MA 442 - Quiz

February 4

Name: _____ **BUID:** _____

There are two graded questions and one, optional, BONUS question.

Question 1. Prove that the set of vectors $\left\{ \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} \right\}$ generates $\mathbb{R}^3$.

Question 2. Consider the real vector space $V = \mathcal{F}(\mathbb{R}, \mathbb{R})$ of functions $\mathbb{R}$ to $\mathbb{R}$. Show that the subset

$$\{\sin x, \cos x\} \subset \mathcal{F}(\mathbb{R}, \mathbb{R}) \tag{1}$$

is linearly independent.

BONUS: One day, at the end of class, your professor was running out the room and spuriously writes on the board:

$$\text{“ } \operatorname{span}(S_1 \cap S_2) = \operatorname{span}(S_1) \cap \operatorname{span}(S_2) \text{ ”} \tag{2}$$

But, in his impetuousness, he made an **error**! Can you find a counterexample to this assertion?