# Mathematics 700 Homework
## Due Wednesday, September 3

(1) Let $V$ be a vector space and $v_1, \ldots, v_m \in V$ with the property that if any vector is removed from $\{v_1, \ldots, v_m\}$ then the resulting set has a smaller span than $\{v_1, \ldots, v_m\}$. Then $v_1, \ldots, v_m$ is linearly independent.

**Restatement:** If $S \subset V$ is a finite subset of $V$ such that for every proper subset $S' \subset S$ we have $\mathrm{Span}(S') \neq \mathrm{Span}(S)$, then $S$ is linearly independent.

HINT: One way would be to use the proposition on page 28 of the notes and a proof by contradiction.

(2) A vector space $V$ is ***finite dimensional*** iff there it is spanned by a finite subset. (That is $V$ is finite dimensional iff there are $v_1, \ldots, v_m \in V$ such that $V = \mathrm{Span}\{v_1, \ldots, v_m\}$. Show that any finite dimensional vector space is spanned by a linearly independent set.