

QUESTION

Find the eigenvalues and eigenvectors of the following matrices.

$$\begin{bmatrix} 3 & 4 \\ -2 & -3 \end{bmatrix} \quad \begin{bmatrix} 3 & 5 \\ -5 & -3 \end{bmatrix}$$

For each of these matrices A write down where possible the matrix M such that $M^{-1}AM$ is diagonal and check that your M works.

ANSWER

For the first matrix

Eigenvalue	1	Eigenvector	$\begin{bmatrix} 2 \\ -1 \end{bmatrix}$
Eigenvalue	-1	Eigenvector	$\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

For the second matrix

Eigenvalue	$\pm 4i$	Eigenvector	$\begin{bmatrix} -5 \\ 3 \mp 4i \end{bmatrix}$
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Where there are two independent eigenvectors the matrix M which has the eigenvectors as its columns will do.