Name: ID:

PMath 330

Assignment 7

Mark

Unification

In each of the following you are given a pair of terms that you are to test for being unifiable, and if they are unifiable, give the most general unifier.

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(1) $(x \cdot (y + z)) + (x + y)$ and $((u + v) \cdot w) + u$

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(2) $(x \cdot (y + z)) + z$ and $((u + v) \cdot v) + 1$

For the Normal Form TRS given by

$$\mathcal{R} \approx \{fffx \longrightarrow fx\}$$

find the normal forms for the following terms:

Term	Normal Form
fx	
ffy	
$fffz$	
$ffffu$	
$fffffv$	

For the Normal Form TRS given by

$$\mathcal{R} \approx \{gfx \longrightarrow fgx,\ ffx \longrightarrow gx,\ gggx \longrightarrow fx\}$$

find the normal forms for the following terms:

Term	Normal Form
$gfgx$	
$gfffgy$	
$gfgfgz$	
$ffggu$	
$fgfgfv$	

For the Normal Form TRS given by

$$\mathcal{R} \approx \{(x+y)+z \longrightarrow x+z\}$$

find the normal forms for the following terms:

Term	Normal Form
$(x+x)+x$	
$(x+u)+(y+v)$	
$(x+(u+v))+(v+u)$	
$((x+w)+(x+u))+y$	
$(x+y)+((y+z)+(z+w))$	

Indicate why the TRS

$$\mathcal{R} \approx \{x \cdot y \longrightarrow z + x\}$$

is not terminating for the term $x \cdot y$ by filling in a few steps of

$x \cdot y \longrightarrow_{\mathcal{R}}$ _____ $\longrightarrow_{\mathcal{R}}$ _____ $\longrightarrow_{\mathcal{R}}$ _____

Indicate why the TRS

$$\mathcal{R} \approx \{(x + y) + z \longrightarrow (z + x) + y\}$$

is not terminating for the term $(x + y) + z$ by filling in a few steps of

$(x + y) + z \longrightarrow_{\mathcal{R}}$ _____ $\longrightarrow_{\mathcal{R}}$ _____ $\longrightarrow_{\mathcal{R}}$ _____

Indicate why the terminating TRS

$$\mathcal{R} \approx \{x + fy \longrightarrow y + x,\ fx + y \longrightarrow x\}$$

is not a normal form TRS by giving two different terminal forms:

Term	Terminal Form
$fx + fy$	
$fx + fy$	

Indicate why the terminating TRS

$$\mathcal{R} \approx \{(x + y) + z \longrightarrow y + (x + z)\}$$

is not a normal form TRS by giving two different terminal forms:

Term	Terminal Form
$((x + y) + z) + w$	
$((x + y) + z) + w$	

Given the pair of term rewrite rules (with disjoint variables)

$$\underline{fgfx} \longrightarrow gfgx \quad \text{and} \quad gf\underline{fu} \longrightarrow fgu$$

find the critical pair that results from unifying the underlined subterms:(Show Work)

Answer: _____

DETAILS:

Given the pair of term rewrite rules (with disjoint variables)

$$\underline{(y+z)} \cdot x \longrightarrow (y \cdot x) + (z \cdot x) \quad \text{and} \quad \underline{(u+v)+w} \longrightarrow u + (v+w)$$

find the critical pair that results from unifying the underlined subterms:(Show Work)

Answer: _____

DETAILS: