Exercise Sheet WS 13/14 Wirtschaftsinformatik und Maschinelles Lernen (ISMLL) Ruth Janning, M.Sc., Carlotta Schatten M.Eng.

## Exercise Sheet 8

Submission: Monday, 13.01.2014, 23:00

## Exercise 1 Propositional Logic (8 Points)

a) Use the Davis-Putnam algorithm to check from  $\begin{array}{l} ((K \wedge \neg P) \Rightarrow M) \wedge (W) \wedge ((\neg Q \wedge K) \Rightarrow \neg P) \wedge (W \Rightarrow K) \wedge (\neg Q) \\ \text{if} \\ (M \wedge \neg P) \\ \text{Explain all steps.} \end{array}$ (8 Points)

## Exercise 2 First-Order Logic (12 Points)

- a) Translate the following natural language sentences in First-Order Logic using the common boolean operators of relations, functions, variables and quantifiers. Explain the used relations and functions.
  - Students, that party a lot, have worse results but more fun
  - There are odd numbers and even numbers
  - Some numbers are also prime numbers
  - Plants with blossoms are flowers or fruit trees.

Translate in natural language the following First-Order Logic sentences:

- $\exists x \forall y \ loves(y, x)$
- ∀y∃x loves(x, y)
  (x, y: Variables, liebt(x, y): Relation with meaning "x loves y")

(6 Points)

b) Find and explain three differences between Propositional and First-Order Logic. (6 Points)