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Tutorials for "Automated Reasoning"
Exercise sheet 7

Exercise 7.1: (*7 P*)
Consider the following puzzle:

> Wolves, foxes, birds, caterpillars, and snails are animals, and there is a wolve lupo, a fox fix, a bird tweety, a caterpillar raupi and a snail berni. All these animals are not produced from nothing, so they all have ancestors, in particular fathers that are animals of the same type. Also there is a grain called korni, and all grains are plants. Every animal either likes to eat all plants or it likes to eat the fathers of all animals much smaller than itself that like to eat some plants. Caterpillars and snails are much smaller than birds, which are much smaller than foxes, which in turn are much smaller than wolves. Wolves do not like to eat foxes or grains, while birds like to eat caterpillars, but not snails. Caterpillars and snails like to eat some plants.
>
> Therefore, there is an animal that likes to eat a grain-eating animal. Who eats whom?

Formalize this puzzle by paperwork using the predicates

$W(x)$	x is a wolve	$F(x)$	x is a fox
$C(x)$	x is a caterpillar	$S(x)$	x is a snail
$G(x)$	x is a grain	$P(x)$	x is a plant
$A(x)$	x is an animal		
$E(x,y)$	x likes to eat y		
$M(x,y)$	x is much smaller than y		

and the constants *lupo*, *fix*, *tweety*, *raupi*, *berni*, *korni* and the function f for father. Once you have done that, write the corresponding input file for SPASS and try to answer the question.

If you formalize correctly, SPASS will find a proof, calling SPASS with option `-DocProof` will print the proof and by inspection of the proof you will find the answer.

Provide paperwork and final answer by paper, but the SPASS input file as well as the proof output electronically to your tutor.

Exercise 7.2: (*3 P*)
Provide a closed, strict AMGU-Tableau for the clause set from Exercise 6.3.

Challenge Problem: (*good grade*)
Prepare well for the exam.

Submit your solution in lecture hall 003 during the lecture on June 19. Please write your name and the date of your tutorial group (Mon, Thu, Fri) on your solution.

Note: Joint solutions, prepared by up to three persons together, are allowed (but not encouraged). If you prepare your solution jointly, submit it only once and indicate all authors on the sheet.