

Problem #10

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Summary: Has any full, finitely-generated and Church-Rosser term-rewriting system (or system with bound variables) a recursive, one-step, normalizing reduction strategy?

Let a term-rewriting system (or more generally, a system with bound variables [Klo92]) have the following properties: it is “finitely generated” (has finitely many function symbols and rules), it is “full” (its terms are all that can be formed from the function symbols), and it is Church-Rosser. Does it follow that it has a recursive, one-step, normalizing reduction strategy? (There are counterexamples if any of the three conditions is dropped.) Kennaway [Ken89] showed that for “weakly” orthogonal systems the answer is yes. So, any counterexample must come from the murky world of non-orthogonal systems. See also [AM96].

Bibliography

- [AM96] Sergio Antoy and Aart Middeldorp. A sequential reduction strategy. *Theoretical Computer Science*, 165(1):75–95, 1996.
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- [Klo92] Jan Willem Klop. Term rewriting systems. In S. Abramsky, D. M. Gabbay, and T. S. E. Maibaum, editors, *Handbook of Logic in Computer Science*, volume 2, chapter 1, pages 1–117. Oxford University Press, Oxford, 1992.