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Disproving things is easier when you know they are false—experimenting with two conjectures on pattern-avoiding permutations

Perhaps the most important mathematical idea that I have learnt was that “It is always easier to prove something when you know it is true.”

I have used this idea a great deal in my work; computer-aided number crunching has been a crucial part of many of my results.

Recently I was introduced the problem of counting pattern-avoiding permutations, which arises in different contexts in computer science and algebra. In the last decade or so it has been subject to a great deal of work and a number of conjectures have been made. Some of these have recently been proved, but much work remains to be done.

In this talk I will give a quick discussion of pattern-avoiding permutations before focussing on some of the experimental work I have done which led me to realise (but not prove) that two open conjectures were false. Thankfully it *is* easier to disprove something when you know it is false, and I will show you how we disproved one conjecture and (given time) some of our work towards disproving the other.