

Logic 1, WS 2014. Homework 2, given Oct 16, due Nov 23

1. Prove that for any propositional formulae $\varphi_1, \varphi_2, \dots, \varphi_n, \psi$, if $(\varphi_1 \wedge \varphi_2 \wedge \dots \wedge \varphi_n) \Rightarrow \psi$ is valid, then $\varphi_1, \varphi_2, \dots, \varphi_n \models \psi$.

(See the style used in the lecture for proving the opposite implication.)

2. Define the meta-function $V[\varphi]$ which gives set of propositional variables of the propositional formula φ . Prove that the cardinality of $V[\varphi]$ is smaller or equal $L[\varphi]$ (the length).

Hint: use the induction principle suggested by the definition of propositional logic formulae.

3. Write the tables of the boolean functions corresponding to disjunction and equivalence.

4. Prove $P, \neg Q \Rightarrow \neg P \models Q$ by constructing the truth table of the associated implication.