

Solved exercises must be marked and solutions (as a single PDF file) uploaded in [OLAT](#). The (strict) deadline is 7 am on March 7.

Exercises

- (1) 1. Master the Greek alphabet.
- (3) 2. For each of the propositional formulas
$$\varphi = \neg(p \rightarrow \neg(q \rightarrow r \vee \neg p))$$
$$\psi = ((q \rightarrow (\perp \rightarrow p)) \rightarrow q) \rightarrow \top \rightarrow p$$
 - (a) draw the parse tree and list all subformulas,
 - (b) compute the truth table,
 - (c) determine satisfiability and validity.
- (2) 3. Determine which of the following semantic entailments are true.
 - (a) $(p \rightarrow q) \rightarrow p, \neg(q \wedge p) \models \neg(\neg p \rightarrow q)$
 - (b) $\neg p \wedge \neg\neg(\neg p \rightarrow \top) \models \perp$
- (2) 4. Transform the following propositional formulas into conjunctive normal form.
 - (a) $p \vee ((q \vee \neg r) \wedge (p \vee (q \wedge r)))$
 - (b) $\neg(p \rightarrow (q \wedge (\neg p \rightarrow q)))$
- (2) 5. A *disjunctive normal form* (DNF) is a disjunction of conjunctions of literals.
 - (a) Explain how a truth table can be used to obtain an equivalent DNF and illustrate your procedure on the truth tables obtained in Exercise 2(b).
 - (b) Show that the satisfiability of DNFs is efficiently decidable.