Math 221: Midterm 2 review sheet

Midterm 2 will cover sections 3.5, 3.7–3.10, 4.1–4.5, 4.7 and 4.8.

From Chapter 3, you should...

- ...know what implicit differentiation is and what it means: it's used to find the derivative of a function implicitly defined by an equation in two variables, where one of the variables can be expresses as a function of the other (at least "locally"). If a curve is given as the solution to an equation in two variables, you should know how to find the tangent line to any point on the curve.

- ...understand how calculus is used to model physical phenomena and be able to interpret the meaning of the derivative for functions coming from such models.

- ...know what differential equations of exponential growth and decay are, and what the form of their solutions are.

- ...be able to solve problems on exponential growth and decay (e.g. predict future behavior for a function assuming exponential growth/decay, given sufficient data for the function).

- ...be able to set up and solve related rates problems.

- ...know what the "best linear approximation" to a differentiable function is, and know how it is used to approximate the values of a function.

- ...be able to solve various problems using the techniques and tools from this chapter.

From Chapter 4, you should...

- ...know how to find the critical points and the local max/min for a function (using the first and second derivatives will be essential).

- ...know how to find the max/min values of a function on a closed interval.

- ...know how to use information about the first and second derivatives of a function to describe the qualitative behavior of a function.

- ...know what the mean value theorem says.

- ...be able to sketch the graph of a function following the guidelines given in section 4.5 (I'll ask for the specific pieces of information, and you will need to be able to find this information and use it to sketch the graph).

- ...know what the indeterminant forms are and how to use L'Hospital's rule to find limits.

- ...be able to set up and solve optimization problems.

- ...be able to use Newton's method to find approximate solutions to equations.

Make sure you practice doing problems for the exam. Try making up your own related rates problems and optimization problems, then trade with your classmates to get more practice. See if you can stump your friends! (caution: to be fair, make sure you can solve your own problems...)

A whole bunch of practice problems: (there is some overlap with homework...)

§3.5: 5, 11, 15, 25, 27.	Ch. 3. Review: 93, 95, 97, 99.	§4.5: 11, 15, 29, 33, 41, 49.
§3.7: 5, 9, 15, 23.	§4.1: 29, 31, 33, 35, 37, 51, 53, 57.	§4.7: 5, 9, 13, 23, 29, 35, 51
§3.8: 3, 5, 9, 17.	§4.2: 11, 13.	§4.8: 5, 7
§3.9: 1, 3, 15, 19, 21, 29, 43.	§4.3: 3, 11, 15, 31, 53, 69.	Ch. 4 Review: 1, 3, 5, 7, 11,
§3.10: 1, 3, 11, 13, 15.	§4.4: 5–63 (odd).	13, 19, 23, 27.