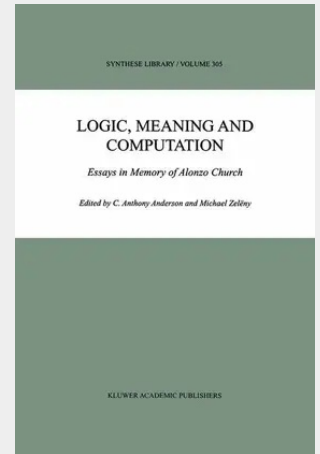


Logic, Meaning and Computation

Essays in Memory of Alonzo Church

Alonzo Church was undeniably one of the intellectual giants of the twentieth century. These articles are dedicated to his memory and illustrate the tremendous importance his ideas have had in logic, mathematics, computer science and philosophy. Discussions of some of these various contributions have appeared in *The Bulletin of Symbolic Logic*, and the interested reader is invited to seek details there. Here we just try to give some general sense of the scope, depth, and value of his work. Church is perhaps best known for the theorem, appropriately called "Church's Theorem", that there is no decision procedure for the logical validity of formulas first-order of logic. A decision procedure for that part of logic would have come near to fulfilling Leibniz's dream of a calculus that could be mechanically used to settle logical disputes. It was not to be. It could not be. What Church proved precisely is that there is no lambda-definable function that can in every case provide the right answer, 'yes' or 'no', to the question of whether or not any arbitrarily given formula is valid.

Logic, truth and number: The elementary genesis of arithmetic.- Second-order logic.- A representation of relation algebras using Routley-Meyer frames.- Church's set theory with a universal set.- Axioms of infinity in Church's type theory.- Logical objects.- The lambda calculus and adjoint functors.- Atomic Boolean algebras and classical propositional logic.- Improved decision procedures for pure relevant logic.- The "triumph" of first-order languages.- Equivalence relations and groups.- Discriminating coded lambda terms.- λ -calculus as a foundation for mathematics.- Peano's lambda calculus: The functional abstraction implicit in arithmetic.- The undecidability of λ -definability.- A construction of the provable wellorderings of the theory of species.- Semantics for first and higher order realizability.- Language and equality theory in logic programming.- Alternative (1*): A criterion of identity for intensional entities.- Nominalist paraphrase and ontological commitment.- Peace, justice and computation: Leibniz' program and the moral and political significance of Church's theorem.- Tarski's theorem and NFU.- Church's theorem and randomness.- Russellian type theory and semantical paradoxes.- The logic of sense and denotation: Extensions and applications.- Analysis, synonymy and sense.- The very possibility of language.



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