1125-15-1645 **Louis Deaett*** (louis.deaett@quinnipiac.edu) and **Colin Garnett**. *Algebraic conditions induced by matrix patterns.* Preliminary report.

Replacing each nonzero entry of a matrix with the symbol $*$ gives its *zero-nonzero pattern*. We may ask whether this combinatorial object captures any information about the eigenvalues of the matrix. Sometimes there exists a multiset of eigenvalues that can be ruled out for every matrix with that pattern; we say that the pattern fails to be *spectrally arbitrary*. It has been conjectured that an $n \times n$ spectrally arbitrary pattern must have at least $2n$ nonzero entries.

The combinatorics of a particular zero-nonzero pattern (perhaps described by a digraph) may imply algebraic conditions on the coefficients of each characteristic polynomial belonging to a matrix with that pattern. Certain such algebraic conditions imply that the pattern cannot be spectrally arbitrary.

Is there a succinct set of algebraic conditions of this sort that apply to every pattern with fewer than $2n$ nonzero entries? We show that the answer is 'yes' for $n \leq 6$, and show that the question for $n = 7$ can be narrowed down to a very small number of patterns. (Received September 18, 2016)