Assignment 8

$\boxed{8.1}$ $P > R > g > b > a$

(0. $\neg P$ 1a. $\neg P(a) \lor \underline{P(g(a))}$

    1b $\cancel{2a}$. $\neg P(b) \lor \underline{P(g(b))}$

    $\times$ $\cancel{b}$ 1c. $\neg P(g(a)) \lor \underline{P(g(g(a)))} > 5$

    $\times$ 1d. $\neg P(g(b)) \lor \underline{P(g(g(b)))} > 5$

2a. $\neg P(a) \lor \underline{R(a, g(a))}$

2b. $\neg P(b) \lor \underline{R(b, g(b))}$

$\times$ 2c. $\neg P(g(a)) \lor \underline{P(g(a), g(g(a)))} > 5$

$\times$ 2d. $\neg P(g(b)) \lor \underline{P(g(b), g(g(b)))} > 5$

3 . $P(a) \lor \underline{P(b)}$

4 . $\underline{\neg R(b, g(b))} \lor P(a)$

5 . $\underline{\neg R(b, g(b))} \lor P(b)$

    $4 > \cancel{5} \; 2b > 2a > 1b > 1a > 3$

C	NC	δc
	$\emptyset$	$\{P(b)\}$
$P(a) \lor \underline{P(b)}$		$\emptyset, \text{true}$
$\neg P(a) \lor \underline{P(g(a))}$	$\{P(b)\}$	$\cancel{\{P(g(a))\}}$
$\neg P(b) \lor \underline{P(g(a))}$	$\{P(b)\}$	$\emptyset, \text{true}$
$\neg P(a) \lor \underline{R(a, g(a))}$	$\{P(b), P(g(a))\}$	$\{R(b, g(b))\}$
$\neg P(b) \lor \underline{R(b, g(b))}$	$\{P(b), P(g(a))\}$	
$\underline{\neg R(b, g(b))} \lor P(a)$	$\{P(b), P(g(a)), R(b, g(b))\}$	$\emptyset$ minimal false clause

Ⓐ M∝k : $\neg R(b(g(b)) \lor P(a)$

Prop. Counter part $\neg P(x) \lor R(x, g(x))$

$\neg R$ mgu $\sigma = \emptyset\ x \longrightarrow b$

$P(a) \lor \neg P(b)$ new clause

we add unit clause $P(a)$ ground atom.

C	NL	δ_L
		$P(a)$
$P(a)$	$\emptyset$	
$P(a) \lor \underline{P(b)}$	$\{P(a)\}$	$\emptyset$
$P(a) \lor \underline{\neg P(b)}$	$\{P(a)\}$	$\emptyset$
$\neg P(a) \lor \underline{P(g(a))}$	$\{P(a)\}$	$\{P(g(a))\}$
$\neg P(b) \lor \underline{P(g(b))}$	$\{P(a), P(g(a))\}$	$\emptyset$
$\neg P(a) \lor \underline{R(a,g(a))}$	$\{P(a), P(g(a))\}$	$\{R(a,g(a))\}$
$\neg P(b) \lor \underline{R(b,g(b))}$	$\{P(a), P(g(a)), R(a,g(a))\}$	$\emptyset$
$\neg R(b,g(b)) \lor P(a)$	$\{P(a), P(g(a)), R(a,g(a))\}$	$\emptyset$, true.

$\{P(a), P(g(a)), R(a, g(a))\} \models N$

$N_I = \{P(a), P(g(a)), R(a, g(a))\}$

$\boxed{8.2}$ choose ordering as your wish (KBO) $\begin{cases} S > Q \\ \omega(-)1 \end{cases}$

(5,6) $S(a)$ ———————— $\neg S(x) \lor Q(x)$

$\qquad\qquad\qquad\qquad$ mgu$\{x \mapsto a\}$

$\qquad\quad$ ⑦ $Q(a)$

(3,2) $\neg P(x) \lor R(a,x)$ $\qquad\qquad P(g(x))$

$\qquad\qquad\qquad\qquad\qquad\qquad$ mgu$\{x \mapsto g(x)\}$

$\qquad\quad R(a,x)$

$\qquad\quad$ ⑧ $R(a, g(x))$

(1,8) $\neg Q(x) \lor R(x, g(x))$ $\qquad$ $R(a, g(x))$

$\qquad\qquad\qquad\qquad\qquad\qquad$ mgu$\{x \mapsto a\}$

$\qquad\qquad$ ⑨ $\neg Q(a)$

(7,9) $Q(a)$ $\qquad\qquad$ $\neg Q(a)$

$\qquad\qquad\qquad$ $\bot$ $\qquad$ unsatisfiable.

8.3

N finite saturated satisfiable.

All $c \in N$ st.

$c = D \vee L$

$c = \bigvee_i \neg P_i^{\circ}$ ground

show: can decide if $N \cup \{c\}$ is satisfiable

• No inferences between $C_1, C_2 \in N$, because N is ~~st~~ saturated.

• Consider inferences bet^N $C_1, C_2 \in N$, because N is saturated

$c = \neg P_1 \vee \dots \vee \neg P_n$, P_i° is max ground

$N \ni D_1 = D_1' \vee P_i^{\circ}$ P_i° contains the clauses

                                       smaller

$D_1'\sigma \vee (\neg P_1 \vee \dots \vee \neg P_{i=1}^{\circ} \vee \neg P_{i+1}^{\circ} \vee \dots \vee \neg_n)\sigma$

                                         $\sigma = mgu(D_1', P_i^{\circ})$

$D_1'\sigma \vee \neg P_1 \vee \dots \vee \neg P_n$ is ground too

we can rewrite $c \to c'$. But since c is a

ground clause,

        $<_{c_\ell}$ is well founded, Descend as

                   many time

                     unsat. $c = \bot$

                        finite

c^N is the last clause decide sat $c \neq \bot$