

ASSIGNMENT 2

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Download all python codes from

https://github.com/vishwahurakadli/EE3900/blob/main/Assignment_2/EE3900_Assignment_2.ipynb

and latex-tikz codes from

https://github.com/vishwahurakadli/EE3900/blob/main/Assignment_2/EE3900_Assignment_2.tex

Calculating multiplication of transpose of matrices
Transpose of matrices

$$\mathbf{A}^T = \begin{pmatrix} -2 & 4 & 5 \end{pmatrix} \quad (2.0.4)$$

$$\mathbf{B}^T = \begin{pmatrix} 1 \\ 3 \\ -6 \end{pmatrix} \quad (2.0.5)$$

Now

$$\mathbf{B}^T \mathbf{A}^T = \begin{pmatrix} 1 \\ 3 \\ -6 \end{pmatrix} \begin{pmatrix} -2 & 4 & 5 \end{pmatrix} \quad (2.0.6)$$

$$\mathbf{B}^T \mathbf{A}^T = \begin{pmatrix} -2 & 4 & 5 \\ -6 & 12 & 15 \\ 12 & -24 & -30 \end{pmatrix} \quad (2.0.7)$$

$$\mathbf{B}^T \mathbf{A}^T = (\mathbf{AB})^T \quad (2.0.8)$$

Therefore $(\mathbf{AB})^T = \mathbf{B}^T \mathbf{A}^T$

1 PROBLEM

(Matrix-2.52)

If $\mathbf{A} = \begin{pmatrix} -2 \\ 4 \\ 5 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} 1 & 3 & -6 \end{pmatrix}$, verify that

$$(\mathbf{AB})^T = \mathbf{B}^T \mathbf{A}^T$$

2 SOLUTION

Calculating transpose of matrix multiplication on
LHS

Matrix multiplication of AB is given by

$$\mathbf{AB} = \begin{pmatrix} -2 \\ 4 \\ 5 \end{pmatrix} \begin{pmatrix} 1 & 3 & -6 \end{pmatrix} \quad (2.0.1)$$

$$\Rightarrow \mathbf{AB} = \begin{pmatrix} -2 & -6 & 12 \\ 4 & 12 & -24 \\ 5 & 15 & -30 \end{pmatrix} \quad (2.0.2)$$

As there is only one element in matrix AB and it is square matrix, therefore transpose of matrix AB is AB itself

$$(\mathbf{AB})^T = \begin{pmatrix} -2 & 4 & 5 \\ -6 & 12 & 15 \\ 12 & -24 & -30 \end{pmatrix} \quad (2.0.3)$$