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Coefficients and Roots of Ehrhart Polynomials

Abstract for the Combinatorics and Number Theory Seminar 2003 November 10 (Note special day.)

The Ehrhart polynomial of a lattice polytope counts integer points in integral dilates of the polytope. The coefficients of these polynomials are, for the most part, a complete mystery. We have established linear inequalities between the coefficients of an Ehrhart polynomial, depending only on the dimension of the polytope. These relations imply, in particular, that in a fixed dimension the roots of any Ehrhart polynomial are bounded. Our result can be generalized slightly, to Poincaré series of a certain type.

Furthermore, we give partially tight bounds for the real roots of an Ehrhart polynomial.

Finally, I will report on studies of special classes of polytopes whose Ehrhart polynomials exhibit remarkable behavior.

This is joint work with Mike Develin (Berkeley), Jesus DeLoera (Davis), and Julian Pfeifle (Barcelona).

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