LINEAR SYSTEMS AND SIGNAL PROCESSING ASSIGNMENT 2

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Download latex codes from

https://github.com/VARSHITHAGANJI/EE3900_VECTORS_ASSIGNMENTS/blob/main/MATRIX_ASSIGNMENT2/MATRIX_ASSIGNMENT2.tex

Download all python codes from

https://github.com/VARSHITHAGANJI/EE3900_VECTORS_ASSIGNMENTS/blob/main/MATRIX_ASSIGNMENT2/Code.py

QUESTION

Matrices 2.19

1) Show that the matrix $A = \begin{pmatrix} 1 & -1 & 5 \\ -1 & 2 & 1 \\ 5 & 1 & 3 \end{pmatrix}$ is a symmetric matrix.
2) Show that the matrix $A = \begin{pmatrix} 0 & 1 & -1 \\ -1 & 0 & 1 \\ 1 & -1 & 0 \end{pmatrix}$ is a skew symmetric matrix.

SOLUTION

1) Given,

$$\mathbf{A} = \begin{pmatrix} 1 & -1 & 5 \\ -1 & 2 & 1 \\ 5 & 1 & 3 \end{pmatrix} \tag{0.0.1}$$

Transposing the matrix,

$$\mathbf{A}^\top = \begin{pmatrix} 1 & -1 & 5 \\ -1 & 2 & 1 \\ 5 & 1 & 3 \end{pmatrix} \tag{0.0.2}$$

Using (0.0.1) and (0.0.2) we get,

$$\mathbf{A} = \mathbf{A}^\top \tag{0.0.3}$$

$\therefore \mathbf{A}$ is symmetric matrix.

2) Given,

$$\mathbf{A} = \begin{pmatrix} 0 & 1 & -1 \\ -1 & 0 & 1 \\ 1 & -1 & 0 \end{pmatrix} \tag{0.0.4}$$

Transposing the matrix,

$$\mathbf{A}^\top = \begin{pmatrix} 0 & -1 & 1 \\ 1 & 0 & -1 \\ -1 & 1 & 0 \end{pmatrix} \tag{0.0.5}$$

Using (0.0.4) and (0.0.5) we get,

$$\mathbf{A} = -\mathbf{A}^\top \tag{0.0.6}$$

$\therefore \mathbf{A}$ is skew symmetric matrix.