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Tutorials for "Automated Reasoning II"
Exercise sheet 13

Exercise 13.1: (P)
Refute the following clause set, not yet abstracted, via SUP(T) where $\mathcal{T}^B = $ LRA and b is a constant (parameter) of $\mathcal{T}^B$.

$$
\begin{array}{ll}
1 & f(b) \approx b \\
2 & x > 1 \lor f(x) \not\approx x \\
3 & x \leq 1 \lor h(f(x)) \approx x \\
4 & h(x) \not\approx x
\end{array}
$$

Exercise 13.2: (P)
Assume a sufficiently complete hierarchic specification with respect to a term-generated background theory $\mathcal{T}^B$. Prove that compactness of $\mathcal{T}^B$ is not needed for completeness if SUP(T) terminates: if $\Rightarrow_{\text{SUPT}}$ terminates on N then SUP(T) is refutationally complete on N.

Exercise 13.3: (P)
Consider the following ground clause set, not yet abstracted, where $\mathcal{T}^B = $ LRA and a is a constant of the foreground theory.

$$
\begin{array}{ll}
1 & f(a) \geq 0 \\
2 & f(a) < 0
\end{array}
$$

1. Show that the clause set is not sufficiently complete.

2. Extend the clause set in a satisfiability preserving way, such that it becomes sufficiently complete and derive $\bot$ via $\Rightarrow_{\text{SUPT}}$.