

Let $A = \begin{bmatrix} 1 & -1 & 0 \\ 3 & 2 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 2 & 6 \\ 1 & 4 & 2 \end{bmatrix}$, and $C = \begin{bmatrix} 2 & 1 \\ -1 & 5 \end{bmatrix}$.

For each of the following, either perform the operation, or explain why it cannot be done.

Hint: Exactly three of these cannot be done.

1. $3A + B$

2. $3A + C$

3. AB

4. CA

5. A^2

6. C^2

7. B^T

8. C^{-1}