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Tutorials for “Automated Reasoning II”
Exercise sheet 4

Exercise 4.1:

Let $\Sigma = (\Omega, \emptyset)$ be a signature without predicate symbols (except built-in equality). For two Σ -algebras \mathcal{A} and \mathcal{B} , we define the product $\mathcal{A} \times \mathcal{B}$ as the Σ -algebra whose universe is the cartesian product of the universes of \mathcal{A} and \mathcal{B} , and where $f_{\mathcal{A} \times \mathcal{B}}((a_1, b_1), \dots, (a_n, b_n)) = (f_{\mathcal{A}}(a_1, \dots, a_n), f_{\mathcal{B}}(b_1, \dots, b_n))$.

A Σ -theory \mathcal{T} is called closed under products, if the product of any two models of \mathcal{T} is again a model of \mathcal{T} .

Prove: If \mathcal{T} is closed under products, then it is convex.

Exercise 4.2:

Prove: If the axioms of the Σ -theory \mathcal{T} are universally quantified equational Horn clauses (that is, clauses where all atoms are equations and at most one of the literals is positive), then \mathcal{T} is convex. (You may use the previous exercise.)

Bring your solution (or solution attempt) to the tutorial on June 2.