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## James Melbourne: Relative Log-concavity in the discrete setting

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A sequence of numbers is considered log-concave with respect to another when the ratio of the two is log-concave. Such relationships arise naturally in diverse fields of study. Examples include the following. The intrinsic volume sequence associated to a convex body, which is log-concave with respect to the probabilities of a Poisson distribution. The confirmation of the strong Mason conjecture shows that the number of independent sets of a matroid of fixed cardinality is log-concave with respect to a Binomial distribution, as are sequences of coefficients of real rooted polynomials, and as is easily observed, every log-concave sequence is relatively log-concave with respect to a geometric sequence. In the case that a complicated probability sequence of interest is relatively log-concave to a simpler “reference sequence” we will demonstrate two techniques and applications thereof, to transfer inequalities (for moments, entropy, tails, etc) known for the reference sequence to the class of sequences relatively log-concave with respect to it. One approach is based on functional analytic considerations, the other using the theory of majorization.

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