

MATH 1271 Spring 2013, Midterm #1  
Handout date: Thursday 21 February 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) Which is the intuitive definition of  $\lim_{x \rightarrow 4^-} (h(x)) = 7$ ? Circle one of the following answers:

- (a) If  $x$  is close to 4, but not equal to 4, then  $h(x)$  is close to 7, but not equal to 7.
  - (b) If  $x$  is close to 4, but less than 4, then  $h(x)$  is close to 7.
  - (c) If  $h(x)$  is close to 7, but not equal to 7, then  $x$  is close to 4, but less than 4.
  - (d) If  $h(x)$  is close to 4, then  $x$  is close to 7.
  - (e) NONE OF THE ABOVE
- 

B. (5 pts) (no partial credit) Compute  $\lim_{x \rightarrow 0} \left[ \frac{(3x^5 - 8x^4)(\cos x)}{4x^3(\sin x)} \right]$ . Circle one of the following answers:

- (a) 3/4
  - (b) -2
  - (c) 0
  - (d) This limit does not exist.
  - (e) NONE OF THE ABOVE
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C. (5 pts) (no partial credit) Compute  $\lim_{t \rightarrow 3} \left[ \frac{t^2 + t - 12}{t - 3} \right]$ . Circle one of the following answers:

- (a) 5
- (b) 6
- (c) 7
- (d) 8
- (e) NONE OF THE ABOVE

D. (5 pts) (no partial credit) (no partial credit) A line passes through  $(1, 40)$  and  $(3, 80)$ . Find its slope. Circle one of the following answers:

- (a) 5
  - (b) 10
  - (c) 15
  - (d) 20
  - (e) NONE OF THE ABOVE
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E. (5 pts) (no partial credit) What is the largest number  $x$  such that  $|x - 3| \leq 0.005$ ?

- (a) 2.995
  - (b) 3
  - (c) 3.005
  - (d)  $-2.995$
  - (e) NONE OF THE ABOVE
- 

F. (5 pts) (no partial credit) Compute  $\lim_{x \rightarrow -\infty} \left[ \frac{x^3 + 2x^2 - 4x}{2x^4 - 7x^2} \right]$  Circle one of the following answers:

- (a)  $4/7$
  - (b)  $-4/7$
  - (c)  $1/2$
  - (d)  $-1/2$
  - (e) NONE OF THE ABOVE
-

II. True or false (no partial credit):

a. (5 pts) Let  $f(x) = |x|$ . Then  $f(x)$  is differentiable at  $x = 1$ .

b. (5 pts) Let  $f$  be the restriction of  $\sin$  to  $[0, \pi]$ . Then  $f$  is a one-to-one function.

c. (5 pts)  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x} = 1$ .

d. (5 pts) Let  $f$  be any function. If  $\lim_{x \rightarrow 3} f(x)$  exists, then 3 is in the domain of  $f$ .

e. (5 pts) Let  $f$  be any rational function. If  $\lim_{x \rightarrow \infty} f(x) = 2$ , then  $\lim_{x \rightarrow -\infty} f(x) = 2$ .

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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. 2

III. 3

III. 4

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) Find all horizontal asymptotes to

$$y = \frac{\sqrt[3]{8x^3 + 2x + 5}}{7x - 3}.$$

(NOTE: A horizontal asymptote is a line; your answers should be equations of lines, **NOT** numbers.)

2. (15 pts) Compute  $\lim_{n \rightarrow \infty} \left(1 + \frac{45}{n}\right)^n$ .

3. (10 pts) Compute  $\lim_{x \rightarrow \infty} \left[ \frac{2x^2 + \cos^2 x}{4x^2 + 2} \right]$ .

4. (10 pts) Let  $f(x) = (x + 2)^5(x - 1)^6(x - 3)^7$ . Find all of the maximum intervals of positivity and negativity for  $f$ .