MA 442 - Quiz

January 28

Name: _____ **BUID:** _____

There are two questions, you must answer **both** of them. Write your answers in a clear and well-organized way to receive full credit.

Question 1. Recall that the set of real functions $\mathbb{R}$ to $\mathbb{R}$ has the natural structure of a vector space that we denoted $\mathcal{F}(\mathbb{R}, \mathbb{R})$. Let $V \subset \mathcal{F}(\mathbb{R}, \mathbb{R})$ be the subset of functions $f\colon \mathbb{R} \to \mathbb{R}$ such that $f(3) = 0$. Is V a subspace? (If it is, you must prove it. If it is not, you must justify why.)

Question 2. Consider the set $V = \mathbb{R}^2$ of pairs of real numbers. Define "weird" addition on this set by the rule

$$(a_1, a_2)\tilde{+}(b_1, b_2) = (a_1 + b_2, a_2 + b_1)$$

Is V together with the rule of weird addtion $\tilde{+}$ and ordinary scalar multiplication[1] a vector space? (If yes, you must prove it. If it is not you must explain why not.)

[1] So, $\lambda \cdot (a_1, a_2) = (\lambda a_1, \lambda a_2)$ for all scalars $\lambda \in \mathbb{R}$.