Inverse eigenvalue problem for nonnegative matrices

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Abstract

The nonnegative inverse eigenvalue problem is the problem of finding necessary and sufficient conditions for a list of n complex numbers σ to be the spectrum of a nonnegative matrix. The problem has been completely solved only for $n \leq 4$. Boyle and Handelman have shown that if $\sigma = (\lambda_1, \lambda_2, ..., \lambda_n)$ is such list of nonzero complex numbers that $s_k = \sum_{i=1}^{n} {\lambda_i}^k > 0$ for all positive integers k; then there exists a nonnegative matrix A with nonzero spectrum $(\lambda_1, \lambda_2, ..., \lambda_n)$. However, their proof is not constructive. The aim of the talk is to show how to construct such matrices for some lists of complex numbers σ.

The talk is based on a joint work with Thomas J. Laffey.