

BASIC PROPERTIES OF STANLEY-REISNER RINGS

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I will discuss the following topics in the four lectures:

- (1) Hilbert functions of Stanley-Reisner rings.
I will discuss the h -vectors of Cohen-Macaulay (Buchsbaum, Gorenstein) Stanley-Reisner rings. Especially I will focus on Buchsbaum rings.
- (2) Minimal free resolutions of Stanley-Reisner rings.
I will discuss the minimal free resolutions of Stanley-Reisner rings. Especially I will focus on minimal free resolutions of 3-dimensional Gorenstein Stanley-Reisner rings and its combinatorial application.
- (3) Regularities of Stanley-Reisner rings.
I will discuss upper bounds of the regularities of Stanley-Reisner rings.
- (4) Arithmetical ranks of Stanley-Reisner ideals.
I will survey known results on arithmetical ranks of Stanley-Reisner ideals. I will also talk about basic techniques used in this field.

REFERENCES

- [1] W. Bruns, J. Herzog, *Cohen-Macaulay rings*, Cambridge Univ. Press, Cambridge, 1997.
- [2] T. Hibi, *Algebraic combinatorics on convex polytopes*, Carlaw Publications, Glebe, N.S.W., Australia, 1992.
- [3] E. Miller, B. Sturmfels, *Combinatorial commutative algebra*, Springer, Berlin/Heidelberg/New York, 2005.
- [4] R.P. Stanley, *Combinatorics and commutative algebra*, 2nd edition, Birkhäuser, Boston/ Basel/ Stuttgart, 1996.
- [5] J. Stuckard, W. Vogel, *Buchsbaum rings and applications: An interaction between algebra, geometry and topology*, Springer, Berlin/Heidelberg/New York, 1986.

Date: 15 Feb 2009.