

Homework 13

Due Monday November 26

From the textbook:

- Section 4.3 (problems begin on p228): 11, 20, 21

Additional (required) problem:

(P1) For each matrix below, find all of the eigenvalues, and for each eigenvalue, find all of the associated eigenvectors. (In each part, the field you should use is also indicated.)

(a) $\begin{pmatrix} 4 & 4 \\ 6 & 2 \end{pmatrix}$, $\mathbb{F} = \mathbb{R}$.

(b) $\begin{pmatrix} 0 & 2 \\ -2 & 0 \end{pmatrix}$, $\mathbb{F} = \mathbb{R}$.

(c) $\begin{pmatrix} 0 & 2 \\ -2 & 0 \end{pmatrix}$, $\mathbb{F} = \mathbb{C}$.

(d) $\begin{pmatrix} 1 & 0 & 3 \\ 0 & 3 & 0 \\ 2 & 0 & 2 \end{pmatrix}$, $\mathbb{F} = \mathbb{R}$.

(e) $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ -5 & -7 & -9 \end{pmatrix}$, $\mathbb{F} = \mathbb{R}$.

Make sure you show all of your work and organize your final answer clearly. For each part, the final answer should look something like this:

The eigenvalues of the matrix $\begin{pmatrix} 2 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{pmatrix}$ are $\lambda_1 = 2$ and $\lambda_2 = 5$.

The set of eigenvectors with eigenvalue λ_1 is the span of $\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$.

The set of eigenvectors with eigenvalue λ_2 is the span of $\begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$ and $\begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$.