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The hull metric, linear extensions, and Cayley graphs of Coxeter groups

A subset C of the vertices of a graph G is called *convex* if any vertex on a shortest path in G between two elements of C also lies in C . When G is the Cayley graph of the symmetric group for the generating set of simple transpositions, convex sets are in bijection with labeled posets, and the size of the convex set is the number of linear extensions of the poset, an important quantity for many applications. We reinterpret an inequality of Sidorenko for linear extensions as a triangle inequality for a “hull metric” on this graph and give new proofs. The existence of this hull metric seems to be quite rare for general graphs, but we conjecture it holds for the standard Cayley graphs of arbitrary Coxeter groups, and prove several special cases. Joint work with Yibo Gao.