

Assignment 2

Akyam L Dhatri Nanda - AI20BTECH11002

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

Finding the characteristic equation of the given matrix

The characteristic equation of a matrix A is

$$|A - \lambda I| = 0 \quad (2.0.1)$$

$$\Rightarrow \begin{vmatrix} 3 & -2 \\ 4 & -2 \end{vmatrix} - \lambda \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} = 0 \quad (2.0.2)$$

$$\Rightarrow \begin{vmatrix} 3 - \lambda & -2 - \lambda \\ 4 & -2 - \lambda \end{vmatrix} = 0 \quad (2.0.3)$$

$$\Rightarrow (3 - \lambda)(-2 - \lambda) - 4(-2 - \lambda) = 0 \quad (2.0.4)$$

$$\Rightarrow \lambda^2 - \lambda + 2 = 0 \quad (2.0.5)$$

$$(2.0.6)$$

From (2.0.5) and (2.0.1)

$$A^2 - A + 2I = 0 \quad (2.0.7)$$

As we compare the given equation with the equation acquired on solving, we get

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