Strange Expectations and Simultaneous Cores

Marko Thiel*[1] and Nathan Williams*[2]

[1]Institut fur Mathematik, Universitat Zurich, Zurich – Switzerland
[2]Laboratoire de combinatoire et d'Informatique mathématique [Montréal] (LaCIM) – LaCIM Pavillon Président-Kennedy 201 CP 8888, Succ. Centre-ville Montréal (Québec) H3C 3P8, Canada

Abstract

Let gcd(a, b) = 1. J. Olsson and D. Stanton proved that the maximum number of boxes in a simultaneous (a, b)-core is (a2 –1)(b2 –1) 24, and showed that this maximum is achieved by a unique core. P. Johnson combined Ehrhart theory with the polynomial method to prove D. Armstrong's conjecture that the expected number of boxes in a simultaneous (a, b)-core is (a–1)(b–1)(a+b+1) 24. We apply P. Johnson's method to compute the variance and third moment. By extending the definitions of "simultaneous cores" and "number of boxes" to affine Weyl groups, we give uniform generalizations of these formulae to simply-laced affine types. We further explain the appearance of the number 24 using the "strange formula" of H. Freudenthal and H. de Vries.

*Speaker

sciencesconf.org:fpsac2016:114365