

1. Let $A = \begin{bmatrix} 5 & -6 & 1 \\ 2 & -4 & 7 \\ 1 & 0 & 2 \\ -2 & 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 10 & -20 & 30 & -10 \\ 5 & 10 & 20 & 30 \\ 15 & -10 & 10 & 10 \end{bmatrix}$. Find each of the following. If a particular item doesn't exist, *explain why not!*

1A) The number of entries of BA .

1B) The number of entries of $A + A + A$.

1C) The entry in the second row, third column of AB .

1D) The entry in the second row, third column of $A^T + B$.

2. What is the inverse of $\begin{bmatrix} w & x \\ y & z \end{bmatrix}$, and what condition(s) must w , x , y and z satisfy in order for the inverse to exist?

3. Suppose A and B are both $n \times n$ matrices. Find a formula for the inverse of $(AB)^T$ in terms of A^{-1} and B^{-1} . Show all your steps.

4. Suppose the inverse of A is $\begin{bmatrix} 1 & 3 & 5 \\ 2 & 4 & 6 \\ 10 & 0 & 20 \end{bmatrix}$.

4A) Find all solutions of $A\mathbf{x} = \begin{bmatrix} 1 \\ 0 \\ 4 \end{bmatrix}$

4B) Do the columns of A span \mathbf{R}^3 ? Explain.