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Computability. Computable Functions, Logic, and the Foundations of Mathematics, 2nd edition, with *Computability and Undecidability - A Timeline. The story of the development of computable functions and the undecidability of arithmetic to 1970* (by Richard L. Epstein)
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REVIEW

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The book under review is based on courses on recursive function theory given by the first author for the Philosophy Department of the Victoria University of Wellington in 1975-1977. It is primarily an introduction to the theory of recursive functions and their applications to logic. The book consists of four parts. Part I has an introductory character — one finds here some considerations about paradoxes, whole numbers, functions, proofs as well as infinite collections. They provide only basic information and background of what will follow. Part I ends with some fragments of a famous and influential paper by David Hilbert, “On the Infinite” (1927).

Part II and Part III form the main part of the book. Part II is devoted to the theory of recursive functions. The following subjects are considered there: computability (in general), Turing machines, Church’s thesis, primitive recursive functions, the Grzegorczyk hierarchy, multiple recursion, the least search operator, partial recursive functions, numbering the partial recursive functions, listability and the problem: Turing machine computable vs. partial recursiveness.

Part III deals with applications of the theory of recursive functions to logic and the foundations of mathematics. It begins with an introduction to propositional logic. An overview of first-order logic and Gödel’s theorems are also given. Next the system of first-order arithmetic is described in detail. In later sections one finds considerations of: functions representable in formal arithmetic, the undecidability of arithmetic and the unprovability of consistency.