

Math 221 Section CL1

Midterm Exam III Study Guide

0.1 General information

- **Exam date and time:** The exam will be given during the recitation class time **Thursday, 12/4/2008, 3:00 pm - 3:50 pm** or **4:00 pm - 4:50 pm**. Please attend your regular recitation class period; the TA will have only enough exams for registered students in each recitation class.
- **Exam rules:** No books, notes, calculators, iPods, blackberries, etc. are allowed. You should be prepared to show your student ID if requested when turning in your exam. Cheating is a violation of the Student Honor Code and any instances of cheating will be reported to the University Academic Affairs Committee. A copy of the Student Honor Code pertaining to Academic Integrity can be found at:

[www.admin.uiuc.edu/policy/code/ §1-402](http://www.admin.uiuc.edu/policy/code/§1-402)

- **Review sessions:** Part of the recitation class on **Tuesday, 12/2/2008** will be used as a review session for the exam. Please be prepared with questions for the TA about material in the book, material from the lectures, or homework or quiz problems.

0.2 Exam content

The exam will cover Chapter 2 (derivatives) and sections 3.1–3.7 in Chapter 3 (applications of derivatives) in the book by Smith and Minton, with the exception of the following topics:

- logarithmic differentiation (section 2.7, page 213)
- Newton's method (section 3.1, pages 246–250)
- indeterminate forms and L'Hopital's Rule (all of section 3.2)

The exam will have 5 or 6 questions, some of which may have multiple parts. The majority of the test will focus on applications of the derivative (linear approximation, curve sketching, optimization problems, etc.). Some questions may be aimed at conceptual knowledge: statements of definitions, convergence tests, or formulas. **You should be prepared to give a precise and correct statement of at least one of the following: the definition of the derivative, Rolle's theorem and/or the Mean Value Theorem, or the First or Second Derivative Tests!** Other questions will be more computational, similar to homework problems. At least one of the problems will have an "applied" component, and will be related to the previous labs.

0.2.1 What you should be able to do

- Know the definition of the derivative and its physical and geometric interpretations. Analyze differentiability of a function.
- Compute derivatives of all elementary functions (power functions, polynomials, rational functions, exponentials and logarithms, trigonometric functions, etc.). Know and be able to use the Product, Quotient, Chain Rules.
- Differentiate an implicit function.
- Compute slopes and equations of tangent lines. Use tangent lines to generate linear approximations.
- Know and be able to use Rolle's theorem and the Mean Value Theorem.
- Analyze a function for extrema, maxima, minima, critical points, and inflection points. Determine regions where the function is increasing, decreasing, concave up or concave down. Use the First and Second Derivative Tests. Sketch a qualitative graph of a function using all of this data.
- Solve optimization problems.