Math 221  
Test 1 Review (Chapters 1 & 2)  
Fall 2008

Each problem is worth one point for a total of ten points. The review sheet will count towards your quiz grade. It is due at the beginning of class on Tuesday, September 30.

1. Billy leaves Evansville at 2:00 PM and drives at a constant speed on I-64. He passes Ferdinand, 45 miles from Evansville, at 2:50 PM. Express the distance traveled in terms of time elapsed. What is the slope of the line? What does it represent?

2. Explain how the graph of $2f(x + 1) + 3$ is obtained from the graph of $f$.

3. Find the domain of the function.
   
a. $y = \ln(x - 2)$

   
b. $y = \sqrt{e^x - 1}$

4. Let $f(x) = \frac{1}{x^2}$ and $g(x) = \sqrt{3 - x}$. Find $f \circ g$ and its domain.

5. Let $f(x) = \frac{x}{x + 2}$. Find $f^{-1}(x)$.
6. Find the limit, if it exists. If not, explain why.

a. \( \lim_{x \to 1} \frac{x^2 + 3x + 2}{x^2 - 2x + 1} \)

b. \( \lim_{h \to 0} \frac{\sqrt{4 + h} - 2}{h} \)

c. \( \lim_{x \to -\infty} \frac{2x^3 - 3x^2 + 7}{3x^3 + 5x - 2} \)

7. For the limit \( \lim_{x \to -1} 2x^2 - 3x - 1 = 4 \), illustrate the \( \delta \)-\( \epsilon \)-definition by finding a value of \( \delta \) corresponding to \( \epsilon = 0.5 \).

8. Find the numbers at which \( f \) is discontinuous, where

\[
f(x) = \begin{cases} 
x^2 & \text{if } x < 1, \\
\frac{1}{x} & \text{if } 1 \leq x \leq 4, \\
\sqrt{x} & \text{if } x > 4.
\end{cases}
\]