

1. Let $B = \begin{bmatrix} 12 & -12 \\ 6 & -5 \end{bmatrix}$.

1A. Find the characteristic polynomial of B . Show all your steps.

1B. What, if any, are the eigenvalues of B ?

1C. What number m should the “6” in B be replaced with, so that the resulting matrix has $\lambda = 0$ as an eigenvalue? (The other eigenvalue will be new, too). How did you find m ?

2. Let $A = \begin{bmatrix} 2 & 2 & -2 \\ 1 & 1 & 2 \\ 1 & -2 & 5 \end{bmatrix}$.

2A. It's a fact that $\mathbf{v} = \begin{bmatrix} -5 \\ 5 \\ 5 \end{bmatrix}$ is an eigenvector of A . Find the eigenvalue by direct computation of $A\mathbf{v}$.

2B. It's a fact that $\lambda = 3$ is an eigenvalue of A . Find a basis for its eigenspace.

2C. What is the dimension of the eigenspace in (2B)?