IA008: 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

Basic logic problems

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Model Checking

Given a model $\mathfrak{M}$ and a formula φ, check whether $\mathfrak{M} \vDash \varphi$.

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Satisfiability

Given a formula φ, check whether there is some model $\mathfrak{M}$ with $\mathfrak{M} \vDash \varphi$.

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