

Problem #31

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Summary: Is there a decidable uniform word problem for which there is no variant on the rewriting theme that can decide it—without adding new symbols?

Is there a decidable uniform word problem for which there is no variant on the rewriting theme (for example, rewriting modulo a congruence with a decidable matching problem, or ordered rewriting) that can decide it—without adding new symbols to the vocabulary? There are decidable theories that cannot be decided with ordinary rewriting (see, for example, [Squ87]); on the other hand, any theory with decidable word problem can be solved by ordered-rewriting with some ordered system for some conservative extension of the theory (that is, with new symbols) [DMT85], or with a two-phased version of rewriting, wherein normal forms of the first system are inputs to the second [Bau85].

Bibliography

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- [Squ87] Craig Squier. Word problems and a homological finiteness condition for monoids. *J. of Pure and Applied Algebra*, 49:201–217, 1987.