

Foundations of Logic Programming

Tutorial 2 (on November 1st)

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Exercise 2.1:

Consider the following program

```
p(X) :- q(X), r(X).  
q(f(X)).  
r(f(a)).
```

- Give an SLD-derivation ξ for the query $?- p(X)$ that uses the Prolog selection rule.
- For each derivation step of ξ , give the resultant that is associated with this step (Slide 18, Lecture 3).
- Give the resultants of every level i of ξ (Slide 19, Lecture 3).

Exercise 2.2:

Consider the query $?- \text{fact}(0, Y), \text{fact}(Y, s(0))$. together with the program

```
fact(0, s(0)).  
fact(s(N), F) :- fact(N, G), mul(s(N), G, F).
```

- Give an SLD-derivation using the Prolog selection rule (you don't have to show the multiplication in detail). Give the substitutions and the CAS.
- Show that the Switching Lemma (Slide 26, Lecture 3) holds for the initial query (i.e., for $n = 0$).
Hint: Give a second SLD-derivation selecting the second atom at the beginning and using the Prolog selection rule afterwards. Show the correspondence of both derivations.

Exercise 2.3:

Give the SLD-tree for the query $?- p(X, Y)$. and the following program. Use Prolog's

selection and computation rule.

$p(X,Y) :- q(X,Y), r(Y,X).$

$q(X,a) :- s(X).$

$q(X,c) :- s(X).$

$r(X,b) :- t(X).$

$s(a).$

$s(b).$

$s(c).$

$t(a).$

$t(c).$