

a

$$\{(y = y_5), A_1, (y_5 = y_3), \neg(y_5 = y_4), (x_1 \geq 1), (y_3 = y_1), \\ \neg(y_3 = y_2), (x_2 \geq 1), ((y_1 = f_{11}), \neg(y_1 = f_{12}))\}$$

$$\begin{aligned} & (\neg A_1 \vee \neg(x_1 \geq 1) \vee \neg(x_2 \geq 1) \vee (y_1 = f_{11})) \\ \wedge & (\neg A_1 \vee \neg(x_1 \geq 1) \vee (x_2 \geq 1) \vee (y_1 = f_{12})) \\ \wedge & (\neg A_1 \vee \neg(x_1 \geq 1) \vee \neg(y_1 = f_{11}) \vee \neg(y_1 = f_{12})) \\ \wedge & (\neg A_1 \vee (x_1 \geq 1) \vee \neg(x_2 \geq 2) \vee (y_2 = f_{21})) \\ \wedge & (\neg A_1 \vee (x_1 \geq 1) \vee (x_2 \geq 2) \vee (y_2 = f_{22})) \\ \wedge & (\neg A_1 \vee (x_1 \geq 1) \vee \neg(y_2 = f_{21}) \vee \neg(y_2 = f_{22})) \\ \wedge & (\neg A_1 \vee \neg(x_1 \geq 1) \vee (y_3 = y_1)) \\ \wedge & (\neg A_1 \vee (x_1 \geq 1) \vee (y_3 = y_2)) \\ \wedge & (\neg A_1 \vee \neg(y_3 = y_1) \vee \neg(y_3 = y_2)) \end{aligned}$$

$$\begin{aligned} \wedge & (A_1 \vee \neg A_2 \vee (y_4 = f_3)) \\ \wedge & (A_1 \vee A_2 \vee (y_4 = f_4)) \\ \wedge & (A_1 \vee \neg(y_4 = f_3) \vee \neg(y_4 = f_4)) \\ \wedge & (\neg A_1 \vee (y_5 = y_3)) \\ \wedge & (A_1 \vee (y_5 = y_4)) \\ \wedge & (\neg(y_5 = y_3) \vee \neg(y_5 = y_4)) \\ \wedge & (y = y_5) \end{aligned}$$

...

b

$$\{(y = y_5), A_1, (y_5 = y_3), \neg(y_5 = y_4), (x_1 \geq 1), (y_3 = y_1), \\ \neg(y_3 = y_2), \neg(x_2 \geq 1), (y_1 = f_{12}), \neg(y_1 = f_{11}))\}$$

$$\begin{aligned} & (\neg A_1 \vee \neg(x_1 \geq 1) \vee \neg(x_2 \geq 1) \vee (y_1 = f_{11})) \\ \wedge & (\neg A_1 \vee \neg(x_1 \geq 1) \vee (x_2 \geq 1) \vee (y_1 = f_{12})) \\ \wedge & (\neg A_1 \vee \neg(x_1 \geq 1) \vee \neg(y_1 = f_{11}) \vee \neg(y_1 = f_{12})) \\ \wedge & (\neg A_1 \vee (x_1 \geq 1) \vee \neg(x_2 \geq 2) \vee (y_2 = f_{21})) \\ \wedge & (\neg A_1 \vee (x_1 \geq 1) \vee (x_2 \geq 2) \vee (y_2 = f_{22})) \\ \wedge & (\neg A_1 \vee (x_1 \geq 1) \vee \neg(y_2 = f_{21}) \vee \neg(y_2 = f_{22})) \\ \wedge & (\neg A_1 \vee \neg(x_1 \geq 1) \vee (y_3 = y_1)) \\ \wedge & (\neg A_1 \vee (x_1 \geq 1) \vee (y_3 = y_2)) \\ \wedge & (\neg A_1 \vee \neg(y_3 = y_1) \vee \neg(y_3 = y_2)) \end{aligned}$$

$$\begin{aligned} \wedge & (A_1 \vee \neg A_2 \vee (y_4 = f_3)) \\ \wedge & (A_1 \vee A_2 \vee (y_4 = f_4)) \\ \wedge & (A_1 \vee \neg(y_4 = f_3) \vee \neg(y_4 = f_4)) \\ \wedge & (\neg A_1 \vee (y_5 = y_3)) \\ \wedge & (A_1 \vee (y_5 = y_4)) \\ \wedge & (\neg(y_5 = y_3) \vee \neg(y_5 = y_4)) \\ \wedge & (y = y_5) \\ \wedge & (\neg A_1 \vee \neg(x_1 \geq 1) \vee \neg(x_2 \geq 1)) \end{aligned}$$

c

$$\mathcal{TA}(\exists xy.(\varphi \wedge \chi \wedge [y = w]_{\mathcal{LUF}}))$$

Assignment	Labeling
$\chi \cup \{A_1, (x_1 \geq 1), (x_2 \geq 1)\}$	$y = y_5 = y_3 = y_1 = f_{11}$
$\chi \cup \{A_1, (x_1 \geq 1), \neg(x_2 \geq 1)\}$	$y = y_5 = y_3 = y_1 = f_{12}$
$\chi \cup \{A_1, \neg(x_1 \geq 1), (x_2 \geq 2)\}$	$y = y_5 = y_3 = y_2 = f_{21}$
$\chi \cup \{A_1, \neg(x_1 \geq 1), \neg(x_2 \geq 2)\}$	$y = y_5 = y_3 = y_2 = f_{22}$
$\chi \cup \{\neg A_1, A_2\}$	$y = y_5 = y_4 = f_3$
$\chi \cup \{\neg A_1, \neg A_2\}$	$y = y_5 = y_4 = f_4$