

IAoo8: Computational Logic

Introduction

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Why Logic?

Logics are formal languages to make statements about mathematical objects.

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Logics are formal languages to make statements about mathematical objects.

They are used everywhere in computer science:

- ▶ databases (SQL)
- ▶ regular expressions
- ▶ software verification, hardware verification
- ▶ controller synthesis
- ▶ type systems
- ▶ SAT-solvers (optimisation)
- ▶ theorem provers

Course organisation

Lectures

- ▶ **Friday, 10:00, D2**
- ▶ language: English
- ▶ slides and a video recording will be available on IS

Exercise classes

- ▶ exercises done by students
- ▶ come prepared

Examination

- ▶ final written exam
- ▶ in English
- ▶ **k** and **z** completion possible

Prerequisites

- ▶ basic knowledge of logic
- ▶ propositional and first-order logic
- ▶ formula, model, satisfaction relation, entailment relation
- ▶ syntactic normal forms

Topics covered

- ▶ resolution method for propositional logic
- ▶ resolution method for first-order logic
- ▶ Prolog
- ▶ proof calculi (natural deduction and tableaux) for first-order logic
- ▶ modal logic
- ▶ induction
- ▶ many-valued logic