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) Compute $\lim\limits_{x \to 0} \left[\dfrac{(3x^2 - 8x^4)(\cos x)}{4x(\sin x)} \right]$. Circle one of the following answers:

    (a) 3/4

    (b) -2

    (c) 0

    (d) This limit does not exist.

    (e) NONE OF THE ABOVE

B. (5 pts) (no partial credit) Compute $\lim\limits_{x \to -\infty} \left[\dfrac{x^3 + 2x^2 - 4x}{2x^4 - 7x^2} \right]$ Circle one of the following answers:

    (a) 4/7

    (b) $-4/7$

    (c) 0

    (d) ∞

    (e) NONE OF THE ABOVE

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

    (a) 40

    (b) 10

    (c) 0

    (d) -10

    (e) NONE OF THE ABOVE

D. (5 pts) (no partial credit) What is the largest number x such that $|x - 3| \leq 0.005$?

(a) 2.995

(b) 3.005

(c) 3

(d) -2.995

(e) NONE OF THE ABOVE

E. (5 pts) (no partial credit) Which is the intuitive definition of $\lim_{x \to 4} (h(x)) = 7$? 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 $h(x)$ is close to 4, then x is close to 7.

(c) If x is close to 4, but not equal to 4, then $h(x)$ is close to 7.

(d) If $h(x)$ is close to 7, but not equal to 7, then x is close to 4, but less than 4.

(e) NONE OF THE ABOVE

F. (5 pts) (no partial credit) Compute $\lim_{t \to 4} \left[\dfrac{t^2 - t - 12}{t - 4} \right]$. Circle one of the following answers:

(a) 7

(b) 8

(c) 9

(d) 10

(e) NONE OF THE ABOVE

II. True or false (no partial credit):

a. (5 pts) Let f be any algebraic function. If $\lim_{x \to \infty} f(x) = 1/3$, then $\lim_{x \to -\infty} f(x) = 1/3$.

b. (5 pts) Let f be any function. If $\lim_{x \to 3} f(x)$ exists, then f is continuous at 3.

c. (5 pts) Let $f(x) = |x|$. Then $f(x)$ is differentiable at $x = 0$.

d. (5 pts) Let f be the restriction of $\sin$ to $[-\pi/2, 0]$. Then f is a one-to-one function.

e. (5 pts) $\lim_{x \to 0} \dfrac{\sin^2 x}{x^2} = 1$.

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

$$y = \frac{\sqrt[4]{x^4 + 2x + 5}}{7x - 3}.$$

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

2. (15 pts) Compute $\displaystyle\lim_{n\to\infty}\left(1+\frac{63}{n}\right)^n$.

3. (10 pts) Compute $\lim\limits_{x \to -\infty} \left[\dfrac{2x^2 + \cos^2 x}{5x^2 + 2} \right]$.

4. (10 pts) Let $f(x) = (x+2)^5(x-1)^6(x-4)^8$. Find all of the maximum intervals of positivity and negativity for f.