

Toppleable permutations, acyclic orientations and excedances

Abstract

Recall that an excedance of a permutation π is any position i such that $\pi_i > i$. Inspired by the work of Hopkins, McConville and Propp (arXiv:1612.06816) on sorting using toppling, we say that permutation is toppleable if it gets sorted by a certain sequence of toppling moves. For the most part of the talk, I will focus on joint work with D. Hathcock and P. Tetali (arXiv:2010.11236) where we show that the number of toppleable permutations on n letters is the same as those for which excedances happen exactly at $1, \dots, \lfloor (n-1)/2 \rfloor$, which is also the number of acyclic orientations with unique sink of the complete bipartite graph $K_{\lfloor n/2 \rfloor, \lfloor n/2 \rfloor + 1}$. Time permitting, I will mention generalizations of these results joint with B. Bényi (arXiv:2104.13654) where we are able to completely classify permutations resulting from the toppling process and enumerate permutations toppling to them.