Properties of transpose of a matrix:

Let $A = [a_{ij}]_{m\times p}$ & $B = [b_{ij}]_{p\times n}$ then $(AB)' = B'A'$

Example:

$$A = \begin{pmatrix} 2 & 0 & -1 \\ 4 & -3 & 5 \end{pmatrix} \text{ and } B = \begin{pmatrix} -2 & 1 \\ 0 & -6 \\ 3 & -1 \end{pmatrix}$$

$$AB = \begin{pmatrix} 2 & 0 & -1 \\ 4 & -3 & 5 \end{pmatrix}\begin{pmatrix} -2 & 1 \\ 0 & -6 \\ 3 & -1 \end{pmatrix} = \begin{pmatrix} -7 & 3 \\ 7 & 17 \end{pmatrix}$$

$$(AB)' = \begin{pmatrix} -7 & 7 \\ 3 & 17 \end{pmatrix}$$

$$A' = \begin{pmatrix} 2 & 4 \\ 0 & -3 \\ -1 & 5 \end{pmatrix} \quad B' = \begin{pmatrix} -2 & 0 & 3 \\ 1 & -6 & -1 \end{pmatrix}$$

$$B'A' = \begin{pmatrix} -2 & 0 & 3 \\ 1 & -6 & -1 \end{pmatrix}\begin{pmatrix} 2 & 4 \\ 0 & -3 \\ -1 & 5 \end{pmatrix} = \begin{pmatrix} -7 & 7 \\ 3 & 17 \end{pmatrix} \quad \therefore (AB)' = B'A'$$

- ❑ $(A_1 A_2 \ldots A_n)' = A_n{}' A_{n-1}{}' \ldots A_2{}' \, A_1{}'$, whenever product is defined.

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