1. Record Nr. UNINA9910461496003321

Autore	Schwichtenberg Helmut <1942->
Titolo	Proofs and computations / / Helmut Schwichtenberg, Stanley S. Wainer [[electronic resource]]
Pubbl/distr/stampa	Cambridge : , : Cambridge University Press, , 2012
ISBN	1-107-22428-4 1-280-48485-3 1-139-22192-2 9786613579836 1-139-21710-0 1-139-21403-9 1-139-22363-1 1-139-22020-9 1-139-03190-2
Descrizione fisica	1 online resource (xiii, 465 pages) : digital, PDF file(s)
Collana	Perspectives in logic
Disciplina	511.352
Soggetti	Computable functions Proof theory
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Title from publisher's bibliographic system (viewed on 05 Oct 2015).
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1.4. Soundness and completeness of the classical fragment1.4.1. Models.; 1.4.2. Soundness of classical logic.; 1.4.3. Completeness of classical logic.; 1.4.4. Compactness and Lowenheim-Skolem theorems.; 1.5. Tait calculus; 1.6. Notes; Chapter 2: RECURSION THEORY; 2.1. Register machines; 2.1.1. Programs.; 2.1.2. Program constructs.; 2.1.3. Register machine computable functions.; 2.2. Elementary functions; 2.2.1. Definition and simple properties.; 2.2.2. Elementary relations.; 2.2.3. The class .; 2.2.4. Closure properties of .; 2.2.5. Coding finite lists.; 2.3. Kleene's normal form theorem 2.3.1. Program numbers.2.3.2. Normal form.; 2.3.3. o1-definable relations and -recursive functions.; 2.3.4. Computable functions.; 2.3.5. Undecidability of the halting problem.; 2.4. Recursive definitions; 2.4.1. Least fixed points of recursive definitions.; 2.4.2. The principles of finite support and monotonicity, and the effective index property.;

2.4.3. Recursion theorem.; 2.4.4. Recursive programs and partial recursive functions.; 2.4.5. Relativized recursion.; 2.5. Primitive recursion and for-loops; 2.5.1. Primitive recursive functions.; 2.5.2. Loop-programs.
2.5.3. Reduction to primitive recursion.2.5.4. A complexity hierarchy for Prim.; 2.6. The arithmetical hierarchy; 2.6.1. Kleene's second recursion theorem.; 2.6.2. Characterization of 01-definable and recursive relations.; 2.6.3. Arithmetical relations.; 2.6.4. Closure properties.; 2.6.6. 0r-complete relations.; 2.7. The analytical hierarchy; 2.7.1. Analytical relations.; 2.7.2. Closure properties.; 2.7.3. Universal 1r+1-definable relations.; 2.7.4. 1r-complete relations.; 2.8. Recursive type-2 functionals and well-foundedness; 2.8.1. Computation trees.; 2.8.2. Ordinal assignments
recursive ordinals.

Sommario/riassunto

Driven by the question, 'What is the computational content of a (formal) proof?', this book studies fundamental interactions between proof theory and computability. It provides a unique self-contained text for advanced students and researchers in mathematical logic and computer science. Part I covers basic proof theory, computability and Godel's theorems. Part II studies and classifies provable recursion in classical systems, from fragments of Peano arithmetic up to 11-CA0. Ordinal analysis and the (Schwichtenberg-Wainer) subrecursive hierarchies play a central role and are used in proving the 'modified finite Ramsey' and 'extended Kruskal' independence results for PA and 11-CA0. Part III develops the theoretical underpinnings of the first author's proof assistant MINLOG. Three chapters cover higher-type computability via information systems, a constructive theory TCF of computable functionals, realizability, Dialectica interpretation, computationally significant quantifiers and connectives and polytime complexity in a two-sorted, higher-type arithmetic with linear logic.