Math 1500 Fall 2010
Exam 2 Review

This is just a guide to help you study. I do not guarantee that anything will or will not be on the exam based on this guide.

1 Basics

Tuesday, October 19, 2010 in class. No books or notes or cell phones. You may use a scientific calculator.

§2.1-§2.3, §2.5-§2.8, §3.1-§3.2

2 Practice Problems

- pg. 165-166 **Concept Check**: 1-5, 6aefgh, 7-15
- pg. 167-169 **Exercises**: 1-18, 20, 23, 25-27, 29ab, 30a, 32, 33-36, 39ab, 40, 42-44, 45a, 47, 49, 50
- pg. 261 **Concept Check**: 1a-f, 2ab
- pg. 262-264 **Exercises**: 1, 3, 6, 8, 9, 58, 89a-c, 92

3 Suggestions

- Work lots and lots of problems, especially those on material you don't understand as well.
- When possible, ask yourself WHY you are solving a problem a certain way or WHY the result is true.
- Do not look at solutions unless you are desperate.
- Check your work!!

4 Sample Exam

1. Find the derivative of the function $f(x) = \sqrt{x+3}$ **using the definition of the derivative**.

2. Evaluate the limit, if it exists.
   (a) $\lim_{x\to 0} \frac{\sqrt{x+1}-1}{x}$

   (b) $\lim_{x\to 2} \frac{x^2-3x-4}{2x-1}$

   (c) $\lim_{x\to -3} \frac{|3-x|}{x-3}$

3. Evaluate the limit of $\lim_{x\to 3}\sqrt{\frac{4x-3+x^2}{2x^2+x+1}}$ and justify each step by indicating the appropriate Limit Laws.

4. Differentiate the following functions.

   (a) $f(x) = 1 - 3x + 2x^3$

   (b) $f(x) = 5x^2 + e^x - \frac{2}{x}$

   (c) $f(x) = \frac{\sqrt{x}}{x^2+1}$

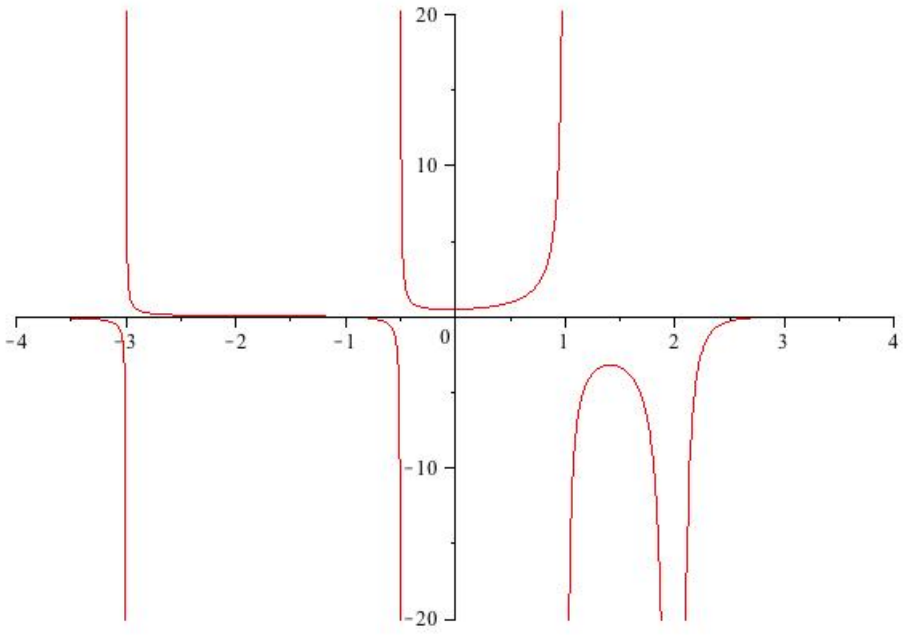
5. Below is the graph of a function $f(x)$. State the following.

   (a) $\lim_{x\to -3^-} f(x)$

   (b) $\lim_{x\to -3^+} f(x)$

   (c) $\lim_{x\to 1} f(x)$

   (d) $\lim_{x\to 2} f(x)$



6. Suppose $2x + 1 \leq g(x) \leq x^2 + 2$ for all x. What is $\lim_{x \to 1} g(x)$?

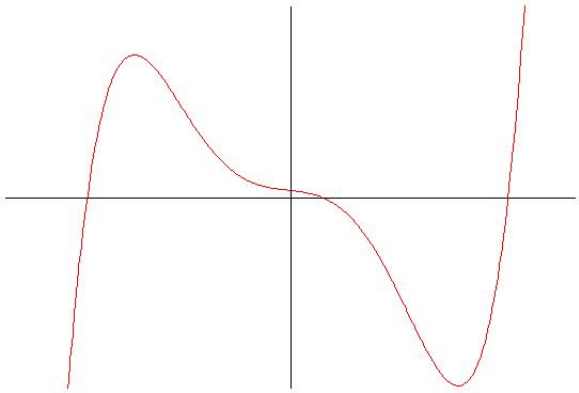
7. Find an equation of the tangent line to the curve $f(x) = e^x + 2x^2$ at the point $x = 1$.

8. Find the limits.

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

   (b) $\lim_{x \to \infty} \frac{3x+1}{\sqrt{x^4+1}}$

9. Below is the graph of a function f. On the same graph sketch a rough graph of its derivative.



10. (a) Find the vertical and horizontal asymptote(s) if they exist for $f(x) = \frac{x^2+2x-3}{x^2+x-6}$.

    (b) $\lim_{x \to \infty} f(x)$ $\lim_{x \to -3} f(x)$

    (c) Find the infinite limit below.

    $\lim_{x \to 2^-} f(x)$