CHARACTERISTIC POLYNOMIAL WORKSHEET

OCTOBER 25, 2017

1. Compute the eigenvalues of the following matrices.

(a) $A = \begin{bmatrix} 0.6 & 0.3 \\ 0.4 & 0.7 \end{bmatrix}$ (b) $A = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ (c) $A = \begin{bmatrix} -2 & 2 & -6 \\ -1 & 2 & -2 \\ 2 & -1 & 5 \end{bmatrix}$

2. Compute the eigenvectors of the matrix in 1.(a).

3. Compute a basis for the eigenspace of $\lambda = 2$ for the matrix in 1.(c). What is its dimension? Compare with the algebraic multiplicity of $\lambda = 2$.

4. Can you explain why the matrix in 1.(b) has no real eigenvalues? Geometrically, what is the transformation given by $\mathbf{x} \mapsto A\mathbf{x}$?