Math/CS 120: Intro. to Math | Professor: Padraic Bartlett

Homework 16: Linear Algebra and Field Extensions

Due Friday, Week 9 | *UCSB 2014*

Solve **one** of the following **three** problems. As always, prove your claims/have fun!

1. In class, we claimed that if V is a vector space and A is a subset of V, then the **span** of A, $span(A)$, is a vector space. Prove this claim!

2. In class, we claimed that the collection of all polynomials with real-valued coefficients $\mathbb{R}[x]$ was a vector space. We verbally talked about why this was true, but didn't do a formal proof.

   Write down a formal proof of this claim (i.e. check that this object forms a vector space over $\mathbb{R}$!)

3. In class, we made the following claim:

   Theorem. Suppose that V is a vector space with two bases $B_1 = \{\vec{v_1}, \ldots \vec{v_n}\}$, $B_2 = \{\vec{w_1}, \ldots \vec{w_m}\}$ both containing finitely many elements.. Then these sets have the same size: i.e. $|B_1| = |B_2|$.

   Prove this claim!