Assignment sheet 3

# Künstliche Intelligenz

Benzmüller & Schommer Summer 2019

**Exercise 6: Truth Tables**

Use a truth table to prove that $\neg p$ is a logical consequence of the set $\{q \vee r, q \Rightarrow \neg p, \neg(r \wedge p)\}$.

**Exercise 7: SLD**

Give SLD-resolution refutations for the following sets of clauses:

- $\{P_1\}, \{P_2\}, \{P_3\}, \{P_4\}, \{\neg P_1, \neg P_2, P_6\}, \{\neg P_3, \neg P_4, P_7\}, \{\neg P_6, \neg P_7, P_8\}, \{\neg P_8\}$
- $\{\neg P_2, P_3\}, \{\neg P_3, P_4\}, \{\neg P_4, P_5\}, \{P_3\}, \{P_1\}, \{P_2\}, \{\neg P_1\}, \{\neg P_3, P_6\}, \{\neg P_3, P_7\}, \{\neg P_3, P_8\}$

**Exercise 8: DPLL I:**

Are the following formulas satisfiable? Use the DPLL procedure:

(a) $(\neg a \vee b) \wedge (\neg c \vee d) \wedge (\neg e \vee \neg f) \wedge (f \vee \neg e \vee \neg b)$

(b) $(p \vee q \vee r \vee s) \wedge (\neg p \vee q \vee \neg r) \wedge (\neg q \vee \neg r \vee s) \wedge (p \vee \neg q \vee r \vee s) \wedge (q \vee \neg r \vee \neg s) \wedge (\neg p \vee \neg r \vee s) \wedge (\neg p \vee \neg s) \wedge (p \vee \neg q)$

**Exercise 9: DPLL II:** Can you present a formula that well illustrates the worst case complexity of DPLL?

**Exercise 10: Pythagoreans Triple Problem:** Find out and explain how the pythagoreans triple problem was represented in SAT by Heule and colleagues.