

## CAAM 336 · DIFFERENTIAL EQUATIONS

### Homework 10

Posted Wednesday 11 September 2013. Due 5pm Wednesday 18 September 2013.

10. [25 points]

Demonstrate whether or not each of the following sets is a real vector space. You do not need to show that  $\mathbb{R}^2$ ,  $\mathbb{R}^3$ ,  $C[0, 1]$ , or  $C^2[0, 1]$  are real vector spaces.

(a)  $\{\mathbf{x} \in \mathbb{R}^2 : x_2 = x_1^3\}$

(b)  $\{\mathbf{x} \in \mathbb{R}^3 : 3x_1 + 2x_2 + x_3 = 0\}$

(c)  $\{f \in C[0, 1] : f(x) \geq 0 \text{ for all } x \in [0, 1]\}$

(d)  $\left\{f \in C[0, 1] : \max_{x \in [0, 1]} f(x) \leq 1\right\}$

(e)  $\{f \in C^2[0, 1] : f(1) = 1\}$

(f)  $\{f \in C^2[0, 1] : f(1) = 0\}$