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ON THE STRUCTURE OF THE DEGREES OF RELATIVE PROVABILITY: WHY SOME FUNCTIONS ARE MORE COMPLICATED THAN OTHERS

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Gödel's famous Incompleteness Theorem states that for any axiomatization of number theory, there is a true statement about the natural numbers which cannot be proved from these axioms. We investigate how this theorem can be extended to proving the totality of computable functions: Not all total computable functions can be proved by a set of axioms to be total; and for some, totality is harder to prove than for others. We define the so-called "degrees of provability", which measure this is a precise way, and relate this to properties of functions, such as how fast a function is growing.

This is joint work with U. Andrews, M. Cai (who originally defined these degrees in his thesis), D. Diamondstone and J. Miller.

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