Part I Problems

In the next three problems, solve the given DE system $x' = Ax$.
First find the eigenvalues and associated eigenvectors, and from these construct the normal modes and thus the general solution.

Problem 1: Solve $\mathbf{x}' = A\mathbf{x}$, where A is $\begin{bmatrix} -3 & 4 \\ -2 & 3 \end{bmatrix}$.

Problem 2: Solve $\mathbf{x}' = A\mathbf{x}$ where A is $\begin{bmatrix} 4 & -3 \\ 8 & -6 \end{bmatrix}$.

Problem 3: Solve $\mathbf{x}' = A\mathbf{x}$ where A is $\begin{bmatrix} 1 & -1 & 0 \\ 1 & 2 & 1 \\ -2 & 1 & -1 \end{bmatrix}$.

Problem 4: Find the real solutions to the system $+\ \mathbf{x}' = A\mathbf{x} = \begin{bmatrix} 3 & -4 \\ 4 & 3 \end{bmatrix} \mathbf{x}$.

18.03SC Differential Equations
Fall 2011