

Lectures on
Convex Polytopes, Monomial Ideals and Toric Rings

by Takayuki Hibi ¹

In the current trends of commutative algebra, the role of combinatorics is distinguished and indispensable. Historically, combinatorics of the modern theory of convex polytopes created a fascinating research area in commutative algebra.

In the series of my talks, first, the historical background of how combinatorics was introduced into the world of commutative algebra in the late 1970s will be reviewed, and then, an overview of the influence of the Gröbner basis theory on the theory of convex polytopes via toric rings in the early 1990s will be surveyed. Finally, the prominent topics of monomial ideals and toric rings in the quarter century since the late 1990s will be discussed. A tentative schedule of the series of my talks is as follows:

- A quick review of convex polytopes
- Face enumeration and monomial ideals
- A short introduction to Gröbner bases
- Lattice enumeration and toric rings
- Topics on monomial ideals and toric rings

No special knowledge will be required to understand my talks.

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