Math 214 Spring 2020
Linear Algebra HW 5
Due Thursday, March 5

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. Let $S = \{1, x+x^2, 3-2x, 5+x^2\} \subset \mathcal{P}_2(x)$. Find a set $B \subseteq S$ that is a basis for $\mathcal{P}_2(x)$.
8. What is the dimension of $\operatorname{span}\{\sin^2, \cos^2, 1\} \subset \mathcal{F}(\mathbb{R}, \mathbb{R})$?
9. ($\star$) Suppose V is a finite–dimensional vector space and U is a subspace of V. If $\dim U = \dim V$, prove that $U = V$.