

Kempner Colloquium

WHAT IS THE GAMMA VECTOR? (AND WHAT DOES IT COUNT?)

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The face vector, or f-vector, of a simplicial complex counts the number of faces in the complex according to dimension (number of vertices, edges, triangles, etc.). An old problem in combinatorial topology is to characterize the f-vectors that can be realized for a given topological space. For example, there is no simplicial complex with 4 vertices and 7 edges (why not?), and while you can construct a simplicial complex with 5 vertices, 8 edges, and 5 triangles, such a complex cannot be realized on a sphere (this fact is deeper).

In this talk, I describe some of the history of attempting to characterize f-vectors in the context of something called the Charney-Davis conjecture, which is itself a discretized version of a conjecture of Hopf. Due to work of S. Gal, the Charney-Davis conjecture follows if one can prove that a certain transformation of the f-vector is nonnegative. This is the gamma vector of the title. Interesting combinatorics ensue.

Monday April 7, 2014

4:00 p.m.

MATH 350