Hw 8 (Math 2890) Due Monday March 23

1. Let A be the matrix
$$A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}.$$
   (a) Find the characteristic polynomial of A.
   (b) Find the eigenvalues and a basis of eigenvectors for A.
   (c) Diagonalize the matrix A if possible.
   (d) Find the formula for A^k where k is an positive integer.

2. Let A be the matrix $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{bmatrix}$.
   (a) Assume that $det(A-\lambda I) = -(\lambda-1)^2(\lambda-4)$. (You can just use this fact without proving it.) Find the eigenvalues and a basis of eigenvectors for A.
   (b) Diagonalize the matrix A if possible.
   (c) Find the formula for A^k where k is an positive integer.