Math 223, Section 201 Homework #1 due Friday, January 18, 2002 at the beginning of class

Warm-Up Questions-do not hand in

I. Lay, Section 1.2, p. 25, #5, #9, #14, #15

II. Lay, Section 1.2, p. 26, #25 and #29

III. Lay, Section 1.3, p. 37, #25

January 18's quiz will be a problem like Lay, Section 1.2, p. 25, #12 (but with different numbers of course, maybe even a different size matrix).

Homework Questions—hand these in

I. Consider the linear system of m equations in n variables:

 $\begin{cases} a_{11}x_1 + a_{12}x_2 + \dots + a_{1n}x_n = b_1 \\ a_{21}x_1 + a_{22}x_2 + \dots + a_{2n}x_n = b_2 \\ \vdots \\ a_{m1}x_1 + a_{m2}x_2 + \dots + a_{mn}x_n = b_m \end{cases}$

Suppose that $(x_1, x_2, \ldots, x_n) = (s_1, s_2, \ldots, s_n)$ and $(x_1, x_2, \ldots, x_n) = (t_1, t_2, \ldots, t_n)$ are two different solutions to the system. Show that

 $(x_1, x_2, \dots, x_n) = (t_1 + y(s_1 - t_1), t_2 + y(s_2 - t_2), \dots, t_n + y(s_n - t_n))$

is also a solution to the system for any y. (This shows that a system of linear equations that has more than one solution must have infinitely many solutions.)

- II. Lay, Section 1.2, p. 25, #6 and #12
- III. (a) Suppose the coefficient matrix of a system of three linear equations in three variables has a pivot in each column. Is the system consistent or inconsistent? If consistent, is the solution unique?
 - (b) Suppose the augmented matrix of a system of four linear equations in three variables has a pivot in each column. Is the system consistent or inconsistent? If consistent, is the solution unique?
 - (c) Suppose the augmented matrix of a system of three linear equations in three variables has a pivot in each column except the last column. Is the system consistent or inconsistent? If consistent, is the solution unique?
- IV. Lay, Section 1.3, p. 37, #24 and #26