MA 442 - Quiz

March 18

Name: _____ **BUID:** _____

There are two questions, you must answer both of them to receive full credit.

Question 1. Suppose that A is a diagonal 2×2 matrix. That is, one of the form

$$A = \begin{bmatrix} a_1 & 0 \\ 0 & a_2 \end{bmatrix} \tag{1}$$

for some scalars a_1, a_2. Prove or find a counterexample to the following statement

"*For every* 2×2 *matrix* B *one has* $AB = BA$ ".

Question 2. A *left inverse* of a linear transformation $\mathsf{T} \colon \mathsf{V} \to \mathsf{W}$ is a linear transformation $\mathsf{L} \colon \mathsf{W} \to \mathsf{V}$ such that $\mathsf{L} \circ \mathsf{T} = \mathbb{1}_{\mathsf{V}}$. Show that if T has a left inverse L then $\dim \mathsf{V} \leq \dim \mathsf{W}$.