

Formale Systeme Proseminar

Tasks for Week 7

Task 1 Show with derivations that the following formula is a tautology

$$((P \Rightarrow Q) \Rightarrow P) \Rightarrow ((P \Rightarrow Q) \Rightarrow Q)$$

Task 2 For each of the line numbers of your solution to Task 4, say where the proposition which occurs on that line is valid (i.e. allowed to be used).

Task 3 Show with derivations that the following formula is a tautology

$$\neg(P \Rightarrow Q) \Rightarrow \neg Q$$

Task 4 Give logical derivation of the following tautology

$$(P \wedge \neg Q) \Rightarrow \neg(P \Rightarrow Q)$$

Task 5 Give logical derivation of the following tautology

$$(\neg P \Rightarrow P) \Rightarrow P$$

Task 6 Give logical derivation of the following tautology.

$$((P \Rightarrow Q) \Rightarrow \neg P) \Rightarrow (P \Rightarrow \neg Q)$$

Task 7 Give logical derivation of the following tautology.

$$(P \wedge (Q \Rightarrow R)) \Rightarrow ((P \Rightarrow Q) \Rightarrow (P \wedge R))$$