Foundations of Logic Programming
Tutorial 1 (on October 25th)

Lukas Schweizer

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Exercise 1.1:
Define in Prolog a predicate for multiplication. (You may want to use the predicate *add* defined on Slide 10, Lecture 1.) Give the output for the following queries:

- ?-mul(s(s(0)),s(s(s(0))),Z).
- ?-mul(s(s(0)),s(s(0)),s(s(s(s(0))))).

Exercise 1.2:
Now use your definition from Exercise 1.2 to define the factorial function.

- Example: ? - fact(s(s(s(0))), F) has the result F = s(s(s(s(s(0))))).

Exercise 1.3:
Define a predicate palindrome(L) which checks if the list L is a palindrome, i.e. the reverse of L is identical to L .

- Example: ? - palindrome([a,b,c,b,a]) has result yes.

Exercise 1.4:
Compute the substitution composition $\theta\eta\tau$, where W, X, Y, Z are variables and

$$\theta = \{y/a(X, Z), Z/Y\} \qquad \eta = \{Y/X, X/f(W)\} \qquad \tau = \{W/g(a), X/Z, Z/b\}$$

Exercise 1.5:
Use the Martelli-Montanari algorithm step by step to unify the following pairs of terms with variables X, Y, and Z. For each step indicate which rule you have used.

a) $f(g(X), g(c), Y)$ and $f(g(g(Y)), X, a)$

b) $f(b, x, x, y)$ and $f(b, g(Y), g(g(Z)), g(a))$

c) $f(X, g(Z), g(Z))$ and $f(h(Y), Y, g(h(X)))$

Give the corresponding *most general unifier* (mgu) or give the reason why the terms are not unifiable.