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

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

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

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