Decidability Questions for Pattern Avoidance Classes of Permutations

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ABSTRACT

I am going to present a survey type talk on pattern avoidance classes of permutations from the point of view of decidability (a.k.a. effective computability). The starting point will be the following template question: Let D be one of the usual methods for defining a pattern class, such as basis, token passing network, one of the standard constructions, or the Sub() operator. Let P be any property that a pattern class may or may not have, such as being finitely based, having a reasonable rational/algebraic/D-finite recurrence, being atomic or being partially well ordered.

Template Question: Does there exist an algorithm which as its input takes a pattern class X given by a finite D, and returns TRUE if X satisfies P, and FALSE otherwise.

Substituting different combinations of D and P in the above question yields a whole series of specific questions about pattern classes. The answers will fall into the following groups:

- trivial/easy;

- well known "classical" results from the area;

- some new results, such as those recently proved by Albert, Atkinson, Linton and Murphy and the speaker; see [1, 2, 3, 4] for more details;

- potentially interesting open problems.

The talk may include (if both the speaker and the audience are up for it) an interactive, "make your own question," section. :-)

References

[1] M.H. Albert, M.D. Atkinson, N. Ruskuc, Regular closed classes of permutations, *Theor. Comp. Sci.* **306** (2003), 85–100.

[2] M.H. Albert, M.D. Atkinson, N. Ruskuc, On permutational power of token passing networks, submitted.

[3] M.D. Atkinson, M.M. Murphy, N. Ruskuc, Partially well-ordered closed sets of permutations, *Order* **19** (2002), 101–113.

[4] M.D. Atkinson, M.M. Murphy, N. Ruskuc, Pattern avoidance classes and subpermutations, submitted.