



A System maintenance is scheduled for Wednesday, August 29, 2018 from 14:30-15:30 UTC. Courses might not be available during this time.

Course > Week... > 4.2 P... > 4.2.2 ...

4.2.2 Transposing a Partitioned Matrix 4.2.2 Transposing a Partitioned Matrix

Important

Around 1:20 in the below video, the slide that shows the transposed matrix is completely wrong (the indices of the blocks are wrong...) Here is how it should be:

Let $A \in \mathbb{R}^{m \times n}$ be partitioned as follows:

$$A = \begin{pmatrix} A_{0,0} & A_{0,1} & \cdots & A_{0,N-1} \\ \hline A_{1,0} & A_{1,1} & \cdots & A_{1,N-1} \\ \hline \vdots & \vdots & & \vdots \\ \hline A_{M-1,0} & A_{M-1,1} & \cdots & A_{M-1,N-1} \end{pmatrix},$$

where $A_{i,j} \in \mathbb{R}^{m_i \times n_j}$. Then

$$A^{T} = \begin{pmatrix} A_{0,0}^{T} & A_{1,0}^{T} & \cdots & A_{M-1,0}^{T} \\ \hline A_{0,1}^{T} & A_{1,1}^{T} & \cdots & A_{M-1,1}^{T} \\ \vdots & \vdots & & \vdots \\ \hline A_{0,N-1}^{T} & A_{1,N-1}^{T} & \cdots & A_{M-1,N-1}^{T} \end{pmatrix}.$$

Similarly, later, in "special cases",

Each submatrix is a scalar. If

$$A = \begin{pmatrix} \alpha_{0,0} & \alpha_{0,1} & \cdots & \alpha_{0,N-1} \\ \hline \alpha_{1,0} & \alpha_{1,1} & \cdots & \alpha_{1,N-1} \\ \hline \vdots & \vdots & & \vdots \\ \hline \alpha_{M-1,0} & \alpha_{M-1,1} & \cdots & \alpha_{M-1,N-1} \end{pmatrix}$$

then

The more I look at it, the more I notice how much I messed up the indices in this particular video... I hate indices...

Best to read the "Related Reading" for this unit...

<u>Start of transcript. Skip to the</u> end.

Homework 4.2.2.1

1/1 point (graded)

Show, step-by-step, how to transpose: $\begin{pmatrix} 1 & -1 & 3 & 2 \\ 2 & -2 & 1 & 0 \\ \hline 0 & 4 & 3 & 2 \end{pmatrix}$

Steps:

$$1. \left(\begin{array}{c|c|c} 1 & 2 \\ -1 & -2 \\ \hline 3 & 1 \end{array} \right) \left(\begin{array}{c|c} 0 \\ -4 \\ \hline 3 \end{array}\right) = \left(\begin{array}{c|c|c} 1 & 2 & 0 \\ -1 & -2 & -4 \\ \hline \hline 3 & 1 & 3 \\ \hline \hline 2 & 0 & 2 \end{array}\right)$$

$$2. \left(egin{array}{c|cc|c} \left(1 & -1 & 3 \ 2 & -2 & 1 \ \end{array}
ight) \left(egin{array}{c|cc|c} 2 \ 0 \ \end{array}
ight)^T \ \hline \left(0 & -4 & 3 \ \end{array}
ight) \left(2 \ \end{array}
ight)$$

$$3. \left(egin{array}{c|ccc} \left(egin{array}{c|ccc} 1 & -1 & 3 \ 2 & -2 & 1 \end{array}
ight)^T & \left(0 & -4 & 3
ight)^T \ \hline \left(egin{array}{c|ccc} 2 \ 0 \end{array}
ight)^T & \left(2
ight)^T \end{array}
ight)$$

List the correct order of the steps taken above. (Answer Format: x,x,x where x is a step number)



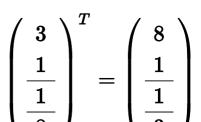
Submit

Homework 4.2.2.2

6/6 points (graded)

$$\left(\,3\,\right) ^{T}=\left(\,3\,\right)$$

TRUE



$$\left(egin{array}{cc|c} 3 & 1 & 1 & 8 \end{array}
ight)^T = \left(rac{3}{1\over 1}
ight)$$

TRUE

$$\left(egin{array}{c|c|c|c|c} 1 & 2 & 3 & 4 \ 5 & 6 & 7 & 8 \ 9 & 10 & 11 & 12 \ \end{array}
ight)^T = \left(egin{array}{c|c|c} 1 & 2 & 3 & 4 \ \hline 5 & 6 & 7 & 8 \ \hline 9 & 10 & 11 & 12 \ \end{array}
ight)$$

FALSE

$$\left(egin{array}{c|c|c} 1 & 5 & 9 \ 2 & 6 & 10 \ 3 & 7 & 11 \ 4 & 8 & 12 \end{array}
ight)^T = \left(rac{1 & 2 & 3 & 4}{5 & 6 & 7 & 8} \ \hline 9 & 10 & 11 & 12 \end{array}
ight)$$

TRUE

$$\left(\left(egin{array}{c|ccccc}1&2&3&4\5&6&7&8\\hline 9&10&11&12\end{array}
ight)^T=\left(egin{array}{c|ccccc}1&2&3&4\5&6&7&8\\hline 9&10&11&12\end{array}
ight)$$

TRUE

Submit

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