

1135-14-2092

Mahrud Sayrafi* (mahrud@berkeley.edu) and **Michael Stillman**, Malott Hall, Mathematics Department, Cornell University, Ithaca, NY 14853. *Computations over Local Rings in Macaulay2*.

Local rings are ubiquitous in algebraic geometry and commutative algebra. Not only are they naturally meaningful in a geometric sense, but also they are extremely useful as many problems can be attacked by first reducing to the local case and taking advantage of their nice properties.

We present a software package for performing computations over localizations of polynomial rings with respect to prime ideals. The main tools and procedures here involve homological properties, such as the flatness property of localization and the existence of minimal free resolutions for finitely generated modules over local rings, which follows from Nakayama's lemma. The procedures presented here are described as pseudocodes and implemented in Macaulay2, a computer algebra software specializing in algebraic geometry and commutative algebra.

The main motivation for this work is enabling mathematicians to computationally study the local properties of algebraic varieties near irreducible components of higher dimension, such as the intersection multiplicity of higher dimensional varieties. (Received September 26, 2017)