Monomial Relations and Supported Resolutions

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ABSTRACT: The relationships between the generators of an ideal encapsulate a great deal of information about the structure of the ideal. The study of these relations leads to the notion of a free resolution and the construction of free resolutions is an area of ongoing research.

This talk will devote time to answer basic questions about the nature of these relations and provide many examples to illustrate the idea. Our focus will be on resolutions monomial ideals and we will provide a general method of supporting resolutions on cell complexes and a combinatorial description of the first few Betti numbers.
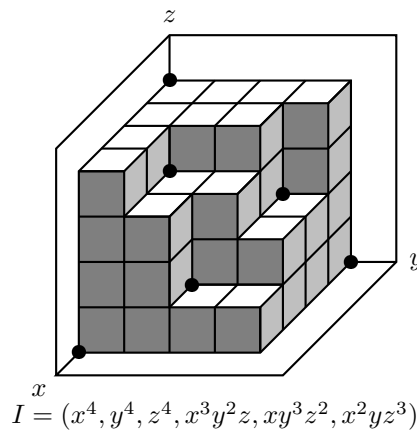
$$I = (x^4, y^4, z^4, x^3y^2z, xy^3z^2, x^2yz^3)$$

Diagram adapted from reference (2).

References:

(1) D. Bayer and B. Sturmfels. *Cellular resolutions of monomial modules.* J. reine angew. Math., 502:123-140, 1998.

(2) E. Miller and B. Sturmfels. *Combinatorial Commutative Algebra.* Springer Graduate Texts in Math, Vol. 227, 2004.

(3) R.H. Villareal. Monomial Algebras. Marcel Dekker, 2001.