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Tutorials for "Decision Procedures SS19"
Exercise sheet 4

Exercise 4.1:
Construct $N_{\mathcal{I}}$ for the ground clause set

$$N = \{f(a) \approx b \vee f(b) \approx a,\ f(f(b)) \approx a,\ f(f(b)) \not\approx a \vee a \approx b\}$$

with respect to a KBO where all function symbols have weight one and $f \succ b \succ a$ and nothing is selected. Find the minimal false clause, perform the respective superposition inference and recompute the partial model with respect to the extended clause set.

Exercise 4.2:
Use superposition to show that the following set of (implicitly universally quantified) clauses is not satisfiable:

$$f(a, x) \approx x$$
$$x \approx a \vee x \approx g(a)$$
$$x \not\approx g(x)$$
$$f(a, g(a)) \approx g(b)$$
$$b \not\approx a$$

Use the LPO with precedence $f > g > a > b$. Compute only inferences that are required according to the ordering restrictions of the superposition calculus.

Exercise 4.3:
Prove that superposition Factoring without equality is an instance of Equality Factoring with respect to the translation of literals to equations and the elimination of redundant literals.