**Math 166 - Section A**
**March 7, 2008**
**Names:** _____, _____, _____

**Quiz #7: Illegal Math**

In small groups of 2-3, discuss the answers to the following questions. Select one person to record your answers on a separate piece of paper. You may use your textbook and calculator. You may not use your computer, cell phone, or any other references. Answers should be in complete sentences. If you use the textbook, please include the page number.

6 pts. 1. Where does the proof of L'Hôpital's Rule for the $\frac{0}{0}$ case fail, if we do not have the hypothesis that $\lim_{x\to c} f(x) = \lim_{x\to c} g(x) = 0$?

6 pts. 2. Give me an example of a problem in which $\lim_{x\to c} f(x) \neq 0$, and $\lim_{x\to c} g(x) \neq 0$. Show how the answer is incorrect if you apply L'Hôpital's Rule.

6 pts. 3. Explain why $(x+y)^n \neq x^n + y^n$ for any rational number or integer $n$.

(a) Find real numbers $x, y$, such that $(x+y)^{1/2} \neq x^{1/2} + y^{1/2}$

(b) Find real numbers $x, y$, such that $(x+y)^2 \neq x^2 + y^2$

6 pts. 4. Find the difference between the following two statements. Which one is false? Why?

$$f(x) = \frac{(3x+7)(2x-9)+(x^2+1)}{(3x+7)(x^3+6)} = \frac{(2x-9)+(x^2+1)}{(x^3+6)}$$

$$g(x) = \frac{(3x+7)[(2x-9)+(x^2+1)]}{(3x+7)(x^3+6)} = \frac{(2x-9)+(x^2+1)}{(x^3+6)}$$

6 pts. 5. Find and explain the mistake in the following calculation.

$$\begin{aligned}
a &= b && \text{Start by assuming this to be true.}\\
a^2 &= ab && \text{Multiply both sides by a.}\\
a^2 - b^2 &= ab - b^2 && \text{Subtract } b^2 \text{ from both sides.}\\
(a-b)(a+b) &= (a-b)b && \text{Factor both sides.}\\
(a+b) &= b && \text{Divide both sides by } (a-b)\\
2b &= b && \text{Recall we started off assuming } a = b.\\
2 &= 1 && \text{Divide both sides by b.}
\end{aligned}$$

6 pts. 6. Find the difference between the following two statements. Which one is false? Why?

$$-3\int 6x - 2\,dx = -9x^2 + 6x + C \qquad \text{or} \qquad -3\int 6x - 2\,dx = -9x^2 - 2x + C$$

**Points earned:** _____ **out of a possible 36 points**