Computable Π_2^0 Scott sentences

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Abstract

Montalbán characterized when a structure has a $\Pi_{\alpha+1}^0$ Scott sentence (which defines the structure up to isomorphism among all countable structures). In earlier work with Alvir, we produced a structure with a Π_2^0 Scott sentence, but not a computable one. Here we explore the question of which structures, among those with a Π_2^0 Scott sentence, have a computable Π_2^0 Scott sentence. We have been able to identify some sufficient conditions that are not necessary, but so far, the only characterizations we have obtained that are both necessary and sufficient still involve comparisons with other countable structures. We give some very preliminary results suggesting that perhaps determining whether a structure has a computable Π_2^0 Scott sentence is actually a computationally difficult problem, and thus may not admit a simpler, internal characterization.