Assignment #01
MATH 1401 - Calculus 1
Spring 2009

Instructor: Eric Sullivan
Name: ________________________

• **Due: Monday, January 26 2009** (at the beginning of lecture)
• Attach this sheet to this assignment. Staple all pages together before you get to class.
• Give enough details about each problem so that I should NOT need to refer back to the text.
• Do your work on engineering paper.

**Problems to be Turned in:**

1. Find a function $f$ such that $f(x+3) = f(x) + f(3)$. Explain (in words or mathematically) why your function satisfies this condition.

2. Find a function $g$ such that $g(x+a) = g(x)g(a)$. Explain (in words or mathematically) why your function satisfies this condition.

3. Find the period for $y_1 = \sin(\pi x)$ and $y_2 = \cos(5x)$. Show your work.

4. Use logarithms to solve (a) $2^x = 5$ and (b) $10^x = 3^{-1}$. Round your answers to three decimal places.

5. John and Jodie are having an argument. John thinks that $\log(5 \cdot 7) = \log(5) \cdot \log(7)$ and Jodie thinks that $\log(5 \cdot 7) = \log(5) + \log(7)$. Who is correct and why? (No calculator allowed)

6. Convert the following to equivalent forms in which no negative exponents appear:
   (a) $\left(\frac{2}{3}\right)^{-1}$  
   (b) $\frac{6}{x^{2}}$  
   (c) $\frac{6xy}{3x^{2} + y^{2}}$  
   (d) $\left(\frac{-3}{2}\right)^{-3}$  
   (e) $\left(\frac{2x^{2}}{3x^{3}}\right)^{-2}$

7. Explain whether each of the following student responses is correct or incorrect. If it is incorrect, give the correct answer.
   (a) Asked to find an expression equivalent to $x^8 - x^5$, a student responded $x^3$.
   (b) Asked to find an expression equivalent to $\frac{x^3 - x^2}{x^2}$, a student responded $x^6 - x^3$.
   (c) Another student said that $\frac{x^2}{x^3 - x^6}$ is equivalent to $\frac{1}{x^2 - \frac{1}{x}}$.
   (d) Asked for an expression equivalent to $x^3 + x^{-3}$, a student responded $x^0$.
   (e) Asked for an expression equivalent to $(x^{-1} + y^{-1})^{-2}$, a student responded $x^2 + y^2$.

8. The figure below shows the graph $y = f(x)$ of an unspecified function $f$. Draw $f(x)$ on your engineering paper, and then sketch a detailed graph of the reciprocal function $y = \frac{1}{f(x)}$ on the same system of coordinate axes.

![Graph Image]

**Suggested Review Problems:**
Chapter 1 Review (page 96) problems 2, 3, 9, 13, 15, 17, 27, 33