

SWP Assignment 4

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Beispiel 1

1

$t = p(\mathbf{Y}, X, g(X))$ und $t' = p(\mathbf{f}(\mathbf{a}), Z, g(f(Z)))$
 $\Theta = \{Y|f(a)\}$
 $t = p(f(a), \mathbf{X}, g(X))$ und $t' = p(f(a), \mathbf{Z}, g(f(Z)))$
 $\Theta = \{Y|f(a), X|Z\}$
 $t = p(f(a), Z, \mathbf{g}(\mathbf{Z}))$ und $t' = p(f(a), Z, \mathbf{g}(\mathbf{f}(\mathbf{Z})))$
 \rightarrow nicht unifizierbar, da Fall 2b eintrifft

2

$t = q(\mathbf{Y}, b, f(Y))$ und $t' = q(\mathbf{f}(\mathbf{X}), X, f(f(a)))$
 $\Theta = \{Y|f(X)\}$
 $t = q(f(X), \mathbf{b}, f(f(X)))$ und $t' = q(f(X), \mathbf{X}, f(f(a)))$
 $\Theta = \{Y|f(X), X|b\}$
 $t = q(f(b), b, \mathbf{f}(\mathbf{f}(\mathbf{b})))$ und $t' = q(f(b), b, \mathbf{f}(\mathbf{f}(\mathbf{a})))$
 \rightarrow nicht unifizierbar, da Fall 2a eintrifft

3

$t = r(f(X, f(Y)), X)$ und $t' = r(f(g(a), f(X)), Y)$
 $t = r(f(\mathbf{X}, f(Y)), X)$ und $t' = r(f(\mathbf{g}(\mathbf{a}), f(X1)), Y1)$
 $\Theta = \{X|g(a)\}$
 $t = r(f(g(a), f(\mathbf{Y})), g(a))$ und $t' = r(f(g(a), f(\mathbf{X1})), Y1)$
 $\Theta = \{X|g(a), Y|X1\}$
 $t = r(f(g(a), f(X1)), \mathbf{g}(\mathbf{a}))$ und $t' = r(f(g(a), f(X1)), \mathbf{Y1})$
 $\Theta = \{X|g(a), Y|X1, Y1|g(a)\}$
 $t = r(f(g(a), f(X1)), g(a))$ und $t' = r(f(g(a), f(X1)), g(a))$
 \rightarrow unifizierbar $\Theta = \{X|g(a), Y|X1, Y1|g(a)\}$

4

$t = s(Y, b, i(j(b)))$ und $t' = s(i(b), X, i(Y))$
 $t = s(\mathbf{Y}, b, i(j(b)))$ und $t' = s(\mathbf{i}(\mathbf{b}), X, i(Y1))$
 $\Theta = \{Y|i(b)\}$
 $t = s(i(b), \mathbf{b}, i(j(b)))$ und $t' = s(i(b), \mathbf{X}, i(Y1))$
 $\Theta = \{Y|i(b), X|b\}$
 $t = s(i(b), b, i(\mathbf{j}(\mathbf{b})))$ und $t' = s(i(b), b, i(\mathbf{Y}1))$
 $\Theta = \{Y|i(b), X|b, Y1|j(b)\}$
 $t = s(i(b), b, i(j(b)))$ und $t' = s(i(b), b, i(j(b)))$
 \rightarrow *unifizierbar* $\Theta = \{Y|i(b), X|b, Y1|j(b)\}$

5

$t = u(\mathbf{f}(\mathbf{a}), g(f(a)), Y)$ und $t' = u(\mathbf{X}, g(X), f(g(a)))$
 $\Theta = \{X|f(a)\}$
 $t = u(f(a), g(f(a)), \mathbf{Y})$ und $t' = u(f(a), g(f(a)), \mathbf{f}(\mathbf{g}(\mathbf{a})))$
 $\Theta = \{X|f(a), Y|f(g(a))\}$
 $t = u(f(a), g(f(a)), f(g(a)))$ und $t' = u(f(a), g(f(a)), f(g(a)))$
 \rightarrow *unifizierbar* $\Theta = \{X|f(a), Y|f(g(a))\}$

Beispiel 2

$nat(0)$
 $nat(s(A)) : - nat(A)$
 $double(s(X), 0) : - nat(X)$
 $double(s(X), s(Y)) : - double(X, Y)$

Beispiel 3

1

$parent(X, Y)$ X..Eltern, Y..Kind TRUE wenn X(Eltern) von Y(Kind) sind

$parent(Esther, Olivia)$	$parent(Esther, William)$	$parent(Esther, Maryam)$
$parent(Esther, Lewis)$	$parent(William, Markel)$	$parent(William, Nora)$
$parent(William, Omri)$	$parent(Nora, Ethan)$	$parent(Maryam, Sofia)$
$parent(Maryam, Jada)$	$parent(Jada, Mark)$	$parent(Jada, Isabel)$

$male(X)$ TRUE wenn X männlich
 $male(William)$ $male(Lewis)$ $male(Markel)$

male(Ethan) male(Omri) male(Mark)

female(X) TRUE wenn X weiblich
 female(Esther) female(Olivia) female(Nora)
 female(Sofia) female(Jada) female(Maryam)
 female(Isabel)

2

$\text{:-niece}(X,Y)$	$\text{parent}(Z,Y), \text{parent}(Z,W), \text{parent}(W,X), \text{female}(X)$
$\text{niece}(X,Y)$	X ist Nichte, Y ist Tante/Onkel
$\text{:- niece}(X,Y)$	$\text{parent}(Z, Y), \text{parent}(W, X), \text{female}(X)$ $\Theta = \{X nora, Y olivia\}$
$\text{:- parent}(Z, olivia), \text{parent}(Z, W)$ $\text{parent}(W, Nora) , \text{female}(nora)$	$\text{parent}(Z, olivia), \text{parent}(Z,W)$ $\Theta' = \{Z Esther\}$
$\text{:- parent}(esther, olivia), \text{parent}(esther, W)$ $\text{parent}(W, nora) , \text{female}(nora)$	$\text{parent}(esther,W), \text{parent}(W,nora)$ $\Theta'' = \{W William\}$
$\text{:- parent}(esther, olivia), \text{parent}(esther, william)$ $\text{parent}(william, nora) , \text{female}(nora)$	$\text{parent}(esther,william), \text{parent}(william,nora)$ $\Theta''' = \{\}$
$\text{:- parent}(esther, olivia)$ $\text{female}(nora)$	$\text{parent}(esther, olivia)$ $\Theta'''' = \{\}$
$\text{:- female}(nora)$	$\text{female}(nora)$ $\Theta''''' = \{\}$
q.e.d.	

3

greatuncle(X,ethan)

X ist Großonkel, Y ist ethan

\vdash greatuncle(X,ethan)

parent(S, X), parent(S, W)
 $\Theta = \{S|esther, \}$

\vdash parent(esther, X), parent(esther, W)
 parent(W, T), parent(T, ethan) male(X)

parent(esther, W), parent(W,T)
 $\Theta' = \{W|william\}$

\vdash parent(esther, X), parent(esther, william)
 parent(william, T), parent(T, ethan) male(X)

parent(william, T), parent(T, Y)
 $\Theta' = \{T|nora\}$

\vdash parent(esther, X), parent(esther, william)
 parent(william, nora), parent(nora, ethan) male(X)

parent(esther, X), male(X)
 $\Theta'' = \{X|Lewis\}$

\vdash parent(esther, lewis), parent(esther, william)
 parent(william, nora), parent(nora, ethan) male(lewis)

parent(esther, lewis), parent(esther, william)
 $\Theta'' = \{\}$

\vdash parent(william, nora), parent(nora, ethan)
 male(lewis)

parent(william, nora), parent(nora, ethan)
 $\Theta''' = \{\}$

\vdash male(lewis)

male(lewis)
 $\Theta'''' = \{\}$

q.e.d.