightarrow a} [(f(x)) - (g(x))] = 0$.

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PLEASE DO NOT WRITE BELOW THE LINE

VERSION C

I. A,B,C

I. D,E,F

II. a,b,c,d,e

III. 1,2.

III. 3.

III. 4.

III. 5. a,b,c

III. Computations. Show work. Unless otherwise specified, answers must be exactly correct, but can be left in any form easily calculated on a standard calculator.

1. (5 pts) Compute $\frac{d}{dx} \left[\frac{e^{-x^4}}{4 - \sin(x^2)} \right]$. (Here e^{-x^4} means $e^{(-x^4)}$.)

2. (5 pts) Compute $\frac{d}{dx} [(2 + 3x^2)^{\tan x}]$.

3. (10 pts) Find an equation for the tangent line to $-6e^x - 5xy + y^2 = 4x - y$ at $(0, 2)$.

4. (10 pts) Compute $\lim_{x \rightarrow 0} (2e^x - \cos x)^{3/x}$.

5. Let $y = x^3$. Then $\Delta y = ax^2(\Delta x) + bx(\Delta x)^2 + c(\Delta x)^3$, for some real numbers a, b, c .
- a. (5 pts) Compute a, b and c .

- b. (5 pts) Assuming $\Delta x \neq 0$, compute $\frac{\Delta y}{\Delta x}$.

- c. (5 pts) Compute $\lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x}$.