

## Final Exam Review Sheet      Calc 1      7/27/2005

Format: 10 problems with generally ascending difficulty, plus an extra credit opportunity.

Prerequisites: The exam is comprehensive over everything since kindergarten. Although there won't be entire questions devoted to material from chapter 1 or anything prior to that, this material will be necessary for stages of most problems on the exam. Linear, exponential, and sinusoidal functions in particular will be likely to show up.

Content: The exam will cover §2.1 through §6.1.

- ▶ Understand how rates of change pertain to a large variety of situations.
- ▶ Understand limits from graphic, numeric, and algebraic standpoints.
- ▶ Know the definition of the derivative (both at a point and as a function).
- ▶ Be able to use the definition of the derivative to find derivatives of basic functions including polynomials, simple rational functions, and square roots.
- ▶ Understand derivatives from graphic, numeric, and algebraic standpoints.
- ▶ Be able to relate derivatives, especially their units and signs, to a variety of contexts.
- ▶ Understand second derivatives from graphic, numeric, and algebraic standpoints.
- ▶ Understand continuity and the connections between continuity and differentiability.
  
- ▶ Be able to use the definition of the derivative to prove results like the Sum Rule, Difference Rule, Constant Rule, and Constant Multiple Rule.
- ▶ Be able to use the definition of the derivative to prove the Product and Quotient Rules.
- ▶ Know and be able to use all the rules for differentiation, including the Product, Quotient, and Chain Rules.
- ▶ Know the derivatives of a wide variety of functions including polynomials, trig functions, exponential functions, hyperbolic trig functions, and inverses of all of these.
- ▶ Know when and how to use L'Hôpital's Rule.
- ▶ Know when and how to perform implicit differentiation.
- ▶ Understand how derivatives relate to the shapes of curves, including aspects like slope, concavity, critical points, inflection points, and non-differentiable points.
- ▶ Be able to do typical optimization problems, both on bounded and unbounded intervals.
- ▶ Be able to model typical situations and optimize the functions involved.
  
- ▶ Be able to relate integrals, especially their units and signs, to a variety of contexts.
- ▶ Understand integrals from graphic, numeric, and algebraic standpoints.
- ▶ Know the antiderivatives of basic polynomials, trig functions, and exponential functions.
- ▶ Understand and be able to use the connections between differentiation and antidifferentiation, especially including both parts of the Fundamental Theorem of Calculus.
- ▶ Be able to perform basic integrations by  $u$ -substitution.

Grading: Each problem is worth 20 points.

- ▶ 20 points indicates complete, accurate, and adequately justified completion of a problem.
- ▶ Isolated mistakes within an otherwise valid solution generally cost about a third of the points possible (6 to 8 points out of 10).
- ▶ Even if you can't complete a problem, make an effort to indicate to me how much you know so I can gauge credit accordingly.
- ▶ Pay attention to what's asked for: You don't need to waste time working out answers if you're only asked to set them up. Providing a decimal approximation when an exact value is requested, or vice versa, costs you points. Pay attention to the difference.

Resources: You are welcome to use a calculator of your choice, and one 8½" by 11" sheet of notes. Scratch paper will be provided.