MATH 1271 Fall 2012, Midterm #2
Handout date: Thursday 8 November 2012

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) $2[\sin(xy)][\cos(xy)][y + xy']$

(b) $[\cos^2(xy)][y + xy']$

(c) $2[\sin(xy)][y + xy']$

(d) $2[\sin(xy)][\cos(y + xy')]$

(e) NONE OF THE ABOVE

B. (5 pts) (no partial credit) Find the logarithmic derivative of $(2 + \sin(2x))^{\cos x}$ w.r.t. x. Circle one of the following answers:

(a) $(\cos x)(\ln(2 + \sin(2x))) + (-\sin x)\left(\dfrac{2\cos(2x)}{2 + \sin(2x)}\right)$

(b) $(-\sin x)(\ln(2 + \sin(2x))) + (\cos x)\left(\dfrac{2\cos(2x)}{2 + \sin(2x)}\right)$

(c) $(\cos x)(\ln(2 + \sin(2x)))$

(d) $(-\sin x)\left(\dfrac{2\cos(2x)}{2 + \sin(2x)}\right)$

(e) NONE OF THE ABOVE

C. (5 pts) (no partial credit) Find the derivative of $(2 + \sin(2x))^{\cos x}$ w.r.t. x. Circle one of the following answers:

(a) $[(2 + \sin(2x))^{\cos x}]\left[(\cos x)(\ln(2 + \sin(2x))) + (-\sin x)\left(\dfrac{2\cos(2x)}{2 + \sin(2x)}\right)\right]$

(b) $[(2 + \sin(2x))^{\cos x}]\left[(-\sin x)(\ln(2 + \sin(2x))) + (\cos x)\left(\dfrac{2\cos(2x)}{2 + \sin(2x)}\right)\right]$

(c) $[(2 + \sin(2x))^{\cos x}][(\cos x)(\ln(2 + \sin(2x)))]$

(d) $[(2 + \sin(2x))^{\cos x}]\left[(-\sin x)\left(\dfrac{2\cos(2x)}{2 + \sin(2x)}\right)\right]$

(e) NONE OF THE ABOVE

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

(a) $[2, \infty)$

(b) $(2, \infty)$

(c) $[1, \infty)$

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

(e) NONE OF THE ABOVE

E. (5 pts) (no partial credit) Compute the derivative of $\ln\left(x^{\arctan x}\right)$, with respect to x, on the interval $x > 0$. Circle one of the following answers:

(a) $\dfrac{x^{1/(1+x^2)}}{x^{\arctan x}}$

(b) $\dfrac{1}{x^{\arctan x}}$

(c) $\dfrac{1}{x^{\sec^2 x}}$

(d) $x^{\sec^2 x}$

(e) NONE OF THE ABOVE

F. (5 pts) (no partial credit) Suppose $f''(x) = -x^2 - 4x - 3$. At most one of the following statements is true. If one is, circle it. Otherwise, circle "NONE OF THE ABOVE".

(a) f is concave up on $(-\infty, 1]$, down on $[1, 3]$ and up on $[3, \infty)$.

(b) f is concave down on $(-\infty, 1]$, up on $[1, 3]$ and down on $[3, \infty)$.

(c) f is concave up on $(-\infty, -3]$, down on $[-3, -1]$ and up on $[-1, \infty)$.

(d) f is concave down on $(-\infty, -3]$, up on $[-3, -1]$ and down on $[-1, \infty)$.

(e) NONE OF THE ABOVE

II. True or false (no partial credit):

a. (5 pts) Assume that $\lim_{x\to 0}[f(x)] = 0 = \lim_{x\to 0}[g(x)]$. Assume also that $\lim_{x\to 0}\left[\frac{f'(x)}{g'(x)}\right]$ does not exist. Then $\lim_{x\to 0}\left[\frac{f(x)}{g(x)}\right]$ does not exist.

b. (5 pts) Assume that $\lim_{x\to 3}[f(x)] = 0 = \lim_{x\to 3}[g(x)]$. Assume also that $\lim_{x\to 3}\frac{f'(x)}{g'(x)} = 7$. Then $\lim_{x\to 3}\frac{f(x)}{g(x)} = 7$.

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

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

e. (5 pts) If f and g are differentiable at a number a, then $fg + f + g$ is differentiable at a.

THE BOTTOM OF THIS PAGE IS FOR TOTALING SCORES
PLEASE DO NOT WRITE BELOW THE LINE

VERSION B

I. A,B,C

I. D,E,F

II. a,b,c,d,e

III. 1,2.

III. 3.

III. 4.

III. 5.

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 $\dfrac{d}{dx}\left[\dfrac{e^{x^4}-8}{5+\csc(x^2)}\right]$. (Here e^{x^4} means $e^{\left(x^4\right)}$.)

2. (5 pts) Compute $\dfrac{d}{dx}\left[(5-\sin x)^{7\arccos x}\right]$.

3. (10 pts) Find an equation for the tangent line to $x^3 + xy + y^3 = 11$ at $(1, 2)$.

4. (15 pts) Compute $\lim_{x \to 0} ((\cos x) - (\sin x))^{3/x}$.

5. (10 pts) Find the global maximum and minimum value of $f(x) = x^3 - 3x^2 + 3x + 9$ on the interval $-1 \leq x \leq 1$.