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 4, and Chapter 5 sections 1-3.

Problem Solving and the Big Picture:

- Solve word problems involving optimization.
- Understand how the first and second derivative control the shape of the graph of a function.
- Be able to graph a function using the rules from class.

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.
- State the Extreme value theorem and use it to find the extrema of a continuous function defined on a closed, bounded interval.
- 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.
- Find elementary antiderivatives.
- Use antiderivatives to reconstruct position from velocity or acceleration.
- Approximate an area using a Riemann sum.
- Express an area as a limit of Riemann sums.
- Given a sum in sigma notation, express it as a standard sum with + signs. Or vice-versa.

Computations:

- 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.