Math 122: Calculus II **2008**

Calculus: Early Transcendentals, Smith & Minton, Chapters 5,7-12

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Course Objectives: *Continue to learn how to do mathematics!* Mathematics is a problem-solving discipline, and we all have room to improve. To develop, we must focus on technique and not on memorization. My role as professor is to guide discussions and help you take the next step from wherever you are mathematically. One objective is for you to have a sound enough understanding of calculus that you can recognize it and apply it in future courses. This will not happen if you have just memorized your way through some problems. A broader objective is for you to be a good problem-solver, to thrive in whatever entrance examinations and job situations are in your future. An objective related to problem-solving ability is critical reading. To that end, you will be asked to read the book. Finally, an objective is to enjoy the course. Calculus is the gateway to the awesome world of modern science. Let yourself be amazed!

Attendance Policy: This class meets four days per week. Regular attendance is expected. You are responsible for everything done in class, through your attendance and sharing class notes with classmates. If you miss a class, you must e-mail or call me before class is over and explain why. **If you have two unexplained absences, you will be dropped from the course.**

Equipment: We will use graphing calculators in class and on tests. We will also use Mathematica, a powerful mathematical software package, in labs and on tests. A free copy for your personal computer can be obtained. Reading quizzes will be taken using Clickers. You need to get one and either register it online or tell me the (lengthy) clicker ID.

Academic Integrity: The college policy is fully supported. Tests are closed notes, closed book. You may always ask me for help on homework and labs. **Do not** copy homework or any portion of a lab report. No electronic devices other than calculators are allowed in a test situation.

Homework: Problems from each section of the book will be assigned, typically in two stages. You will be asked to read ahead and work basic problems from the next section to be discussed. Reading quizzes will assess your understanding of concepts and guide class discussion. After that section has been discussed, a small number of more in-depth problems will be assigned. Homework will be graded partly on effort and partly on correctness. Late homework is not accepted. If you miss class, get a friend to turn in your homework for you. Reading quizzes cannot be taken late. The more work you do, the easier the class is!

Co-Curricular: During the course of the semester, you must attend at least two approved co-curricular events offered by the MCSP department. For each, write a two-paragraph description of the event, due within a week of the event. A sample will be provided.

Tests: There will be four tests and a final exam. Each test will cover all material discussed since the previous test. Anticipated test dates are (Th) 9/18, (Th) 10/9, (Th) 11/6 and (T) 12/4. The exam is Monday, December 8, 8:30-11:30 or Wednesday, December 10, 8:30-11:30.

Make-ups: In case of sickness or scheduling conflicts, get in touch with me ASAP.

Grading: The lab reports count 15% of the final grade. Homework and reading quizzes count 5% each. The exam counts 15%. Each test counts 15% of the final average. Grades may be curved up based on participation, one unusually low test score or other extenuating circumstance.
A: 93-100 A-: 90-92 B+: 87-89 B : 83-86 B-: 80-82 C+: 77-79 C: 73-76 C-: 70-72
D+: 67-69 D: 63-67 D-: 60-62 F: 59 and below

Model Reflection Paper

(This is from a faculty member, but shows what I'd like to get from you. The two main elements are (1) brief summary of talk and (2) some original thought on the subject.)

The meeting on September 7th was a social gathering for students engaged in a Math class in the fall semester. Although there was not a formal speaker, a professor provided an activity that captivated the attention of many of the attendees: a math game known as Sudoku.

In this game, a 9x9 playing space is provided. Each grid is further subdivided into 9 3x3 grids. The objective of the game is to use the digits 0-9 once to fill each row, each column and each 3x3 sub-grid. Several numbers are already entered into the grid (seed numbers), providing restrictions on where the solver is allowed to place their numbers. An example given was:

		6	2			5	8	
4		2	5					7
				7	8	6		3
5		1		6	7			8
	3						6	
6			8	2		9		1
7		4	3	9				
9					5	2		6
	5	3			1	4		

To "solve" the puzzle, one could just enter numbers in a brute-force kind of way to see if they could get a working configuration. However, sitting in a room full of mathematicians, taking a more analytical approach seemed to be the dominant strategy. Treating this as a constraint-satisfaction problem, you can identify that certain cells must contain specific values. This leads to the conclusion that there is exactly one solution to a "well-formed" Sudoku. I suspect that if there were ambiguity or multiple correct configurations, the game would not be as intriguing/fun.

This got me thinking about well-formed Sudoku, and how they are generated in the first place. It seems unlikely that the seeds are randomly assigned, you run the risk of violating set-up rules. A bigger problem is that the seeds may not constrain the possibilities enough to make a unique solution. Another naïve approach might be to take a completed grid and start taking away numbers, but I suspect that you might have a similar issue in terms of necessary constraints.

One that I want to think about is: In forming a viable Sudoku, is it the number of seeds or the placement of seeds that is more critical? I suspect the latter. Along those lines, then, I am curious about the following:

- What is the maximum number of seed numbers that can be provided and still result in an ambiguous (unsolvable) puzzle?
- What is the minimum number of seed numbers that can be provided to generate a (uniquely) solvable puzzle?

We were provided two puzzles – one was rated "Easy" the other "Difficult".

- What goes into the rating system?
- Does a difficult puzzle necessarily have fewer seed numbers?
- Is the rating of the complexity somehow determined by the deductive skills required?