Math 201: Linear Algebra **2010**

Linear Algebra, Lay, Chapters 1-4, 6

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Course Objectives: *Continue to learn mathematics*! Linear algebra is a course that mixes basic equation-solving, abstract theory and deep applications. The course material is use in a wide range of higher-level math courses and applications. One objective is to see its usefulness.

Intended Learning Outcomes: At the end of the course, successful students will be able to

- State and apply each of the numerous equivalent parts of the Invertible Matrix Theorem
- Graphically analyze linear transformations
- Identify vector spaces and their dimensions
- In the context of various applications, set up systems of equations of interest and determine the number of solutions and the implications of the form of the solution set

Attendance Policy: Regular attendance is expected. You must keep up with definitions! 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.**

Technology: We will use Mathematica in class, on homework assignments and on tests (and future courses, including independent studies). No electronic devices other than calculators are allowed in a test situation. Clickers will be used to provide feedback.

Academic Integrity: The college policy is fully supported. Tests and quizzes are closed notes, closed book. Homework assignments will be discussed in class, and you may always ask me for help. **Do not** collaborate on homework.

Study problems and homework: Problems from each section of the book will be assigned, typically in two stages. You will be asked to work several problems that are not to be turned in. These will indicate the types of problems you will see on tests. In addition, you will often be asked to turn in designated problems. These are due at the beginning of class. Late homework is not accepted. If you miss class, get a friend to turn in your homework for you.
Four homework projects will be given. These are extended problems beyond a typical book problem; you will have a week to work on each one.

Co-Curricular: During the course of the semester, you must attend at least two approved co-curricular events offered by the math department. For each, write a one- or 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 (W) 9/22, (F) 10/15, (F) 11/12 and (W) 12/8. The exam is Thursday, December 16, 2:00-5:00.

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

Grading: Homework and co-curricular count 18%. The final counts 18%. Each test counts 16% 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

Math 201 Information Sheet

Name:

Intended Major:

Hometown:

List any other college math courses you have taken.

Do you have a Clicker?

Do you have an Iphone or other data phone?

What are your expectations and goals for this course?

Math 201 Assignments

Date	Turn in	Section	Study
9/1		intro	
9/3	p10, #2,4	1.1	p11, #1-4,7-14,23-25
9/6	p11, #18 (M)	1.2	p25, #3-4,11-14,19-22,25-26,33
9/8	p37, #6,10	1.3	p37, #1-2,5-6,9-16,21-24,29
9/10	p39, #30		Football rankings
9/13	p47, #10	1.4	p47, #1-2,5-8,11-14,21-24,31-32
9/15	p55, #10	1.5	p55, #3-8,13-14,23-24,29-32
9/17	Homework Project #1	1.7	p71, #1-6,11-12,15-22,31-38
9/20	p71, #6 (M)	Review	
9/22		TEST #1	

Date	Turn in	Section	Study
9/24		1.8	p79, #1-4,9-14,19-22,29-32
9/27	p90, #6	1.9	p90, #1-14,17-20
9/29	p116, #12	2.1	p116, #1-10,15-18,27-28
10/1	p118, #40 (M)		Fractals
10/4	p126, #2	2.2	p126, #1-10,13-16,29-33
10/6	p132, #4	2.3	p132, #1-4,11-16,19-24,33-34
10/8	Homework Project #2	2.4	p139, #1-10,13,17
10/11	p139, #10	2.5	p149, #1-4,7-10,15-17,25-26
10/13	p149, #8	Review	
10/15		TEST #2	

Date	Turn in	Section	Study
			p165, #1-8,10-11,15-16
10/19		2.8	p173, #1-6,11-18,21-26
10/21	p173, #18	2.9	p180, #1-4,9-20
10/23	p180, #12	4.1	p223, #1-12,15-18,23-24
10/26	p223, #12	4.2	p234, #1-10,17-20,25-26,31-34
10/28	p234, #24	4.3	p243, #1-6,9-10,13-16,21-24
10/30	p243, #14	4.4	p253, #1-16,27-30
11/2	p253, #10	4.5	p260, #1-6,11-22
11/4		Review	
11/6		TEST #3	

Date	Turn in	Section	Study
11/9		4.8	p285, #1-18,23-30
11/11	p285, #14	Google	handout
11/13		6.1	p382, #3-20,23,25-26
11/16	p382, #12,14	6.2	p392, #7-24
11/18	Homework Project #3	6.3	p400, #1-18,21-22
11/20	p400, #8	6.5	p416, #1-14
11/23	p416, #10	3.1	p190, #7-14,19-24
11/30		Review	
12/2		TEST #4	

Model Reflection Paper

(This is made up, 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 talk on September 7th was by Dr. Sue Dokoo of Pseudo Duke University. Her research is in the game of Sudoku and discussed different aspects of this game. I have seen other people playing it, but did not know the rules or any of the mathematics behind it.

In this game, a 9x9 playing space is provided. 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.

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. Also,

- 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?