



Reasoning and Formal Modelling for Forensic Science  
2010/2011; 2nd Semester  
Prof. Dr. Benedikt Löwe

*Werkcollege Exercises # 2*

Please start thinking about these exercises before the next *werkcollege* on Tuesday, 15 February, 11am, room A1.04. The exercises will be discussed in class with active student participation: you will get some extra time to think about them, and then present the solutions in front of the class.

**Exercise 5.**

Check whether the following formulas are valid:

- $\neg(\neg p \vee \neg q) \rightarrow q$ ,
- $((p \wedge q) \rightarrow r) \rightarrow (((q \rightarrow p) \wedge q) \rightarrow r)$ ,
- $(p \wedge q) \leftrightarrow \neg(p \vee \neg q)$ ,
- $\neg\neg(p \wedge q) \leftrightarrow \neg(\neg p \wedge \neg q)$ .

**Exercise 6.**

Consider the binary connective given by the truth table

	T	F
T	F	T
F	T	T

It is sometimes called “NAND”. Can you explain why? There is a formally provable result behind this explanation. State it and prove it.

**Exercise 7.**

In the lecture, we have always worked with only two truth values: true and false. Suppose for a moment that we allow three truth values: true, undecided and false. How many truth-functional binary connectives with three truth values exist? (Compare Exercise 1.) Come up with reasonable truth tables for conjunction (“and”) and disjunction (“or”) in this setting.