232 TEST 1

You may use your notebook during this exam.
You may NOT use calculators, cell phones, or peeking.

Math 232
February 18, 2009

Name: _____

By printing my name I pledge to uphold the honor code.

1. Define each of the following in complete sentences:

a) e

b) $\log_2 x$

c) a function f *dominates* a function g

2. Assume you have \$5000 in the bank. Give the formula for your bank balance $Q(t)$ at the end of t years in each of the following conditions:

a) Continuous growth at a rate of 4% per year

b) Yearly percentage growth at a rate of 4%

c) Growth at 4% per year compounded monthly

3. Simplify each of the following as much as possible.

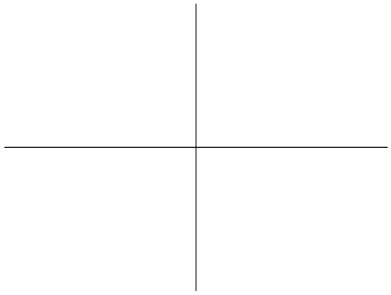
a) $\dfrac{\ln 32}{\ln 2}$

b) $2\log_2 3 - \log_2 5$

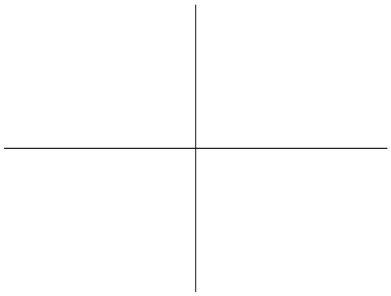
c) $\log_2 \dfrac{1}{8}$

4. Sketch quick graphs of each of the following functions, without using any derivative information. Label all asymptotes and intercepts on the graphs.

$f(x) = 2^{-x} + 3$



$f(x) = \ln(\frac{1}{x})$



5. Calculate each of the following limits and select your answer from A–E. Letters may be used once, more than once, or not used at all.

_____ $\lim_{x\to 0} \dfrac{x^3}{2^x - 1}$

_____ $\lim_{x\to 1} (\ln x)^{\frac{1}{x-1}}$

_____ $\lim_{x\to\infty} (2^x - 4^x)$

_____ $\lim_{x\to\infty} \log_{\frac{1}{3}} x$

A) 0
B) 1
C) e
D) ∞
E) $-\infty$

6. Some of the limits below require multi-step processes to solve. Indicate a viable first step by choosing one of A–C. If a limit could be solved immediately without any of A–C then select D. Letters may be used more than once, or not used at all.

_____ $\lim_{x\to\infty} (\frac{1}{2})^x x^5$

_____ $\lim_{x\to\infty} \dfrac{2^{-x}}{x^2 + 1}$

_____ $\lim_{x\to\infty} \left(\dfrac{1}{\ln x}\right)^x$

_____ $\lim_{x\to\infty} (\ln x)^{\frac{1}{x}}$

A) can apply L'Hôpital's Rule immediately
B) need to do algebra before L'Hôpital's Rule
C) must use logarithms
D) could be solved right now

7. Compute the following derivatives. Show all of your work, but do not simplify your answers! Please put boxes around your final answers.

a) $f(x) = 7x^3 e^{2x}$

b) $f(x) = \dfrac{\log_2 x}{x^2 + 1}$

c) $f(x) = (\ln 2)\ln(\ln x)$

d) $f(x) = x^x$

Confidential Survey:
We may be switching groups after this exam. Please answer the following questions. Your answers will not be revealed to your other groupmates.

Your name: _____ Your group's name: _____

Please circle one: **A)** Please don't break up our group!

B) Either way is okay with me

C) I would prefer to try working with another group