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**JINTING LIANG**, UBC

*Log-concavity and log-convexity via distributive lattices*

In this work we present a lemma, which we call the Order Ideal Lemma, that can be used to demonstrate a wide array of log-concavity and log-convexity results in a combinatorial manner using order ideals in distributive lattices. We use the Order Ideal Lemma to prove log-concavity and log-convexity of various sequences involving lattice paths (Catalan, Motzkin and large Schröder numbers), intervals in Young's lattice, order polynomials, specializations of Schur and Schur  $Q$ -functions, Lucas sequences, descent and peak polynomials of permutations, pattern avoidance, set partitions, and noncrossing partitions. This is a joint work with Bruce E. Sagan.