

1. Record Nr.	UNINA9910784595103321
Autore	Sørensen Morten Heine
Titolo	Lectures on the Curry-Howard isomorphism [[electronic resource] /] / Morten Heine Sørensen, Pawe Urzyczyn
Pubbl/distr/stampa	Amsterdam ; ; Boston [MA], : Elsevier, 2006
ISBN	1-281-05105-5 9786611051051 0-08-047892-1
Edizione	[1st ed.]
Descrizione fisica	1 online resource (457 p.)
Collana	Studies in logic and the foundations of mathematics, , 0049-237X ; ; v. 149
Altri autori (Persone)	UrzyczynPawe
Disciplina	511.3/26
Soggetti	Curry-Howard isomorphism Lambda calculus Proof theory
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references (p. 403-430) and index.
Nota di contenuto	Cover; Title Page; Copyright Page; Table of Contents; Chapter 1 Type-free Lambda-calculus; 1.1 A gentle introduction; 1.2 Pre-terms and Lambda-terms; 1.3 Reduction; 1.4 The Church-Rosser theorem; 1.5 Leftmost reductions are normalizing; 1.6 Perpetual reductions and the conservation theorem; 1.7 Expressibility and undecidability; 1.8 Notes; 1.9 Exercises; Chapter 2 Intuitionistic logic; 2.1 The BHK interpretation; 2.2 Natural deduction; 2.3 Algebraic semantics of classical logic; 2.4 Heyting algebras; 2.5 Kripke semantics; 2.6 The implicational fragment; 2.7 Notes; 2.8 Exercises Chapter 3 Simply typed Lambda-calculus 3.1 Simply typed Lambda-calculus a la Curry; 3.2 Type reconstruction algorithm; 3.3 Simply typed Lambda-calculus a la Church; 3.4 Church versus Curry typing; 3.5 Normalization; 3.6 Church-Rosser property; 3.7 Expressibility; 3.8 Notes; 3.9 Exercises; Chapter 4 The Curry-Howard isomorphism; 4.1 Proofs and terms; 4.2 Type inhabitation; 4.3 Not an exact isomorphism; 4.4 Proof normalization; 4.5 Sums and products; 4.6 Prover-skeptic dialogues; 4.7 Prover-skeptic dialogues with absurdity; 4.8 Notes; 4.9 Exercises; Chapter 5 Proofs as combinators

5.1 Hubert style proofs; 5.2 Combinatory logic; 5.3 Typed combinators; 5.4 Combinators versus lambda terms; 5.5 Extensionality; 5.6 Relevance and linearity; 5.7 Notes; 5.8 Exercises; Chapter 6 Classical logic and control operators; 6.1 Classical propositional logic; 6.2 The Lambda mu-calculus; 6.3 Subject reduction, confluence, strong normalization; 6.4 Logical embedding and CPS translation; 6.5 Classical prover-skeptic dialogues; 6.6 The pure implicational fragment; 6.7 Conjunction and disjunction; 6.8 Notes; 6.9 Exercises; Chapter 7 Sequent calculus; 7.1 Gentzen's sequent calculus LK; 7.2 Fragments of LK versus natural deduction; 7.3 Gentzen's Hauptsatz; 7.4 Cut elimination versus normalization; 7.5 Lorenzen dialogues; 7.6 Notes; 7.7 Exercises; Chapter 8 First-order logic; 8.1 Syntax of first-order logic; 8.2 Informal semantics; 8.3 Proof systems; 8.4 Classical semantics; 8.5 Algebraic semantics of intuitionistic logic; 8.6 Kripke semantics; 8.7 Lambda-calculus; 8.8 Undecidability; 8.9 Notes; 8.10 Exercises; Chapter 9 First-order arithmetic; 9.1 The language of arithmetic; 9.2 Peano Arithmetic; 9.3 Gödel's theorems; 9.4 Representable and provably recursive functions; 9.5 Heyting Arithmetic; 9.6 Kleene's realizability interpretation; 9.7 Notes; 9.8 Exercises; Chapter 10 Gödel's system T; 10.1 From Heyting Arithmetic to system T; 10.2 Syntax; 10.3 Strong normalization; 10.4 Modified realizability; 10.5 Notes; 10.6 Exercises; Chapter 11 Second-order logic and polymorphism; 11.1 Propositional second-order logic; 11.2 Polymorphic lambda-calculus (system F); 11.3 Expressive power; 11.4 Gödel-style polymorphism; 11.5 Strong normalization; 11.6 The inhabitation problem; 11.7 Higher-order polymorphism; 11.8 Notes; 11.9 Exercises; Chapter 12 Second-order arithmetic

Sommario/riassunto

The Curry-Howard isomorphism states an amazing correspondence between systems of formal logic as encountered in proof theory and computational calculi as found in type theory. For instance, minimal propositional logic corresponds to simply typed lambda-calculus, first-order logic corresponds to dependent types, second-order logic corresponds to polymorphic types, sequent calculus is related to explicit substitution, etc. The isomorphism has many aspects, even at the syntactic level: formulas correspond to types, proofs correspond to terms, provability corresponds to inhabitation,
