IN3070
IN4070

Autumn 2023

Exercises for the Course

Logic

Obligatory Exercises 2

Deadline: 18 October 2023, 23:59

Exercise O2.1 **(Validity and Proof Calculi)**

Consider the following formulae.

F_1: $((p \to q) \land (q \to r)) \to (p \to r)$ ("Transitivity")

F_2: $\forall x\, \exists y\, (\, p(x) \land (p(y) \to q(x))\,) \to \forall z\, q(z)$ ("A modus ponens")

Prove the validity of formulae F_1 and F_2 in the *resolution calculus*. First, translate the negated formula into clausal form.

Exercise O2.2 **(Adding a Logical Operator)**

The logical operator $\uparrow$ is defined as follows: $A \uparrow B \;\equiv\; \neg(A \land B)\,.$

Resolution works on formulae in clause form. For a resolution-based theorem proving programme to work with full 1st-order or propositional formulae, these are tramsformed to clause form before starting resolution. What would have to be changed in such a theorem prover to make it accept formulae with a $\uparrow$ operator?