

Combinatorics

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Bijjective combinatorics is an area of mathematics merely concerned with proving that two finite sets have the same cardinality by constructing explicit bijections between the two sets. Such proofs can be particularly satisfying, especially when the construction is elegant, but often they also reveal many more details about the relation between the two sets than just “equinumerosity”. A famous set of problems that has resisted numerous attempts to find bijective proofs for more than 35 years now is concerned with alternating sign matrices (ASMs) and their relations to certain classes of plane partitions. Very recently, Fischer and Konvalinka have constructed first bijective proofs of some ASM results (see their two recent preprints on arXiv). The bijections are based on certain natural constructions associated with signed sets, but they are by no means simple (the technical constructions take about 20 pages; they also needed more than 2000 lines to produce a working Python code). A possible project is to extend these ideas to provide bijective proofs of other ASM results as well as to simplify the constructions.

Applications have to be sent via the Job Center of the University of Vienna at the [Reference number 10406](#). The deadline for application is **March 5, 2020**.