Name:_____.

MATH 115 - SEC 011, WINTER 2011. QUIZ 5
TIME LIMIT: 20 MINUTES

INSTRUCTOR: GERARDO HERNÁNDEZ

Good luck!

Problem 1. Find the quadratic polynomial $g(x) = ax^2 + bx + c$ which best fits the function $f(x) = e^x$ at $x = 0$, in the sense that

$$g(0) = f(0), \text{ and } g'(0) = f'(0), \text{ and } g''(0) = f''(0).$$

Using your calculator, sketch the graphs of f and g on the same axes. What do you notice?

Date: February 16, 2011.

Problem 2. The period, T, of a pendulum is given in terms of its length, ℓ, by

$$T = 2\pi\sqrt{\frac{\ell}{g}},$$

where g is the acceleration due to gravity (a constant).

- Find $\frac{dT}{d\ell}$. *Show your work. Specify what rules you are using.* You are **NOT** allowed to use rules that we haven't seen in class.

- What is the sign of $\frac{dT}{d\ell}$? What does it tell you about the period of the pendulum?

Problem 3. For what value(s) of a are $y = a^x$ and $y = 1 + x$ tangent at $x = 0$? *Explain.*

Problem 4. State the *quotient* rule. **Be specific.**

Problem 5. Find the derivative of the following functions.

(a) $f(x) = x \cdot e^x$

(b) $f(x) = x \cdot 2^x$

(c) $g(t) = \frac{t-4}{t+4}$

(d) $y = (t^2 + 3) \cdot e^t$