



Christoph Weidenbach

January 13, 2021

Tutorials for “Automated Reasoning WS20/21”
Exercise sheet 8

Exercise 8.1:

Refute the following set N of clauses

- | | |
|--|---------------------------------------|
| (1) $P(a, b) \vee P(b, a)$ | (2) $\neg P(a, b) \vee P(f(b, b), b)$ |
| (3) $\neg P(b, a) \vee Q(g(a))$ | (4) $\neg Q(g(a)) \vee P(f(b, b), b)$ |
| (5) $\neg P(f(b, b), b) \vee \neg P(f(b, b), b)$ | |

both using KBO and LPO with ground superposition by only applying the inference rules Superposition Left and Factoring:

1. using KBO where all variables and signature symbols have weight 1 and $Q \succ P \succ f \succ g \succ b \succ a$,
2. using LPO with precedence $Q \succ P \succ f \succ g \succ b \succ a$.

Exercise 8.2:

Consider again the above clause set from Exercise 8.1. This time compute the model $N_{\mathcal{I}}$ both for KBO and LPO:

1. using KBO where all variables and signature symbols have weight 1 and $Q \succ P \succ f \succ g \succ b \succ a$. Compute $N_{\mathcal{I}}$, determine the minimal false clause, perform the respective ground superposition inference, add the result to N yielding N' and compute again $N'_{\mathcal{I}}$,
2. using LPO with precedence $Q \succ P \succ f \succ g \succ b \succ a$. Compute $N_{\mathcal{I}}$, determine the minimal false clause, perform the respective ground superposition inference, add the result to N yielding N' and compute again $N'_{\mathcal{I}}$.

Exercise* 8.3:

Prove that any set of ground clauses can be finitely saturated by ground superposition.

It is not encouraged to prepare joint solutions, because we do not support joint exams.