

Linear Algebra. Math-4100, Fall 2007
Assignment 3

Due Thursday, September 27, by 4pm. (Either in class, or my mailbox in AE 301, or under my door AE 405).

Reading

Sep. 17 and 20: **Strang** Sections 3.4–3.6, 4.1; **Gelfand** Section 2.

Sep. 24: **Strang** Sections 4.1-4.2. There will be a pre-test review on Sep. 27

Problems

You are welcome to consult the text and notes and discuss the problems with other people. However, the solutions should be *yours*. Please indicated on your papers, who you discussed the problems with. *Please submit extra credit problems on a separate sheet of paper.*

R1. Read (and understand!) *worked examples 3.4 A* and *3.4 B* (the latter is very tempting as a source of examination questions). Nothing to hand in for this problem.

1. Problem 3.4 #1.
2. Problem 3.4 #5.
3. Problem 3.4 #10.
4. Problem 3.4 #21
5. Problem 3.4 #24. Demonstrate that your examples have the desired properties.
6. Problems 3.4 #33 and 34. The latter is similar to Problem 3.2 #31.
7. Problem 3.5 #5. Comment: You have to understand that the question of whether the given column vectors v_1, v_2, v_3 are dependent or independent is the same as the question whether the system $Vx = 0$ has a nontrivial solution. (of course, $V = [v_1, v_2, v_3]$ is the matrix formed of vs as columns).
8. Problem 3.5 #10.

R2. Read (and understand!) *worked example 3.6 A*. It is rather compressed, so you'll need to work a little.

9. Problem 3.6 #5.
10. Problem 3.6 #14.
11. Problem 3.6 #23.

R3. Read *worked examples 4.1 A* and *4.1B*.

12. Problem 4.1 #11.

E4*. (Extra credit) Let A be a square matrix. Prove that if $AX = XA$ for any matrix X then $A = cI$ for some constant c . [This is a serious problem, please take it seriously. If you don't get it now, you are welcome to revisit it and submit a solution in the coming weeks.]