

MATH 1271 Fall 2011, Midterm #1
Handout date: Thursday 6 October 2011

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) Assume that $\lim_{x \rightarrow 100} (f(x)) = 4$ 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) $\lim_{x \rightarrow 300} [(f(x)) + (g(x))] = 9$
 - (b) $\lim_{x \rightarrow 4} (f(x)) = 100$
 - (c) $\lim_{x \rightarrow 2} \frac{f(x)}{g(x)} = 4/5$
 - (d) $\lim_{x \rightarrow 300} [(f(x)) + (g(x))]$ does not exist
 - (e) NONE OF THE ABOVE
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B. (5 pts) (no partial credit) Compute $\lim_{x \rightarrow -\infty} \left[\frac{2x^2 - x}{4x^2 + x} \right]$. Circle one of the following answers:

- (a) ∞
 - (b) $-\infty$
 - (c) $1/2$
 - (d) $-1/2$
 - (e) NONE OF THE ABOVE
-

C. (5 pts) (no partial credit) Compute $\lim_{x \rightarrow -\infty} \left[\frac{\sqrt{4x^4 - x}}{8x^2 + x} \right]$. Circle one of the following answers:

- (a) $1/4$
- (b) $-1/4$
- (c) $1/2$
- (d) $-1/2$
- (e) NONE OF THE ABOVE

D. (5 pts) (no partial credit) Compute $\ln(e^{-(5^2)})$. Circle one of the following answers:

- (a) 25
 - (b) -10
 - (c) -25
 - (d) DOES NOT EXIST
 - (e) NONE OF THE ABOVE
-

E. (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) 2/7
 - (b) 5/7
 - (c) ∞
 - (d) 0
 - (e) NONE OF THE ABOVE
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F. (5 pts) (no partial credit) Compute the largest $\delta > 0$ such that: $0 < |x - 1| < \delta$ implies $|(2x + 4) - 6| < 0.1$. Circle one of the following answers:

- (a) 0.2
 - (b) 0.1
 - (c) 0.025
 - (d) 0.01
 - (e) NONE OF THE ABOVE
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II. True or false (no partial credit):

a. (5 pts) If $\lim_{x \rightarrow a} f(x) = \infty$, then $\lim_{x \rightarrow a^-} f(x) = \infty$.

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

c. (5 pts) If f and g are continuous at 3, then $f + g$ MUST be continuous at 3 as well.

d. (5 pts) Every polynomial is continuous.

e. (5 pts) The function $f(x) = |x|$ is differentiable at 0.

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

VERSION A

I. A,B,C

I. D,E,F

II. a,b,c,d,e

III. 1

III. 2a,b

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. (10 pts) Draw a single graph showing a function $f : [3, 5] \rightarrow \mathbb{R}$ with *all* of the following properties:

- (•) Its domain is the interval $[3, 5]$.
- (•) It is continuous on $[3, 5]$.
- (•) It is differentiable on $(3, 4)$ and on $(4, 5)$.
- (•) It is not differentiable at 4.

2. a. (10 pts) Compute $\lim_{h \rightarrow 0} \frac{\sqrt{7+h} - \sqrt{7-h}}{h}$.

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

3. (10 pts) Compute $\lim_{x \rightarrow -\infty} (\sqrt{x^2 + 4x} - \sqrt{x^2 - 5x})$.

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

a. (5 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.