Homework 1
Linear Algebra
(MATH 442), Spring, 2026

Due: 01/30/2026

Section 1.A - Systems of Linear Equations

Problem 1. Show that $(ab)x = a(bx)$ for all $x \in \mathbf{F}^n$ and all $a, b \in \mathbb{F}$.

Problem 2. Show that $\lambda(x + y) = \lambda x + \lambda y$ for all $\lambda \in \mathbb{F}$ and all $x, y \in \mathbf{F}^n$.

Section 1.B - Vector Equations

Problem 3. Let V be a vector space over $\mathbb{F}$. Suppose $a \in \mathbb{F}$, $v \in V$, and $av = 0$. Prove that $a = 0$ or $v = 0$.

Problem 4. Suppose S is a nonempty set and let V be a vector space over $\mathbb{F}$. Let V^S denote the set of functions from S to V. Define a notion of addition and scalar multiplication on V^S such that V^S is a vector space under the definition you have provided.