Equational complexity of graph algebras

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A graph G can be turned into an algebra A by introducing a default element 0 and a multiplication as xy = x if x and y are adjacent in G and 0 otherwise. The finite algebra membership problem for graph algebras would ask if a finite input algebra B is in the variety generated by the graph algebra A. The equational approach to the membership problem was introduced by George McNulty as follows: for an n-element input algebra B find the minimum length of equations, depending on n, that are true in A and we have to test in B in order to decide its membership in the variety generated by A. This minimum length, or equational bound function, is determined by the graph algebra A. We attach this function to A, as the measurement of its equational complexity.

In this talk we overview some results on lower and upper bounds of the equational complexities of some graph algebras. Some interesting examples include the 4 forbidden subgraphs, as described in a characterization theorem of finitely based graph algebras by Baker, McNulty and Werner.

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