

Problem 1.

Unify $\{(f(A, g(B, C, h(D))) = f(g(C, B, C), A))\}$

Let $S \rightarrow \{(f(A, g(B, C, h(D))), f(g(C, B, C), A))\}$

1. Pick pair: $((f(A, g(B, C, h(D))), f(g(C, B, C), A))$

Decompose: $((A, g(C, B, C)), (g(B, C, h(D)), A))$

$S \rightarrow \{(f(A, g(B, C, h(D))), f(g(C, B, C), A))\}$

$\rightarrow \{((A, g(C, B, C)), (g(B, C, h(D)), A))\}$

2. Pick pair: $(g(B, C, h(D)), A)$

Orient: $(A, g(B, C, h(D)))$

$S \rightarrow \{((A, g(C, B, C)), (g(B, C, h(D)), A))\}$

$\rightarrow \{((A, g(C, B, C)), (A, g(B, C, h(D))))\}$

3. Pick pair: $(A, g(C, B, C))$

Substitute: $\{A \mapsto g(C, B, C)\}$ and Eliminate the pair

$S \rightarrow \{((A, g(C, B, C)), (A, g(B, C, h(D))))\}$

$\rightarrow \{(g(C, B, C), g(B, C, h(D)))\}$ with $\{A \mapsto g(C, B, C)\}$

4. Pick pair: $(g(C, B, C), g(B, C, h(D)))$

Decompose: $((C, B), (B, C), (C, h(D)))$

$S \rightarrow \{(g(C, B, C), g(B, C, h(D)))\}$

$\rightarrow \{((C, B), (B, C), (C, h(D)))\}$ with $\{A \mapsto g(C, B, C)\}$

5. Pick pair: $(C, h(D))$

Substitute: $\{C \mapsto h(D)\}$ and Eliminate the pair

$S \rightarrow \{((C, B), (B, C), (C, h(D)))\}$

$\rightarrow \{((h(D), B), (B, h(D)))\}$ with $\{A \mapsto \{C \mapsto h(D)\} g(C, B, C)\} \circ \{C \mapsto h(D)\}$

6. Pick pair: $(h(D), B)$

Orient: $(B, h(D))$

$S \rightarrow \{((h(D), B), (B, h(D)))\}$

$\rightarrow \{((B, h(D)), (B, h(D)))\}$ with $\{A \mapsto \{C \mapsto h(D)\} g(C, B, C)\} \circ \{C \mapsto h(D)\}$

7. Pick pair: $(B, h(D))$

Substitute: $\{B \mapsto h(D)\}$ and Eliminate the pair

$S \rightarrow \{((B, h(D)), (B, h(D)))\}$

$\rightarrow \{\}$ with $\{A \mapsto \{B \mapsto h(D)\} (\{C \mapsto h(D)\} g(C, B, C))\} \circ \{C \mapsto \{B \mapsto h(D)\} h(D)\} \circ \{B \mapsto h(D)\}$