

Problem #30

Originator: Wayne Snyder

Date: April 1991

Summary: What are the complexities of various term ordering decision problems?

What are the complexities of the various term ordering decision problems in the literature (see [Der87])? Determining if a precedence exists that makes two ground terms comparable in the recursive path ordering is NP-complete [KN85], but an inequality can be decided in $O(n^2)$, using a dynamic programming algorithm. Snyder [Sny91] has shown that the lexicographic path ordering can be done in $O(n \log n)$ in the ground case with a total precedence, but the technique doesn't extend to non-total precedences or to terms with variables.

Bibliography

- [Der87] Nachum Dershowitz. Termination of rewriting. *Journal of Symbolic Computation*, 3(1&2):69–115, February/April 1987. Corrigendum: 4, 3 (December 1987), 409–410; reprinted in *Rewriting Techniques and Applications*, J.-P. Jouannaud, ed., pp. 69–115, Academic Press, 1987.
- [KN85] M. S. Krishnamoorthy and P. Narendran. On recursive path ordering. *Theoretical Computer Science*, 40:323–328, 1985.
- [Sny91] Wayne Snyder. A note on the complexity of simplification orderings. Technical Report TR 90-009, Boston University, Boston, MA, 1991.