

# Graph Isomorphism is PSPACE-complete

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August 30, 2007

Combining the the results of A.R. Meyer and L.J. Stockmeyer "The Equivalence Problem for Regular Expressions with Squaring Requires Exponential Space", and K.S. Booth "Isomorphism testing for graphs, semigroups, and finite automata are polynomially equivalent problems" shows that graph isomorphism is PSPACE-complete.

## 1 Proof

The equivalence problem for regular expressions was shown to be PSPACE-complete by (Meyer and Stockmeyer [2]). Booth [1] has shown that isomorphism of finite automata is equivalent to graph isomorphism. Taking these two results together with the equivalence of regular expressions, right-linear grammars, and finite automata see [3] for example, shows that graph isomorphism is PSPACE-complete.

## References

- [1] Booth, K.S. Isomorphism testing for graphs, semigroups, and finite automata are polynomially equivalent problems, SIAM J. Comput. 7, No 3, (1978), 273-279.
- [2] Hopcroft, J.E., and Ullman, J.D. (1979), Introduction to Automata Theory, Languages and Computation, Addison-Wesley, Reading, MA.
- [3] Meyer, A.R. and Stockmeyer, L.J. The Equivalence Problem for Regular Expressions with Squaring Requires Exponential Space, 13th Annual IEEE Symp. on Switching and Automata Theory, Oct., 1972,125-129.