

**Exercise for the lecture Modeling Methods in Computer Science,
Winter Semester 2007/08**

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Consultation-hour: Thursday, 15:00-16:00

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Exercise Sheet 2Due date: **31.10.2007, 14:00 Uhr**

Exercise 3: Semantic Equivalence

Given a set of atomic statements \mathcal{A} and the set of all boolean expressions $T_{\mathcal{A}}$ that can be formed out of \mathcal{A} , demonstrate that the following statements are true for every boolean expression T out of $T_{\mathcal{A}}$:

(a) $T \wedge \neg T \equiv 0$

(b) $T \vee \neg T \equiv 1$

(c) $0 \wedge T \equiv 0$

(d) $1 \wedge T \equiv T$

12 Points

Exercise 4: Syntactic and Semantic Level

Given a set of atomic statements $\mathcal{A} = \{A, B, C\}$ and the following boolean expressions:

- $T_1 := (A \wedge B) \rightarrow C$
- $T_2 := (A \rightarrow B) \rightarrow (A \rightarrow C)$

Demonstrate the semantic equivalence of T_1 and T_2 over \mathcal{A}

- on the syntactic level (by conversion, equivalent to the examples in the script with explanations for each step),
- on the semantic level (using truth tables).

Hint:

In addition to the semantic equivalence according to the script you can use the type of equivalence as used in Exercise 3 and the equivalences $1 \vee T \equiv 1$ and $0 \vee T \equiv T$.

8 Points