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?