

MATH 1271 Spring 2012, Midterm #1
Handout date: Thursday 16 February 2012

PRINT YOUR NAME:

PRINT YOUR TA'S NAME:

WHAT 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 the largest $\delta > 0$ such that: $0 < |x - 1| < \delta$ implies $|(2x + 7) - 9| < 0.05$. Circle one of the following answers:

- (a) 0.01
 - (b) 0.025
 - (c) 0.1
 - (d) 0.2
 - (e) NONE OF THE ABOVE
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B. (5 pts) (no partial credit) Compute $\lim_{x \rightarrow 0} \frac{2x^3 - 5x^2}{7x(\sin x)}$. Circle one of the following answers:

- (a) 0
 - (b) ∞
 - (c) $2/7$
 - (d) $-5/7$
 - (e) NONE OF THE ABOVE
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C. (5 pts) (no partial credit) Let $y = x^2 - x$. Find Δy . Circle one of the following answers:

- (a) $[(x + \Delta x)^2 - (x + \Delta x)] - [x^2 - x]$
- (b) $[x^2 - x] - [(x + \Delta x)^2 - (x + \Delta x)]$
- (c) $[(x + \Delta x)^2 - (x + \Delta x)] + [x^2 - x]$
- (d) $(x + \Delta x)^2 - (x + \Delta x)$
- (e) NONE OF THE ABOVE

D. (5 pts) (no partial credit) A particle travels along a number line. Its position at time 1 is 40 and its position at time 5 is 80. Find its average velocity between time 1 and time 5. Circle one of the following answers:

- (a) 20
 - (b) 30
 - (c) 40
 - (d) 50
 - (e) NONE OF THE ABOVE
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E. (5 pts) (no partial credit) A line passes through (1, 40) and (5, 80). Find its slope. Circle one of the following answers:

- (a) 20
 - (b) 30
 - (c) 40
 - (d) 50
 - (e) NONE OF THE ABOVE
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F. (5 pts) (no partial credit) Assume that $\lim_{x \rightarrow 200} (f(x)) = 4$ and $\lim_{x \rightarrow 200} (g(x)) = 5$. At most one of the following statements must follow. If one does, circle it. Otherwise, circle Answer e.

- (a) $\lim_{x \rightarrow 1} \left[\frac{f(x)}{g(x)} \right] = \frac{4}{5}$
 - (b) $\lim_{x \rightarrow 300} [(f(x)) + (g(x))]$ does not exist
 - (c) $\lim_{x \rightarrow 400} [(f(x)) + (g(x))] = 9$
 - (d) $\lim_{x \rightarrow 200} [(f(x)) + (g(x))] = 9$
 - (e) NONE OF THE ABOVE
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II. True or false (no partial credit):

- a. (5 pts) A tangent line to the graph of a function cannot intersect the graph of the function more than once.

- b. (5 pts) The function $f(x) = |x|$ is differentiable at every real number.

- c. (5 pts) For every real number x , $\ln(e^x) = 1 + x$.

- d. (5 pts) If a function is differentiable at 2, then it is continuous at 2.

- e. (5 pts) There is a function with three horizontal asymptotes.

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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. 1a,b

III. 2

III. 3

III. 4a,b

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. a. (5 pts) Compute $\lim_{h \rightarrow 0} \frac{\sqrt{5+2h} - \sqrt{5-h}}{h}$.

b. (5 pts) Compute $\lim_{h \rightarrow 0} \frac{\frac{1}{5+2h} - \frac{1}{5-h}}{h}$.

2. (10 pts) Find all the horizontal asymptotes to $y = \frac{\sqrt{9x^2 + 5}}{x + 1}$.

3. (10 pts) Compute $\lim_{x \rightarrow 0} \left(\frac{7x^3 + 4x^2}{8x \sin x} \right)$.

4. On the planet of Gallifrey, in an alternate universe, a dropped object travels $t^3 + t^2$ feet during its first t seconds of free fall.

a. (10 pts) For $h \neq 0$, the average velocity between time $t = 2$ seconds and time $t = 2 + h$ seconds is given by a quadratic polynomial in h of the form $ah^2 + bh + c$. Find the coefficients a , b and c .

b. (5 pts) Find the instantaneous velocity at time $t = 2$ seconds.