Geometry Seminar
October 2, 2007, Tuesday, 6:00 p.m.
Room 613, Courant Institute
251 Mercer Street, New York

f-vectors: Some new developments

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Abstract

We mention some basic questions regarding face numbers and related invariants of polytopes and complexes and discuss a few recent developments.

1. Andy Frohmader proved a conjecture of Eckhoff and myself regarding face numbers of clique (flag) complexes. His theorem asserts that the f-vector of a clique complex (the complex of complete subgraphs of a graph) of dimension d is the f-vector of some completely balanced simplicial complex of the same dimension. This is a far reaching extension of Turán's theorem.
2. The g-conjecture for spheres which proposes a complete description of their face numbers is a central problem in this area. Isabella Novik and Ed Swartz recently proved a conjecture of mine on face numbers of manifolds which allows to state an analogue of the g-conjecture for manifolds without boundary. The Novik-Swartz theorem has vaious other applications.
3. Raman Sanyal, Axel Werner, and Günter M. Ziegler disproved two conjectures I made regarding face number of centrally symmetric d-polytopes. The conjecture that every such polytope has at least 3^d nonempty faces was not disproved and in fact was verified in dimensions 4 and 5.

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