

# Computational Logic

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## **Organization of the course**

- home work
- exercises
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- questionnaires
- extra points
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## 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 Jonathan will go to play tennis*

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

- multivalued, fuzzy
- and more?
- second-order

*There is a feature that is common for all human beings*

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