Automated Theorem Proving, SS 2016. Homework 4 (due April 27, 2016)

1. [noitemsep,nolistsep]

(1a) Prove that $\varphi_1, ..., \varphi_n \models \psi$ iff $\varphi_1 \wedge ... \wedge \varphi_n \Rightarrow \psi$ valid.

(1b) Prove that $\varphi_1, ..., \varphi_n \models \psi$ iff $\varphi_1 \wedge ... \wedge \varphi_n \wedge \neg\psi$ inconsistent.

2. Write all the inference rules for the propositional calculus.

   (*Hint:* you have to write the inference rules for the sequent calculus having the logical connectives $\neg$, $\wedge$, $\vee$, $\Rightarrow$, $\Leftrightarrow$ in the goal and assumption).

3. Find the sequent rules for:

   - implied goal: $\frac{???}{\Phi, \varphi \Rightarrow \phi \vdash \phi, \Phi}$
   - subsumption: $\frac{???}{\Phi, \varphi_1, \varphi_1 \vee \varphi_2 \vdash \Phi}$