

Assignment 2

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Download all python codes from

https://github.com/Dhatri-nanda/EE3900/blob/main/Assignment_2/code.py

and latex-tikz codes from

https://github.com/Dhatri-nanda/EE3900/blob/main/Assignment_2/Assignment_2.tex

1 PROBLEM

If $A = \begin{pmatrix} 3 & -2 \\ 4 & -2 \end{pmatrix}$ and $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, find k so that $A^2 = kA - 2I$

2 SOLUTION

First find A^2

$$A^2 = AA \quad (2.0.1)$$

$$= \begin{pmatrix} 3 & -2 \\ 4 & -2 \end{pmatrix} \begin{pmatrix} 3 & -2 \\ 4 & -2 \end{pmatrix} \quad (2.0.2)$$

$$= \begin{pmatrix} 9 - 8 & -6 + 4 \\ 12 - 8 & -8 + 4 \end{pmatrix} \quad (2.0.3)$$

$$= \begin{pmatrix} 1 & -2 \\ 4 & -4 \end{pmatrix} \quad (2.0.4)$$

From A,

$$kA = \begin{pmatrix} 3k & -2k \\ 4k & -2k \end{pmatrix} \quad (2.0.5)$$

As given, $A^2 = kA - 2I$, from (2.0.4) and (2.0.5)

$$\begin{pmatrix} 1 & -2 \\ 4 & -4 \end{pmatrix} = \begin{pmatrix} 3k & -2k \\ 4k & -2k \end{pmatrix} - \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} \quad (2.0.6)$$

$$= \begin{pmatrix} 3k - 2 & -2k \\ 4k & -2k - 2 \end{pmatrix} \quad (2.0.7)$$

Since matrices are equal, comparing it's corresponding elements

$$k = 1 \quad (2.0.8)$$