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Generalized Inversion Sequences

An inversion sequence is a sequence of positive integers (e_1, \dots, e_n) satisfying $e_k < k$. Inversion sequences are used in various ways to encode permutations, for example, Lehmer codes and inversion tables.

In this talk we describe a generalization of inversion sequences, with corresponding statistics derived from the theory of lecture hall partitions. An s -inversion sequence (e_1, \dots, e_n) satisfies $e_k < s_k$, where $s = (s_1, \dots, s_n)$ is an arbitrary sequence of positive integers.

These s -inversion sequences provide both combinatorial and geometric models for generalizations of permutations. We will show that s -inversion sequences can be used to unify and generalize results about permutations, Eulerian polynomials, lattice points in polyhedra, partition generating functions, Coxeter groups, and lecture hall partitions.