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**Markus Lohrey** and **Benjamin Steinberg\*** (bsteinbg@math.carleton.ca), School of Mathematics and Statistics, Carleton University, Ottawa, ON K1S 5B6, Canada. *The submonoid and rational subset membership problems for graph groups.*

It is shown that the membership problem in a finitely generated submonoid of a graph group (also called a right-angled Artin group or a free partially commutative group) is decidable if and only if the independence graph (commutation graph) is a transitive forest. In particular, we obtain the first example of a finitely presented group with a decidable generalized word problem that does not have a decidable membership problem for finitely generated submonoids. We also show that the rational subset membership problem is decidable for a graph group if and only if the independence graph is a transitive forest.

This answers a question of Kambites, Silva, and the speaker. (Received January 17, 2007)