Linear Systems

Math 214 Spring 2006 — Fowler 307 MWF 2:30pm - 3:25pm

 — http://faculty.oxy.edu/ron/math/214/06/

Class 33: **Friday April 28**

TITLE Wrapping it all together!
CURRENT READING Poole

Summary
The text uses the repetitive theme of addingstatements to the Fundamental Theorem of Invertible Matrices as a theme. We'll look at the **final** version.

Theorem 7.19

The Fundamental Theorem of Invertible Matrices (Final Version). Let A be a $n \times n$ matrix. Each of the following statements is equivalent:
(a) A is invertible.
(b) $A\vec{x} = \vec{b}$ has a unique solution for every $\vec{b}$ in $\mathbb{R}^n$.
(c) $A\vec{x} = \vec{0}$ has only the trivial solution.
(d) The reduced row echelon form of A, rref(A), is I_n.
(e) A is a product of elementary matrices.
(f) rank$(A) = n$.
(g) nullity$(A) = 0$.
(h) The column vectors of A are linearly independent.
(i) The column vectors of A span $\mathbb{R}^n$.
(j) The column vectors of A form a basis for $\mathbb{R}^n$.
(k) The row vectors of A are linearly independent.
(l) The row vectors of A span $\mathbb{R}^n$.
(m) The row vectors of A form a basis for $\mathbb{R}^n$.
(n) The determinant of A is not equal to zero.
(o) 0 is not an eigenvalue of A.
$\vdots$
(u) 0 is not a singular value of A.

Note that the book's version has some more concepts dealing with Linear Transformations ans Changes of Basis that we did not discuss in this version of the course.