

Transpose and its rules

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Practice problems

1. Find the transpose of the matrix $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$.
2. Given $A = \begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$, compute $(A + B)^T$.
3. If A is a 2×3 matrix and B is a 3×4 matrix, what are the dimensions of $(AB)^T$?

Solutions

1. Find the transpose of the matrix $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$.

- The first row $(1, 2)$ becomes the first column.
- The second row $(3, 4)$ becomes the second column.
- The third row $(5, 6)$ becomes the third column.

Answer: $\begin{pmatrix} 1 & 3 & 5 \\ 2 & 4 & 6 \end{pmatrix}$

2. Given $A = \begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$, compute $(A + B)^T$.

- First, find $A + B = \begin{pmatrix} 1+0 & 0+1 \\ 2+1 & 1+0 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 3 & 1 \end{pmatrix}$.
- Now, transpose the result by swapping rows and columns.

Answer: $\begin{pmatrix} 1 & 3 \\ 1 & 1 \end{pmatrix}$

3. If A is a 2×3 matrix and B is a 3×4 matrix, what are the dimensions of $(AB)^T$?

- The product AB has dimensions 2×4 .
- The transpose of a 2×4 matrix swaps the number of rows and columns.

Answer: 4×2