Matthias Beck (San Francisco State)

Generating Functions of Rational Polyhedra and Dedekind-Carlitz Polynomials

Abstract for the Combinatorics Seminar 2007 April 10

We study higher-dimensional analogs of the *Dedekind-Carlitz polynomials*,

> $c(u,v;a,b) := \mathrm{Sum}_{k=1\,..\,a-1}\, u^{k-1}\, v^{\mathrm{floor}(kb/a)}$,

where u and v are indeterminates and a and b are positive integers. These polynomials satisfy the *reciprocity law*

> $(u-1)\, c(u,v;a,b) + (v-1)\, c(v,u;b,a) = u^{a-1}\, v^{b-1} - 1$,

from which one easily deduces many classical reciprocity theorems for the Dedekind sum and its generalizations, most notably by Hardy and Berndt-Dieter.

Dedekind-Carlitz polynomials appear naturally in generating functions of rational cones. We use this fact to give geometric proofs of the Carlitz reciprocity law. Our approach gives rise to new reciprocity theorems and a multivariate generalization of the Mordell-Pommersheim theorem on the appearance of Dedekind sums in Ehrhart polynomials of 3-dimensional lattice polytopes.

I will not assume familiarity with Dedekind sums or discrete geometry and I will carefully define all the terminology used above. The talk will be accessible to a beginning graduate student.

This is joint work with Asia Matthews.

From:
http://www2.math.binghamton.edu/ - **Department of Mathematics and Statistics, Binghamton University**

Permanent link:
http://www2.math.binghamton.edu/p/seminars/comb/abstract.200704beck

Last update: **2020/01/29 19:03**