SI Session: November 24th & 25th 2008
Mondays: 3:00 PM – 4:30 PM
Tuesdays: 1:30 PM – 3:00 PM
Thursdays: 1:30 PM – 3:00 PM
Room 1239 SNAD

Prof. McCurdy : Linear Algebra
Fall 2008
SI Leader : Neil Jody

[1] Mark each statement True or False. Justify each answer.

(a) $\vec{u}\cdot\vec{v}-\vec{v}\cdot\vec{u}=0$

(b) For any scalar c, $\|c\vec{v}\|=c\|\vec{v}\|$.

(c) If $\vec{x}$ is orthogonal to every vector in a subspace W, then $\vec{x}$ is in $W^{\perp}$.

(d) If $\|\vec{u}\|^2+\|\vec{v}\|^2=\|\vec{u}+\vec{v}\|^2$, then $\vec{u}$ and $\vec{v}$ are orthogonal.

(e) For an $m\times n$ matrix A, vectors in the null space of A are orthogonal to vectors in the row space of A.

(f) If A is invertible and 1 is an eigenvalue for A, then 1 is also an eigenvalue for A^{-1}.

(g) Eigenvalues must be nonzero scalars.

(h) Eigenvectors must be nonzero vectors.

[2] For the given matrix A: (a) find the characteristic polynomial, (b) find its eigenvalues, (c) find bases for its eigenspaces, (d) Is A diagonalizable? If so, identify an invertible matrix P and a diagonal matrix D so that $A = PDP^{-1}$.

(1) $A = \begin{bmatrix} 5 & 0 & -4 \\ 0 & -3 & 0 \\ -4 & 0 & -1 \end{bmatrix}$

(2) $A = \begin{bmatrix} -3 & 2 & 0 & 0 \\ -3 & 4 & 0 & 0 \\ 0 & 0 & -5 & -4 \\ 0 & 0 & -2 & 2 \end{bmatrix}$

(3) $A=\begin{bmatrix} -4 & 0 & 6 & 0 \\ 0 & -5 & 0 & -4 \\ -1 & 0 & 1 & 0 \\ 0 & 3 & 0 & 2 \end{bmatrix}$

(4) $A = \begin{bmatrix} 6 & 0 & 0 & 0 \\ 4 & 5 & 0 & 0 \\ 3 & 0 & 5 & 0 \\ 2 & 0 & 0 & 5 \end{bmatrix}$