

Combinatorics Seminar

The critical exponent of a graph

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Abstract: We classify the powers that preserve positive semidefiniteness, when applied entrywise to matrices with rank and sparsity constraints. This is part of a broad program to study entrywise functions preserving positivity on distinguished submanifolds of the cone. In our first main result, we completely classify the powers preserving Loewner properties on positive semidefinite matrices with fixed dimension and rank. This includes the case where the matrices have negative entries. Our second main result characterizes powers preserving positivity on matrices with zeros according to a chordal graph. We show how preserving positivity relates to the geometry of the graph, thus providing interesting connections between combinatorics and analysis. The work has applications in regularizing covariance/correlation matrices, where entrywise powers are used to separate signal from noise, while minimally modifying the entries of the original matrix. (Based on joint work with D. Guillot and B. Rajaratnam.)

Monday, September 28 at 3:00 PM in SEO 427