1106-20-2125 **John H. Johnson*** (johnson.5316@osu.edu). *An algebraic proof of Szeméredi's affine cube lemma via ultrafilters.* Preliminary report.

Szeméredi's affine cube lemma states that for every real number $\delta > 0$ and every positive integer m there exists a positive integer N such that if $A \subseteq \{1, 2, \ldots, N\}$ with $|A| \geq \delta \cdot N$, then there exists a finite sequence of positive integers $\langle a_n \rangle_{n=0}^{m}$ such that $a_0 + \left\{\sum_{i \in F} a_i \mid \emptyset \neq F \subseteq \{1, 2, \ldots, m\}\right\} \subseteq A$. Szeméredi's proved this lemma as one important component of his combinatorial proof that "dense" subsets of a sufficiently long interval of positive integers contains a 4-term arithmetic progression. I'll give a short and simple proof, which is similar to the ultrafilter proof of Hindman's finite sums theorem, of the affine cube lemma using the algebraic structure of the Stone-Čech compactification of the positive integers. (Received September 15, 2014)