Matgeo Presentation - Problem 12.498

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Question

If $\mathbf{A} = \begin{pmatrix} 1 & 5 \\ 6 & 2 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 3 & 7 \\ 8 & 4 \end{pmatrix}$,then $\mathbf{AB}^\top$ is equal to

(a) $\begin{pmatrix} 38 & 28 \\ 32 & 56 \end{pmatrix}$ (b) $\begin{pmatrix} 3 & 40 \\ 42 & 8 \end{pmatrix}$ (c) $\begin{pmatrix} 43 & 27 \\ 34 & 50 \end{pmatrix}$ (d) $\begin{pmatrix} 38 & 32 \\ 28 & 56 \end{pmatrix}$

solution

Given,

$$\mathbf{A} = \begin{pmatrix} 1 & 5 \\ 6 & 2 \end{pmatrix} \tag{0.1}$$

$$\mathbf{B} = \begin{pmatrix} 3 & 7 \\ 8 & 4 \end{pmatrix} \tag{0.2}$$

$$\mathbf{B^T} = \begin{pmatrix} 3 & 8 \\ 7 & 4 \end{pmatrix} \tag{0.3}$$

$$\mathbf{AB^T} = \begin{pmatrix} 1 & 5 \\ 6 & 2 \end{pmatrix} \begin{pmatrix} 3 & 8 \\ 7 & 4 \end{pmatrix} = \begin{pmatrix} 38 & 28 \\ 32 & 56 \end{pmatrix} \tag{0.4}$$

$$\implies \mathbf{AB^T} = \begin{pmatrix} 38 & 28 \\ 32 & 56 \end{pmatrix} \tag{0.5}$$