

① Let $A = \begin{bmatrix} 6 & 5 & 4 \\ 3 & 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ 2 & 6 \\ 5 & 4 \end{bmatrix}$

Find $3A - 2B^T$.

$$3A = \begin{bmatrix} 18 & 15 & 12 \\ 9 & 6 & 3 \end{bmatrix}, \quad B^T = \begin{bmatrix} 1 & 2 & 5 \\ 3 & 6 & 4 \end{bmatrix},$$

$$\text{and } 2B^T = \begin{bmatrix} 2 & 4 & 10 \\ 6 & 12 & 8 \end{bmatrix}.$$

$$\text{Hence } 3A - 2B^T = \begin{bmatrix} 18-2 & 15-4 & 12-10 \\ 9-6 & 6-12 & 3-8 \end{bmatrix}$$

$$= \begin{bmatrix} 16 & 11 & 2 \\ 3 & -6 & -5 \end{bmatrix}.$$

② Find the dot product $u \cdot v$ if

$$u = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \quad \text{and} \quad v = \begin{bmatrix} 3 \\ -4 \end{bmatrix}$$

$$u \cdot v = (1)(3) + (2)(-4) = 3 - 8 = -5.$$