

Assignment 2

Shivangi Parashar

Matrices

Abstract—This document contains the solution to find the value of given Matrix Equation

Download all python codes from

https://github.com/shivangi-975/EE5609-Matrix_Theory/tree/master/Assignment2/Codes

Download latex-tikz codes from

https://github.com/shivangi-975/EE5609-Matrix_Theory/blob/master/Assignment2/Assignment2.tex

Writing the equation by putting values we have:

$$A^2 - 5A + 6I = 3A^{-1} - 2A + 2$$

$$\begin{pmatrix} 3 & -1 & -1 \\ 3 & -1 & -4 \\ -3 & 2 & 2 \end{pmatrix} + \begin{pmatrix} -4 & 0 & -2 \\ -4 & -2 & -6 \\ -2 & 2 & 0 \end{pmatrix} + \begin{pmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{pmatrix} \quad (2.0.8)$$

Solving equation we have: $A^2 - 5A + 6I =$

$$\begin{pmatrix} 1 & -1 & -3 \\ -1 & -1 & -10 \\ -5 & 4 & 4 \end{pmatrix} \quad (2.0.9)$$

1 PROBLEM

Find the value of equation $A^2 - 5A + 6I$

$$\text{If } A = \begin{pmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{pmatrix}$$

2 SOLUTION

Given equation $A^2 - 5A + 6I$

$$A - \lambda I = \begin{pmatrix} 2 - \lambda & 0 & 1 \\ 2 & 1 - \lambda & 3 \\ 1 & -1 & 0 - \lambda \end{pmatrix} \quad (2.0.1)$$

Solving equation we have :

$$\lambda^3 - 3\lambda^2 + 4\lambda - 3 = 0 \quad (2.0.2)$$

$$A^3 - 3A^2 + 4A = 3 \quad (2.0.3)$$

$$A^2 - 5A + 6 = 3A^{-1} - 2A + 2 \quad (2.0.4)$$

$$3A^{-1} = \begin{pmatrix} 3 & -1 & -1 \\ 3 & -1 & -4 \\ -3 & 2 & 2 \end{pmatrix} \quad (2.0.5)$$

$$-2A = \begin{pmatrix} -4 & 0 & -2 \\ -4 & -2 & -6 \\ -2 & 2 & 0 \end{pmatrix} \quad (2.0.6)$$

$$2I = \begin{pmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{pmatrix} \quad (2.0.7)$$