

First midterm study guide

October 14, 2013

Your first midterm will cover Chapters 1 to 3.7 of your textbook, precalculus to chain rule. Here's a brief study guide to help you. This is only intended to give you a quick overview of the general materials you need to know for the exam—**anything and everything in your notes and the textbook is fair game for the exam, even if it's not mentioned explicitly in this study guide**. A good resource is your textbook, especially the summaries at the end of each section right before the exercises. Study the book and your notes—and start cranking out lots of problems and exercises!

1. Theorems, definitions, examples, propositions, corollaries, etc.

a) Theorems, propositions, corollaries, etc.

- Be able to state theorems (including propositions, corollaries and all other types of big mathematical statements) in their entirety—hypotheses and conclusions.
- Know how to use theorems to prove/show a certain result, and be able to explain how the theorem applies to your solution. **Eg:** Using the intermediate value theorem to show that $f(x) = c$ for some y -value c and continuous function f . Using the squeeze theorem to compute a certain limit. Using the bisection method.

b) Definitions and examples

- Completely state definitions of concepts and terms. **Eg:** Definitions of limits, continuity, differentiation; the formal definition of limit; etc.
- Give examples, non-examples, counterexamples. **Eg:** A noncontinuous function; a differentiable function; a continuous but nondifferentiable function; a function where a certain limit doesn't exist; **important trig limits, limits at infinity**; etc.

2. Properties and laws

a) Precalculus properties and identities

- Equations of lines; quadratic formula; properties of logarithms, exponentials; etc.
- Trig identities. **Eg:** Double-angle identities, trigonometric pythagorean theorem

b) Laws

- Limit laws, continuity laws, derivative laws and rules, Chain rule, etc.

3. Miscellany

- a) **Derivatives of special functions:** e^x , $\sin x$, $\cot x$, etc.
- b) **Graphing functions:** Be able to graph functions.
- c) **Applications:** Rates of change.