Objectives for Exam #2

To be well-prepared for Exam #2, you should be able to

- state and understand the definitions of average velocity and average rate of change of a function
- interpret the instantaneous rate of change of a function f at a point on its graph.
- understand the meaning of secant and tangent lines and how they relate to slopes
- estimate a limit of a function from graphical information
- estimate a limit of a function numerically by building a table of values
- explain the meaning of one-sided limits, two-sided limits, and how they are related
- graphically describe at least three different ways a limit can fail to exist
- understand infinite limits and how they relate to vertical asymptotes of graphs
- state and explain the formal definition of the limit of a function at a point in more depth than just using the phrase "ought to be"
- state the formal definition of limit
- provide a carefully written and complete logical proof, including the careful and correct use of ϵ and δ, that the formal definition of limit is satisfied for a given linear function or linear function with a removable discontinuity
- state and use all of the basic limit laws and/or sqeeze theorem
- state the definition of the continuity of a function at a point or on an interval
- explain and illustrate the different types of discontinuity discussed in the textbook
- state and understand the basic laws of continuity
- recognize and use the functions that are known to be continuous on their domains
- use algebra, trigonometry and/or the special limits for sines, $\lim_{\theta\to 0}\frac{\sin(\theta)}{\theta}$, and cosines, $\lim_{\theta\to 0}\frac{1-\cos(\theta)}{\theta}$, to evaluate limits that have indeterminate forms
- recognize and be able to evaluate limits as $x \to \infty$ of functions like $\lim_{x\to\infty}\frac{\sqrt{4x^6+x}}{x^3+7}$.
- apply the bisection method for approximating zeros of functions
- use the **definition** of derivative to compute $f'(x)$ for a given function $f(x)$.
- use the derivative rules from section 3.2 to determine the derivatives of appropriate functions
- recognize and use the relationships between the graph of a function and the graph of its derivative function