

BINOMIAL COMPLETE INTERSECTIONS

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A binomial ideal in a polynomial ring is an ideal generated by binomials. Binomial ideals are quite ubiquitous in very different contexts particularly those involving toric geometry and its applications, and in the study of semigroup algebras. While binomial ideals are quite amenable to Gröbner and standard bases techniques, they also provide some of the worst-case examples in computational algebra, such as the Mayr-Meyer ideals. Thus, we are interested in algorithms that allow us to obtain information about binomial ideals purely in terms of the data defining them.

In this talk we will discuss how to determine when a binomial ideal is a zero-dimensional complete intersection and, if so, how we may compute the total number of solutions and the total multiplicity of solutions in the coordinate subspaces. These problems arise naturally in the computation of sparse discriminants and in the study of hypergeometric systems of differential equations, which we will briefly discuss.