

Computational Logic

Luboš Popelínský
popel@fi.muni.cz

<http://www.fi.muni.cz/~popel/> → Courses → Computational Logic

Exercises: Eva Mráková and Jana Fábriková

Table of Contents

see the web page

Organization of the course

- home work
- exercises
- questionnaires
- extra points
- intrasemestral exam
- final exam

Logic

- investigates (some aspects of) correct reasoning
- sentence: the conclusion follows from the premises
 $A_1, A_2, \dots, A_n \Rightarrow$ (implies) B
- only the form of a sentence is important, not its meaning
- **logic = a science investigating the relation of consequence**

Logic (cont.)

- modelling human reasoning
- a tool for building theories (e.g. the group theory)
- computational logic
 - automatic theorem proving
 - programming in logic, Prolog
 - deductive databases
 - inductive reasoning
 - abduction, non-monotonic reasoning
 - knowledge representation, knowledge-based systems

Propositional and predicate logic

- propositional

if weather is good and Barbie has no classes, then she will go to play tennis

$$p \wedge \neg q \Rightarrow r$$

- predicate

- first-order

It is not true that every human being is happy

$$\neg \forall x : (\text{human}(x) \Rightarrow \text{happy}(x))$$

- modal

It is possible that if weather is good Barbie will go to play tennis

$$\diamond(p \Rightarrow r)$$

- second-order

There is a feature that is common for all human beings

$$\exists P \forall x : (\text{human}(x) \Rightarrow P(x))$$