

1. Find the eigenvalues and eigenvectors of $A = \begin{bmatrix} 3 & 4 & 2 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 0 & 2 \\ 0 & 2 & 0 \\ 2 & 0 & 0 \end{bmatrix}$

Check that $\lambda_1\lambda_2\lambda_3 = \text{the determinant}$.

2. Suppose that λ is an eigenvalue of A , and \vec{x} is its eigenvector.

(1) If s is a scalar, show that this same \vec{x} is an eigenvector of $sI - A$, and find the eigenvalue.

(2) Assuming $\lambda \neq 0$, show that \vec{x} is also an eigenvector of A^{-1} and find the eigenvalue.

- (3) Let $A = \begin{bmatrix} -2 & 2 & 3 \\ -2 & 3 & 2 \\ -4 & 2 & 5 \end{bmatrix}$. Use (1) and (2) to find the eigenvalues and eigenbases for

the eigenspaces of A^{-1} and $3I - A$.