Intro to Calculus, Final Review

The final exam will be approximately 2 hours in length, and will be approximately an exam and a half long (about 5-6 pages, depending on graphs and room to write). You may have one page of notes (standard 8.5×11) written on one side only. You may also have a calculator, but it can only be used for numerical work (no graphs or algebra/calculus).

For study material:

- Think of the midterm as a good summary of the first 8 weeks of class, so be sure to go through the midterm and make sure you understand the topics from that.
- After that, quizzes 4, 5, and 6 summarize the remainder of the course, so be sure to go over those carefully.
- I will also post a general "final exam" sample you can try.

Overview of the Calculus part of the course

Calculus 1 has 4 main themes:

1. The limit

   Be able to compute a basic limit graphically, numerically and algebraically. Know and be able to apply l'Hospital's rule.

2. Continuity

   Know the definition. Be able to check the definition (find the limit of a function) to algebraically see if a function is continuous at a point. Understand the difference between a continuous function and a differentiable function.

3. The Derivative

   Know the definition. Be able to compute a derivative from the definition. Be able to estimate a derivative numerically and graphically (also be able to compute the average rate of change).

   Know the rules of differentiation and be able to apply the rules.

   (a) Applications of the derivative: Linearization (and approximation using the tangent line), Be able to compute the equation of the tangent line to a function, Be able to find critical points, and be able to apply the first and second derivative tests for local extrema. Be able to find the global extrema for a continuous function on a closed interval.

   (b) Related rates.

   (c) Determine where a function is increasing/decreasing, concave up/concave down.

4. The Antiderivative (and Fundamental Theorem).

   See the worksheets for 4.1-4.4.

   Understand the Riemann sums, and be able to write the Riemann sum in the case of left or right endpoints. With that, understand the sigma notation for sums (write a sum using sigma notation, or given sigma notation, write the expanded sum).

   Be able to define the definite integral. Be able to use the properties of the definite integral in computations.

   Be able to compute the definite integral using geometry. Be able to use the FTC to evaluate a definite integral.

   Be able to compute an antiderivative.

   Careful with notation- What's the difference?

$$f'(a) \text{ versus } f'(x) \qquad \int_a^b f(x)\,dx \text{ versus } \int f(x)\,dx$$