

Exercises for “Decision Procedures for Verification” Exercise sheet 1

Exercise 1.1: (5 P)

Determine which of the following formulas are valid/satisfiable/unsatisfiable:

- (1) $(P \wedge Q) \rightarrow (P \vee Q)$
- (2) $(P \vee Q) \rightarrow (P \wedge Q)$
- (3) $\neg(P \wedge \neg\neg P)$
- (4) $Q \rightarrow \neg Q$
- (5) $Q \wedge \neg Q$
- (6) $\neg(\neg P \vee \neg\neg P)$
- (7) $((P \rightarrow Q) \wedge (\neg P \rightarrow R)) \rightarrow (Q \vee R)$

Exercise 1.2: (5 P)

Prove:

- If F_1, \dots, F_n are propositional formulae then $\bigwedge_{i=1}^n F_i \rightarrow G$ is valid iff every valuation which is a model of all the formulae F_1, F_2, \dots, F_n is also a model of G .
- If F_1, \dots, F_n are propositional formulae then $\bigwedge_{i=1}^n F_i \rightarrow G$ is valid iff $\bigwedge_{i=1}^n F_i \wedge \neg G$ is unsatisfiable.

Please submit your solution until Friday, October 21, 2011 at 17:00. Joint solutions prepared by up to two persons are allowed. Please do not forget to write your name on your solution.

Submission possibilities:

- By e-mail to sofronie@uni-koblenz.de with the keyword “Homework DP” in the subject.
- Put it in the box in front of Room B 225 (if you prefer to submit the written exercise like this please tell me such that I can prepare such a box).