Math 161 – Exam 1 Review Topics

Note. The following is not intended to be an exhaustive list of every single relevant topic we've covered. However, it should give you an overview of the most important topics thus far.

Exam Coverage. The exam will cover sections 2.1 through 2.9, 3.1, and 3.2.

STUDYING NOTE: The best way to study for any exam in this class is to DO PROBLEMS. Do the review sheet problems, the worksheet problems we did in class, and practice problems from the list at the beginning of the semester. The more practice you get, the better off you will be. STARTING YOUR STUDYING EARLY will give you the best chance of success on the exam. In particular, I'd recommend coming to class on Monday, 3/3 having done or at least attempted all of the sample exam problems.

GUARANTEED PROBLEMS. The test will likely contain 7-10 total questions. Here are three problems that will *definitely* appear on the test:

- A page where you calculate derivatives of several functions using shortcut formulas. NOTE: CALCULATORS WILL NOT BE ALLOWED ON THIS PAGE OF THE EXAM.
- A problem where you find the equation of the tangent line to a function.
- A problem where you calculate the derivative of a function using the LIMIT DEFINITION of the derivative (i.e., the long way, using formula 2 on page 155).

Important Concepts

1. Know what a limit is and how to calculate it graphically, algebraically, and estimate it numerically using a table.
2. Understand graphically what it means for a function to be continuous and what it means for a function to be differentiable.
3. Be able to interpret the derivative as a rate of change and to use this interpretation to solve an applied problem involving derivatives.
4. Be able to calculate the derivative of simple functions using the limit definition (the long way). Problems 19-23 on page 166 would be good practice for this. Also be able to estimate a derivative graphically or using the table method.
5. Know what $f'(x)$ and $f''(x)$ tell you about the original function $f(x)$ (i.e. increasing/decreasing, concave up/down). Be able to sketch a graph of $f'(x)$ given a graph of $f(x)$, or to interpret the behavior of $f(x)$ based on information about its first and second derivative. (Sections 2.8 and 2.9 dealt with these topics.)
6. Know and be able to use the short-cut formulas for taking a derivative. In particular, know the Power Rule (p. 185), the Product Rule, the Quotient Rule, and the derivative of $y = e^x$.
7. Know how to calculate the velocity and acceleration of a moving object given a formula for its displacement. Be able to answer questions about velocity and acceleration.
8. Finally, keep in mind that limits and continuity were tools whose purpose was to define "derivative," the most important concept in the course. Therefore, derivatives will receive more emphasis on the exam than generic limits or continuity.