1 Compute the following if it is defined:

2 point question.

\[
A = \begin{pmatrix} 2 & 3 & 1 \\ 0 & -1 & 2 \end{pmatrix} \quad B = \begin{pmatrix} 0 & 1 & -1 \\ 4 & -1 & 2 \end{pmatrix} \quad C = \begin{pmatrix} 1 & 2 \\ 3 & -1 \end{pmatrix}
\]

A. \(B^T\)
B. \(A^T C^T\)
C. \(A^T C\)
D. \((CA)^T\)
E. \(A^T + B^T\)
F. \(3B - 2A\)
G. \(A \otimes C\)
H. \(\text{tr}(8 \cdot C)\)

2 Matrices in R

1 point question. Define the matrices \(A\), \(B\), and \(C\) from Question #1 in R. Compute the quantities in parts A-H in R. Show your code and output.

3 Mathematical Demonstration

1 point question. Show in general that if \(WX\) is defined, then \(X^T W^T\) is defined but \(W^T X^T\) need not be defined. Under what circumstances would \(W^T X^T\) be defined? Under what circumstances would \(W^T X^T\) be undefined?