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Tutorials for "Automated Reasoning"
Exercise sheet 10

Exercise 10.1: (*2+2+2 P*)
Compute an mgu for the following unification problems using both $\Rightarrow_{\mathrm{SU}}$ and $\Rightarrow_{\mathrm{PU}}$ where x, y ,z and their primed versions are all variables:

1. $\{f(x, h(x, y) = f(f(y, z), h(y, z'))\}$
2. $\{h(x, y) = z, g(f(x, x)) = z', g(g(f(a, y))) = g(z')\}$
3. $\{h(x, y) = h(x', y'), y' = f(x, a), f(g(a), z) = y\}$

Exercise 10.2: (*3 P*)
Prove the following statements or provide a counter example:

1. if $\Rightarrow_{\mathrm{SU}}$ computes an mgu it is idempotent.
2. if $|s| > |t|$ then there is no substitution σ with $s\sigma = t$.
3. if $|\operatorname{vars}(s)| > |\operatorname{vars}(t)|$ then there is no substitution σ with $t\sigma = s$.

Exercise 10.3: (*3 P*)
Prove: if σ_1, σ_2 are two mgus for two terms s, t, then they are identical up to variable renaming.

Exercise 10.4: (*3 P*)
Prove that $\Rightarrow_{\mathrm{PU}}$ terminates.

Submit your solution in lecture hall E1.3, Room 002 during the lecture on January 20. Please write your name and the date of your tutorial group (Mon, Thu) on your solution.

Joint solutions are not permitted, please submit individually. However, I encourage you working and solving the exercises in a group.