

Math 165 Written Homework 10

Due Friday, April 12 at 11:59 pm on gradescope

- Suppose that an $n \times n$ matrix A satisfies $\sum_{j=1}^n a_{ij} = r$. That is, the sum of the entries in each row is r . Show that r is an eigenvalue of A and determine an eigenvector.
 - Prove that the eigenvalues of an upper triangular matrix are just the diagonal entries.
- Determine any eigenvalues for each matrix below. Find corresponding eigenvectors. In (c), find two independent eigenvectors for each eigenvalue.

(a)
$$\begin{bmatrix} 0 & 2 & 2 \\ 2 & 0 & 2 \\ 2 & 2 & 0 \end{bmatrix}$$

(b)
$$\begin{bmatrix} 2 & 3 \\ -3 & 2 \end{bmatrix}$$

(c)
$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$