Math Xb Spring 2005
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 labs 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 all of Chapters 21 and 22, sections 23.1 and 23.2, and Appendix F 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 the derivatives of the six trigonometric functions, and be able to find derivatives of more complex functions that involve trigonometric functions. *Problems: §21.2 # 1,3,4,5,7,9,15*

- Be able to solve word problems involving trigonometry. These include related rates, optimization, curve-sketching, and other problems. You need to be able to look at a problem and determine what kind of problem it is so that you can decide what strategy to use. Look at the problems in §21.3 and try to classify all of the problems without solving them, then look at how we have classified the problems below.[1] *Problems: §21.3 #1–18 and 23.*

- 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 $\cot x$, $\sec x$, or $\csc x$.*

- 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.*

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[1](This list only covers problems #1–18 and 23) Related rates problems: 8, 13, 15, 18, 23 ; Optimization: 1, 2, 9, 11, 12, 14, 16, 17, ; Curve Sketching: 1, 2, 3, 4, 5, 6, 16 ; Other: 7, 10

APPENDIX F: L'HÔPITAL'S RULE

- Recognize the indeterminate forms $\frac{0}{0}$, $\frac{\infty}{\infty}$, $0 \cdot \infty$, 1^∞, ∞^0, and 0^0.

- Evaluate the indeterminate forms $\frac{0}{0}$, $\frac{\infty}{\infty}$, $0 \cdot \infty$, 1^∞, ∞^0, and 0^0 using L'Hôpital's Rule.

- *Problems: Appendix F: # 1 – 15, 18–21, 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 4/8/05.*

- Interpret area function as a net change function. *Problems: §23.1 #4 and worksheet from 4/8/05 (back page).*

- Know that two area functions $_aA_f$ and $_bA_f$ differ by a constant and why. *Problems: Worksheet from 4/8/05, # 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 4/11/05.*