Math Xb Spring 2006
Midterm 2 Review Guide

Preparing for Midterm 2: Some Suggestions

1. Go over your old homework problems, and pay special attention to the problems that you skipped or answered incorrectly. For each problem, ask yourself:

   - How did I solve this problem?
   - How did I decide how to solve this problem? (In other words, if the problem was on the midterm exam, what clues in the problem would help you know how to solve it?)

   If you get stumped answering either question, do the problem again.

2. Review workshops and in-class worksheets, asking yourself the same questions.

3. Review the topics in the following outline, asking yourself if you understand each subject, and testing yourself with problems. For any topics where you run into difficulty, look at notes for the corresponding class (either your own or the notes online), go back and read the book, do more problems, and/or ask someone for help.

4. Set aside a couple of hours to do the practice midterm exam. Once you are done, review the solutions, and discuss anything you missed with a TF, a CA, or a friend in the course.

Topics

Midterm 2 will cover §21.4, Appendix F, all of Chapters 22, 23, and 24, and §25.1 and §25.2 in our textbook, *Calculus: An Integrated Approach to Functions and Their Rates of Change*. In particular, you should know how to do the following.

Chapter 21: Differentiation of Trig Functions

- Know how one can find the derivatives of the inverse trig functions using implicit differentiation. *Problem: §21.4 #7(a), also try finding the derivatives of* $\cot^{-1} x$, $\sec^{-1} x$, *and* $\csc^{-1} x$.
- Know the derivatives of $\sin^{-1}$, $\tan^{-1}$, and $\cos^{-1}$ and be able to use them to find derivatives of more complex functions involving inverse trig functions. *Problems: §2.14 # 2, 3, 4, 8, 9.*

Appendix F: L'Hôpital's Rule

- Recognize the indeterminate forms $\frac{0}{0}$ and $\frac{\infty}{\infty}$
- Evaluate the indeterminate forms $\frac{0}{0}$ and $\frac{\infty}{\infty}$ using L'Hôpital's Rule.
- *Problems: Appendix F: # 1 – 8, 10–15, 18, as well as the problems that were on the in-class worksheets.*

Chapter 22: Net Change, Area, and the Definite Integral

- Understand the relationship between the definite integral and the questions

  1. Given a rate function, how do we calculate the net change in amount?
  2. How do we calculate the signed area between the graph of a function and the horizontal axis?

  and be able to use these relationships to solve problems *Problems: §22.1 #1, §22.2 #1, 5, 7, and §22.3 #3, 4.*
- Be able to approximate a definite integral, net change, or signed area using left- and right-hand sums. *Problems: §22.2 #4, 6(a,b,e).*
- Be able to evaluate a definite integral, net change, or signed area using geometric area formulas. *Problems: §22.3 #1, 5, 6, 7, §22.4 #1, 2.*
- Be able to simplify or alter integrals using the properties on p. 738. *Problems: §22.4, 1, 2(b), 3, 8.*

Chapter 23: The Area Function

- Be able to find the area function ${}_cA_f(x)$ for a function $f(t)$. *Problems: §23.1 #1 (a,b,c), 2 (a,b,c), 3(a), and #1 on worksheet from 4/10/06.*
- Interpret area function as a net change function. *Problems: §23.1 #4 and worksheet from 4/10/05 (back page).*
- Know that two area functions ${}_aA_f$ and ${}_bA_f$ differ by a constant and why. *Problems: Worksheet from 4/10/05, # 2, 3*
- Determine where an area function A_f is increasing, decreasing, concave up, and concave down by examining f. *Problems: §23.2 #1, 2, 3, worksheet from 4/12/05.*
- Know the statement of, understand, and be able to use the Fundamental Theorem of Calculus, Part 1. You should also be able to follow and reproduce the proof of the Fundamental Theorem on p. 757—758. *Problems: §23.3 #1–4*

Chapters 24: The Fundamental Theorem of Calculus

- Know the statement of and understand the Fundamental Theorem of Calculus, version 2. Be able to apply the Fundamental Theorem of Calculus to evaluate definite integrals. *Problems: §24.1 #2–8, 11–14*
- Be able to use the definite integral to compute the average value of a function on a given interval and be able to interpret the average value of a function in a particular context (e.g., velocity or speed). *Problems: §24.2 #1–11, 13*

Sections 25.1 & §25.2: Finding Antiderivatives

- To evaluate simple definite and indefinite integrals. (See the list on page 784.) *Problems: §25.1 #2–14 17, 18*
- To evaluate more complex definite and indefinite integrals using substitution. *Problems: §25.2 #1–27*