Two enumerative tidbits

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008 Kemeny, 4:00PM
(Tea: 300 Kemeny, 3:30 pm)

Abstract

We discuss two unrelated results in enumerative combinatorics.

1. Smith normal form of a matrix related to Young diagrams. A classic result of Carlitz, Roselle, and Scoville concerns certain matrices of determinant one whose entries have a combinatorial interpretation involving Young diagrams. We discuss a generalization obtained by introducing additional parameters and computing the Smith normal form of the resulting matrix.

2. A distributive lattice associated with three-term arithmetic progressions (with Fu Liu). We prove two conjectures of Noam Elkies which arose from the New York Times Numberplay blog. These conjectures are related to the following question: given a set of eight integers, can we two-color the elements so there is no three-term monochromatic arithmetic progression? The proofs of Elkies' conjectures proceed by establishing a connection with a distributive lattice of certain semistandard Young tableaux.

This talk should be accessible to graduate students.