Linear Algebra
10/3/2012

Topic: Inverses of matrices

Idea 1: The inverse of an invertible matrix, A, is the matrix of the inverse of T_A.

Idea 2: The inverse of an invertible matrix is the product of the elementary matrices used in its reduced row reduction.

Some simple observations:

$T_A(T_B(\mathbf{v}))=T_{AB}\mathbf{v}$, because $A(B(\mathbf{v}))=(AB)\mathbf{v}$.

So A has an inverse B (AB=I=BA) if and only if T_A is bijective and has inverse T_B.

So if A is invertible, rref(A)=I.

Since $\text{rref}(A)=E_nE_{n-1}...E_1A$, if A is invertible $E_nE_{n-1}...E_1$ is the inverse of A.

Oct 3-9:07 AM

Notation: If A is invertible then its inverse is labelled A^{-1}.
So from the previous slide we could write $E_nE_{n-1}...E_1=A^{-1}$.
Recall B[A|C]=[BA|BC].
Notice: if A is invertible then rref([A|I])=[I|A^{-1}].

Question: Is this matrix invertible and if so what is its inverse.

$$A=\begin{bmatrix} 1 & -2 & 3 \\ 2 & 3 & -1 \\ 3 & 1 & -2 \end{bmatrix}$$

Oct 3-9:25 AM