

Homework assignment 4

Due date: September 27

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Exercise 1. If F is a field verify that the n -tuple space F^n is a vector space over the field F .

Exercise 3. If \mathbb{C} is the field of complex numbers, which vectors in \mathbb{C}^3 are linear combinations of $(1, 0, -1)$, $(0, 1, 1)$ and $(1, 1, 1)$?

Exercise 6. Let V be the set of all complex-valued functions f on the real line such that (for all t in \mathbb{R})

$$f(-t) = \overline{f(t)}.$$

The bar denotes complex conjugation, i.e. $\overline{a + bi} = a - bi$. Show that V is a vector space over the field of *real* numbers. Give an example of a function in V that is not real-valued.

Exercise 7. Let V be the set of pairs (x, y) of real numbers. Define

$$(x, y) + (x_1, y_1) = (x + x_1, 0)$$

$$c(x, y) = (cx, 0).$$

Is V , with these operations, a vector space?