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 3 sections 10 and 11 and Chapter 4 sections 4.1, 4.3, 4.4, 4.7. There will be a stronger emphasis on problem solving and word problems than on the previous two exams.

Problem Solving and the Big Picture

- Solve word problems involving rates of change.
- Understand how the chain rule allows you to compare the rates of change of two related quantities. (e.g. related rates problems).
- Understand what the linear approximation is and how to use it.
- Solve word problems involving optimization.

Tasks:

- Find an absolute maximum of a given function on a closed interval.
- Use the first and second derivative tests to find local minimums and maximums of a function.
- Use the global first and second derivative tests to find absolute minimums and maximums of a function.
- Use the linear approximation to compute the approximate value of a function.
- Use differentials to estimate the change in a function value.
- Compute horizontal or vertical asymptotes using L'Hopitals rule.
- Determine regions where a function is increasing/decreasing.
- Determine regions where a function is concave up/concave down.
- Identify increasing/decreasing and concave up/concave down regions on a graph.

Computations:

- Compute the differential of a function.
- Compute the linear approximation of a function.
- Given $f(x)$, determine where $f'(x) > 0$, $f'(x) < 0$, $f''(x) > 0$, $f''(x) < 0$, and where the critical points of f ($f'(x) = 0$ or does not exist) are.
- Compute limits using L'Hopital's rule.