Algebra/Topology Seminar

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"Good" Posets and Minimal Free Resolutions of Monomial Ideals

Thursday, January 31, 2013
1:15 p.m. in ES-143

ABSTRACT. This is joint work with Tim Clark. One of the main open problems in the theory of monomial ideals, dating back to work of Kaplansky in the 1960's, is to give an explicit description (preferably in a closed form) of the free modules and maps in the minimal free resolution of a given monomial ideal over a given field. The main difficulty here is to find a combinatorial structure producing a chain complex that has a reasonably simple description yet has enough flexibility to cover every monomial ideal. Most of the structures studied in the literature come from topology, e.g., simplicial complexes and CW-complexes. We introduce the notion of monomial ideals supported on a poset. It turns out that every monomial ideal is supported on some poset (this was the subject of a previous talk in this seminar). In fact, given the ideal, there are many nonisomorphic posets that support that ideal, and so the next step is to identify "better" posets that support the given ideal. The main result we report here is that one can always take a "homology CW poset" to support our ideal.