Math 113 Homework # 1, due 1/19/01 at 5:00 PM

Later assignments might be a little harder, after we have introduced more material. Note that to prove that the object satisfying property P is unique, you assume that x and y both satisfy property P, and then try to deduce that $x = y$.

0. (optional, don't hand in) If you haven't done a lot of row reduction before, you might want to do section 3.4, problem 2 to get a feel for it.

1. Can a matrix that does not consist entirely of zeros be reduced by row operations to the matrix consisting only of zeros? Explain your answer.

2. Show that the additive inverse of a vector in a vector space is unique.

3. Find numbers a, b, c such that this system has no solution: $2x - 3y = a$, $x + y = b$, $x - y = c$. What relation among a, b, c must hold for the system to be solvable?

4. Section 1.2, problems 1,7,10,11.

5. Show that the difference between two solutions to the system $Ax = b$ is a solution to the homogeneous system $Ax = 0$. Deduce that if the homogeneous system $Ax = 0$ has only the trivial solution, then the solution to $Ax = b$ is unique if it exists. Also show that if $Ax = 0$ has a nontrivial solution, then there are infinitely many solutions to $Ax = b$ if there are any at all.

6. Section 1.4, problem 4.