

**Problem 1.** Consider the matrices

$$A = \begin{pmatrix} 5 & 1 & 3 \\ 2 & 1 & 2 \end{pmatrix}, \quad B = \begin{pmatrix} 2 & 2 \\ 1 & -1 \\ 0 & 3 \end{pmatrix}, \quad C = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}.$$

For each of the following, compute the matrix or indicate that the expression is undefined.

$AB$

$BA$

$A + 3BC$

$2C^2 + I_2$