Boğaziçi
MATH GRAD SEMINAR

Erdős-Szekeres for Arrays

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Abstract: In 1993, Fishburn and Graham established the following qualitative extension of the classical Erdős-Szekeres theorem. If N is sufficiently large with respect to n, then any $N \times N$ real matrix contains an $n \times n$ submatrix in which every row and every column is monotone. We prove that the smallest such N is at most $2^{n^{4+o(1)}}$. We prove the following surprisingly sharp transition in the asymmetric setting. On one hand, every $8n^2 \times 2^{n^{4+o(1)}}$ matrix contains an $n \times n$ submatrix, in which every row is monotone. On the other hand, there exist $\frac{n^2}{6} \times 2^{2^{n^{1-o(1)}}}$ matrices containing no such submatrix. In this talk, I will review the history of the problem and a particular proof technique using binary trees which may be important in and of itself. This is joint work with Z. Jin,E. Räty, and I. Tomon.

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