

From pattern avoidance to rectangular Young tableaux: two new results

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Thursday, October 17, 2013

008 Kemeny, 4:00PM

(Tea: 300 Kemeny, 3:30 pm)

Abstract

First, we discuss the enumerative consequences of a new bijection to the field of pattern avoidance. Although this mapping, Π , was originally defined in order to answer a question about shape-Wilf-equivalence, it has since unified (and simplified the proofs of) many existing results in the field. Most notable among these is a simplification for the enumeration of 2314-avoiding permutations. Previously, M. Boná showed via a complicated bijection that these permutations were enumerated by a certain algebraic generating function. We will demonstrate how this enumeration can easily be obtained via the mapping Π . Further, we establish new enumerative results using Π in the context of rook placements, perfect matchings, and set partitions.

On a very different note, we also discuss a recent proof confirming a conjecture of J. Propp and T. Roby regarding the new idea of *homomesy*. Let X be a set of combinatorial objects, G a cyclic group acting on X , and $f : X \rightarrow \mathbb{C}$. We say the triple (X, G, f) exhibits homomesy if the average value of f on any two orbits is the same. In particular, the Propp–Roby conjecture stated that rectangular Young tableaux under promotion (an operation originally defined by Shützenberger) exhibits homomesy. We will define these terms and if time permits provide two proofs of this result: the first using Fomin’s growth diagrams and the second involving *jeu de taquin*.

This talk should be accessible to graduate students.