This list is intended as the start of a study guide. There is no guarantee that because a topic is listed here that it will be on the midterm, nor is there a guarantee that every problem on the midterm is represented in the list below. I've broken down the topics into three categories: problem solving, tasks, and basic computations. You can expect to find all of these categories represented on the midterm. The midterm will cover:

- **Chapter 2** All sections
- **Chapter 3** Sections 1, 2, 3, 4

You will want to do the following:

- Go over all of your quizzes. If I asked you a question on a quiz, you can assume that I like that kind of question.
- Go over ALL webassign problems you were not able to solve.
- Go over ALL homework problems you were not able to solve. You should pay close attention to Addendum problems. If I decided to write up a question, you can assume I thought it was important.
- Go over the worksheets we looked at in class. If there are parts you don't understand, look at the solutions, and ask questions if needed.
- For strictly computational problems (i.e. computing derivatives), try some sample problems from the text: there are answers in the back for the odd problems.
- Quiz 2, Quiz 3 and Worksheet 1 are all very similar. I bet you that stuff is important.
- Go over the list of topics on the next page.
- Look over the sample exam. The exam is old, and dates from a time when we used a different text, so you can expect your exam might have substantial differences.

Problem Solving and the Big Picture:

- Know how slopes of tangent lines are obtained as limits of slopes of secant lines. See, for example, Homework 4 Addendum 2.
- Know how instantaneous rates of change are obtained as limits of average rates of change.
- Know the definition of the derivative as a limit.
- Know the relationship between rates of change, slopes of tangent lines, and derivatives.
- Given an equation involving a derivative, e.g. $x'(3) = 9$ be able to explain what the equation means in a way that a friend would understand.
- Be able to solve word problems involving the derivative. For example, think of the coffee problem at the start of the semester: could you now compute the instantaneous rate of change of the coffee's temperature at time t=20? How about those problems involving falling objects?
- Know how velocities and accelerations are related to derivatives.
- Know the definition of continuity and know what it means.

Tasks and Computations:

- Compute average rates of change.
- Determine the slope of (or formula of) a secant line connecting two points on a graph.
- Compute instantaneous rates of change (and be able to interpret what they mean).
- Given the graph of a function, sketch the graph of its derivative.
- Given the graph of the derivative of a function, sketch the original function.
- Determine the tangent line at a point on a graph.
- Determine where a function is continuous.
- Compute limits that can be determined by cancellation. Be sure to known when the rule "Limits Don't Care" applies.
- Be able to compute a derivative using the rules from Chapter 2.
- Compute basic derivatives from the definition. You must know how to use the Quotient Rule, the Product Rule, and the Light Chain Rule.
- Compute one-sided limits.
- Compute infinite limits (e.g. $\lim_{x\to 0^-} x^{-1} = -\infty$).
- Show that a limit does not exist (e.g. $\lim_{x\to 0} x/|x|$ does not exist).
- Know what the Squeeze Theorem is and how it is used. See, e.g. Homework 3 Addendum.
- Demonstrate mastery of review material, especially:
    - the absolute value function
    - inverse functions
    - exponential functions
    - logarithmic functions