Midterm 1 Review Guide

1 Chapter 0

You should be familiar with all of the review material, especially anything that was covered in class or on the first homework assignment.

2 Chapter 1

2.1 Section 1

1. Situations where there is not a limit (jumps, endpoints, wiggles too much)
2. Left and Right limits
3. Theorem 1.1A (there is only a limit if the left limit equals the right limit)

2.2 Section 3

1. Main Limit Theorem (be able to use the 9 rules to simplify limits, you do not need to have all 9 rules memorized by number)
2. Know how to evaluate the limits of polynomial and rational functions, especially what to do if the rational function is dividing by zero at the limit point.
3. Squeeze Theorem. Know how to use a picture where $u(x)$ and $l(x)$ are given to prove that f(x) has a limit.

2.3 Section 4

1. Know the limits of simple trig functions (Theorem 1.4A)
2. Know the 2 special trig limits (sin x)/x and (1-cos x)/x (Theorem 1.4B)
3. Be able to use these rules to solve the limits of more complicated functions made of trig functions

2.4 Section 5

1. Know how to take the limit of functions and sequences at plus or minus infinity
2. Know how to take limits of functions with horizontal and vertical asymptotes

2.5 Section 6

1. Know what it means for a function to be continuous at a point (Theorem 1.6A)
2. Know how to fix the discontinuity of a removably discontinuous function (for example HW problem 1.6.20)

3 Chapter 2

3.1 Section 1

1. Understand the different types of problems that all mean the same thing (Derivative = slope of tangent line = instantaneous velocity/rate of change)

3.2 Section 2

1. Know the different limit definitions of the derivative and how to use them to evaluate a derivative
2. Differentiable implies continuous, know why the opposite is not true
3. Know examples of how functions are not differentiable at a point (corners, holes, endpoints, vertical tangents, wiggles too much, etc.)
4. Be able to sketch a graph of f' if you are given the graph of f.

3.3 Section 3

1. Know the derivative rules (power, product, quotient, etc.) and be able to use them together to find the derivatives of more complicated functions.

3.4 Section 4

1. Know the simple trig function derivatives

3.5 Section 5

1. Know the definition of the chain rule and how to use it to find the derivative of more complicated functions

3.6 Section 6

1. Know the different notations for higher order derivatives and how to take them.
2. Know what happens to sin, cos, and polynomial functions as you take higher order derivatives.

3.7 Section 7

1. Know how to take the derivatives of equations/relations which are not necessarily functions with implicit differentiation using the chain rule on y(x)

3.8 Section 8

1. Know how to set up related rates equations
2. Know how to use implicit differentiation to solve for derivatives of related rates equations

4 Homework Problems

Understand and be able to do all of the homework assignments (1-4)

5 Practice Midterm

Understand and be able to solve all of the problems from the practice midterm.