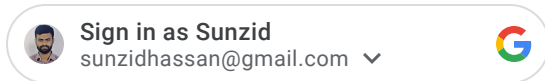




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Exercise 32, Linear Algebra: A Modern Introduction, 4th Edition

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Exercise 32 Answer

Step by step explanation

HIDE ALL

Tip



- In this type of questions we need to find eigenvalues and eigenvectors.

Explanation



- We will take β as the standard basis of \mathbb{R}^2
- We will find $[T]_{\beta}$ with the help of standard basis.
- Eigenvalues does not exist as $\det([T]_{\beta} - \lambda I)$ do not have real roots.

- So, Basis C does not exist for T to be diagonalizable.

Step 1 of 1

Let, $\beta = \{e_1, e_2\}$ be the standard basis of \mathbb{R}^2 .

$$T(e_1) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$T(e_2) = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$$

Thus,

$$[T]_{\beta} = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$$

Eigenvalues of $[T]_{\beta}$:

$$\begin{aligned} \det([T]_{\beta} - \lambda I) &= \det\left(\begin{bmatrix} 1-\lambda & -1 \\ 1 & 1-\lambda \end{bmatrix}\right) \\ &= (1-\lambda)^2 - (-1) \\ &= (1-\lambda)^2 + 1 \end{aligned}$$

$(1-\lambda)^2 + 1$ does not have any real roots. T_{β} does not have eigenvalue. Therefore, Basis C such that T is diagonalizable does not exist.

◆ Final answer

In this question basis does not exist such that T is diagonalizable.

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