

Math 214 Spring 2019
Linear Algebra HW 5
Due Friday, March 8

For all these problems, justify your answers; do not just write “yes” or “no”.

1. Is $B = \{(1, 2, 3), (-2, 1, 0), (1, 0, 1)\}$ a basis for $V = \mathbb{R}^3$?
2. Is $B = \{(2, 1, 3), (3, -1, 4), (2, 6, 4)\}$ a basis for $V = \mathbb{R}^3$?
3. Is $B = \{1 + x, 1 + x^2, 1 + x^3, x + x^2\}$ a basis for $V = \mathcal{P}_3(x)$?
4. Let $V = \{(a, b, c) : a + b = c\}$. Find a basis for V .
5. Let $S = \{(1, 2, 0), (3, 2, -1)\}$. Find a set $B \supseteq S$ that is a basis for \mathbb{R}^3 .
6. Let $T = \{(1, 2, 2), (2, 5, 4), (1, 3, 2), (2, 7, 4), (1, 1, 0)\}$. Find a set $B \subseteq T$ that is a basis for \mathbb{R}^3 .
7. What is the dimension of $\text{Span}\{\sin^2, \cos^2, 1\} \subset \mathcal{F}(\mathbb{R}, \mathbb{R})$?
8. (★) Suppose V is a finite-dimensional vector space and U is a subspace of V . If $\dim U = \dim V$, prove that $U = V$.