

Proof Theory and Automated Theorem Proving
2013
Exercises
Week 1

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Natural deduction

Prove the following formulas using natural deduction:

1. $(\varphi \wedge \psi \rightarrow \sigma) \rightarrow (\varphi \rightarrow (\psi \rightarrow \sigma))$
2. $(\psi \rightarrow (\varphi \rightarrow \sigma)) \rightarrow (\varphi \wedge \psi \rightarrow \sigma)$
3. $(\varphi \rightarrow \psi) \rightarrow (\varphi \wedge \chi \rightarrow \psi)$
4. $(\varphi \rightarrow (\psi \rightarrow \chi)) \rightarrow ((\varphi \rightarrow \psi) \rightarrow (\varphi \rightarrow \chi))$ this is the tautology corresponding to the K operator in combinatorial logic.
5. $\varphi \rightarrow (\psi \rightarrow \varphi \wedge \psi)$