Math 40
Matrix Algebra and the Inverse of a Matrix
Friday, February 5, 2016

3.2.{33, 36}, 3.3.{19, 42, 46, 53}

3.2.33 Using induction, prove that for all $n \geq 1$,

$$(A_1 + A_2 + ... + A_n)^T = A_1^T + A_2^T + ... + A_n^T$$

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3.2.36

(a) Give an example to show that if A and B are symmetric $n \times n$ matrices, then AB need not be symmetric.

(b) Prove that if A and B are symmetric $n \times n$ matrices, then AB is symmetric if and only if $AB = BA$.

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$\boxed{\textbf{3.3.19}\ \text{Give a counterexample to show that } (A+B)^{-1} \neq A^{-1}+B^{-1} \text{ in general.}}$

■

3.3.42

(a) Prove that if A is invertible and $AB = O$, then $B = O$.

(b) Give a counterexample to show that the result in part (a) may fail if A is not invertible.

$\blacksquare$

$\boxed{\textbf{3.3.46} \quad \text{Prove that if a symmetric matrix is invertible, then its inverse is symmetric also.}}$

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3.3.53 Use the Gauss-Jordan method to find the inverse of the given matrix (if it exists).

$$\begin{bmatrix} 1 & -1 & 2 \\ 3 & 1 & 2 \\ 2 & 3 & -1 \end{bmatrix}$$

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