Assignment 2

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Download all python codes from

https://github.com/AI20BTECH11014/EE3900-Linear-Systems-and-Signal-processing/blob/main/Assignment_2/Assignment_2.py

Download latex-tikz codes from

https://github.com/AI20BTECH11014/EE3900-Linear-Systems-and-Signal-processing/blob/main/Assignment_2/Assignment_2.tex

1 Problem(matrix Q.2.15)

Find the transpose of each of the following matrices:

1) $\begin{pmatrix} 5 \\ \frac{1}{2} \\ -1 \end{pmatrix}$

2) $\begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$

3) $\begin{pmatrix} -1 & 5 & 6 \\ \sqrt{3} & 5 & 6 \\ 2 & 3 & -1 \end{pmatrix}$

2 Solution

1) $\begin{pmatrix} 5 \\ \frac{1}{2} \\ -1 \end{pmatrix}$

Let

$$\mathbf{A} = \begin{pmatrix} 5 \\ \frac{1}{2} \\ -1 \end{pmatrix}$$

transpose of $\mathbf{A}$ is given as $\mathbf{A}^\top$

$$(\mathbf{A}^\top)_{ij} = \mathbf{A}_{ji} \tag{2.0.1}$$

$$\therefore \mathbf{A}^\top = \begin{pmatrix} 5 & \frac{1}{2} & -1 \end{pmatrix}$$

2) $\begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$

Let

$$\mathbf{B} = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$$

transpose of $\mathbf{B}$ is given as $\mathbf{B}^\top$

$$(\mathbf{B}^\top)_{ij} = \mathbf{B}_{ji} \tag{2.0.2}$$

$$\therefore \mathbf{B}^\top = \begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix}$$

3) $\begin{pmatrix} -1 & 5 & 6 \\ \sqrt{3} & 5 & 6 \\ 2 & 3 & -1 \end{pmatrix}$

Let

$$\mathbf{C} = \begin{pmatrix} -1 & 5 & 6 \\ \sqrt{3} & 5 & 6 \\ 2 & 3 & -1 \end{pmatrix}$$

transpose of $\mathbf{C}$ is given as $\mathbf{C}^\top$

$$(\mathbf{C}^\top)_{ij} = \mathbf{C}_{ji} \tag{2.0.3}$$

$$\therefore \mathbf{C}^\top = \begin{pmatrix} -1 & \sqrt{3} & 2 \\ 5 & 5 & 3 \\ 6 & 6 & -1 \end{pmatrix}$$