Abstract

Using elementary first order logic we can prove many things about models and theories, however more can be gleamed if we consider sentences with countably many conjunctions and disjunctions, yet still have the restriction of using only finitely many quantifiers. A logic with this feature is $L_{\omega_1,\omega}$. In 1965 Scott proved by construction the existence of an $L_{\omega_1,\omega}$ sentence that could describe a countable model up to isomorphism. This type of infinitary sentence is now known as a Scott sentence.
Given an infinitary cardinal κ, we wish to find a set of conditions such that if a countable model satisfies (or can be expanded to satisfy) these conditions, a Scott sentence of it will have a model of cardinality κ.