

t6\_gate\_3  
(TMXZPgpE5cmR8VDh7iR6NrPSTMvrYHd6v7b)

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Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $k14\_gate\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_gate\_1 : \iota \Rightarrow \iota$  be given. Let  $k2\_gate\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_gate\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\forall X0.\forall X1.\forall X2.\forall X3.(\neg v1\_xboole\_0 (k14\_gate\_1 X0 X1 X2 X3)) \Leftrightarrow ((\neg v1\_xboole\_0 X0) \wedge ((\neg v1\_xboole\_0 X1) \wedge ((\neg v1\_xboole\_0 X2) \wedge (\neg v1\_xboole\_0 X3)))) \quad (1)$$

Assume the following.

$$\forall X0.\forall X1.((v1\_xboole\_0 X0) \wedge (v1\_xboole\_0 X1)) \Rightarrow (v1\_xboole\_0 (k3\_gate\_1 X0 X1)) \quad (2)$$

Assume the following.

$$\forall X0.\forall X1.(\neg v1\_xboole\_0 X1) \Rightarrow (\neg v1\_xboole\_0 (k3\_gate\_1 X0 X1)) \quad (3)$$

Assume the following.

$$\forall X0.\forall X1.(v1\_xboole\_0 X0) \Rightarrow (v1\_xboole\_0 (k2\_gate\_1 X0 X1)) \quad (4)$$

Assume the following.

$$\forall X0.\forall X1.((\neg v1\_xboole\_0 X0) \wedge (\neg v1\_xboole\_0 X1)) \Rightarrow (\neg v1\_xboole\_0 (k2\_gate\_1 X0 X1)) \quad (5)$$

Assume the following.

$$\forall X0.(\neg v1\_xboole\_0 X0) \Rightarrow (v1\_xboole\_0 (k1\_gate\_1 X0)) \quad (6)$$

Assume the following.

$$\forall X0.(v1\_xboole\_0 X0) \Rightarrow (\neg v1\_xboole\_0 (k1\_gate\_1 X0)) \quad (7)$$

Assume the following.

$$\forall X0.\forall X1.k3\_gate.1 X0 X1 = k3\_gate.1 X1 X0 \quad (8)$$

Assume the following.

$$\forall X0.\forall X1.k2\_gate.1 X0 X1 = k2\_gate.1 X1 X0 \quad (9)$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.\forall X3.\forall X4.\forall X5. \\
& \forall X6.\forall X7.\forall X8.\forall X9.\forall X10.\forall X11. \\
& \forall X12.\forall X13.\forall X14.\forall X15.\forall X16. \\
& \forall X17.\forall X18.\forall X19.\forall X20.\forall X21. \\
& \forall X22.\forall X23.\forall X24.\forall X25.\forall X26. \\
& \forall X27.\forall X28.\forall X29.\forall X30.\forall X31. \\
& \forall X32.\forall X33.\forall X34.\forall X35.\forall X36. \\
& \forall X37.\forall X38.\forall X39.\forall X40.\neg(\neg(\neg v1\_xboole\_0 \\
& X0)\wedge(v1\_xboole\_0 (k14\_gate\_1 (k1\_gate\_1 X35) (k1\_gate\_1 X3 \\
& (k1\_gate\_1 X33) (k1\_gate\_1 X32))))\wedge((\neg(\neg v1\_xboole\_0 (k14\_gate\_1 \\
& (k1\_gate\_1 X35) (k1\_gate\_1 X34) (k1\_gate\_1 X33) (k1\_gate\_1 X3 \\
& (v1\_xboole\_0 X0))\wedge((\neg(\neg v1\_xboole\_0 X1)\wedge(v1\_xboole\_0 (k14\_gate\_1 \\
& (k1\_gate\_1 X35) (k1\_gate\_1 X34) (k1\_gate\_1 X33) X32))))\wedge((\neg(\neg v1 \\
& (k14\_gate\_1 (k1\_gate\_1 X35) (k1\_gate\_1 X34) (k1\_gate\_1 X33) X \\
& (v1\_xboole\_0 X1))\wedge((\neg(\neg v1\_xboole\_0 X2)\wedge(v1\_xboole\_0 (k14\_gate\_1 \\
& (k1\_gate\_1 X35) (k1\_gate\_1 X34) X33 (k1\_gate\_1 X32))))\wedge((\neg(\neg v1 \\
& (k14\_gate\_1 (k1\_gate\_1 X35) (k1\_gate\_1 X34) X33 (k1\_gate\_1 X3 \\
& (v1\_xboole\_0 X2))\wedge((\neg(\neg v1\_xboole\_0 X3)\wedge(v1\_xboole\_0 (k14\_gate\_1 \\
& (k1\_gate\_1 X35) (k1\_gate\_1 X34) X33 X32))))\wedge((\neg(\neg v1\_xboole \\
& k14\_gate\_1 (k1\_gate\_1 X35) (k1\_gate\_1 X34) X33 X32))\wedge(v1\_xbo \\
& X3))\wedge((\neg(\neg v1\_xboole\_0 X4)\wedge(v1\_xboole\_0 (k14\_gate\_1 (k1\_gate \\
& X35) X34 (k1\_gate\_1 X33) (k1\_gate\_1 X32))))\wedge((\neg(\neg v1\_xboole \\
& (k14\_gate\_1 (k1\_gate\_1 X35) X34 (k1\_gate\_1 X33) (k1\_gate\_1 X3 \\
& (v1\_xboole\_0 X4))\wedge((\neg(\neg v1\_xboole\_0 X5)\wedge(v1\_xboole\_0 (k14\_gate \\
& (k1\_gate\_1 X35) X34 (k1\_gate\_1 X33) X32))))\wedge((\neg(\neg v1\_xboole \\
& k14\_gate\_1 (k1\_gate\_1 X35) X34 (k1\_gate\_1 X33) X32))\wedge(v1\_xbo \\
& X5))\wedge((\neg(\neg v1\_xboole\_0 X6)\wedge(v1\_xboole\_0 (k14\_gate\_1 (k1\_gate \\
& X35) X34 X33 (k1\_gate\_1 X32))))\wedge((\neg(\neg v1\_xboole\_0 (k14\_gate \\
& (k1\_gate\_1 X35) X34 X33 (k1\_gate\_1 X32))))\wedge(v1\_xboole\_0 X6 \\
& (\neg(\neg v1\_xboole\_0 X7)\wedge(v1\_xboole\_0 (k14\_gate\_1 (k1\_gate\_1 X3 \\
& X34 X33 X32))))\wedge((\neg(\neg v1\_xboole\_0 (k14\_gate\_1 (k1\_gate\_1 X35) \\
& X33 X32))\wedge(v1\_xboole\_0 X7))\wedge((\neg(\neg v1\_xboole\_0 X8)\wedge(v1\_xbo \\
& (k14\_gate\_1 X35 (k1\_gate\_1 X34) (k1\_gate\_1 X33) (k1\_gate\_1 X3 \\
& ((\neg(\neg v1\_xboole\_0 (k14\_gate\_1 X35 (k1\_gate\_1 X34) (k1\_gate\_1 X3 \\
& (k1\_gate\_1 X32))))\wedge(v1\_xboole\_0 X8))\wedge((\neg(\neg v1\_xboole\_0 X9) \\
& v1\_xboole\_0 (k14\_gate\_1 X35 (k1\_gate\_1 X34) (k1\_gate\_1 X33) X \\
& ((\neg(\neg v1\_xboole\_0 (k14\_gate\_1 X35 (k1\_gate\_1 X34) (k1\_gate\_1 X3 \\
& X32))\wedge(v1\_xboole\_0 X9))\wedge((\neg(\neg v1\_xboole\_0 X10)\wedge(v1\_xboole \\
& (k14\_gate\_1 X35 (k1\_gate\_1 X34) X33 (k1\_gate\_1 X32))))\wedge((\neg(\neg v1 \\
& (k14\_gate\_1 X35 (k1\_gate\_1 X34) X33 (k1\_gate\_1 X32))))\wedge(v1\_xbo \\
& X10))\wedge((\neg(\neg v1\_xboole\_0 X11)\wedge(v1\_xboole\_0 (k14\_gate\_1 X35 (k1 \\
& X34) X33 X32))))\wedge((\neg(\neg v1\_xboole\_0 (k14\_gate\_1 X35 (k1\_gate\_1 \\
& X33 X32))\wedge(v1\_xboole\_0 X11))\wedge((\neg(\neg v1\_xboole\_0 X12)\wedge(v1\_xbo \\
& (k14\_gate\_1 X35 X34 (k1\_gate\_1 X33) (k1\_gate\_1 X32))))\wedge((\neg(\neg v1 \\
& (k14\_gate\_1 X35 X34 (k1\_gate\_1 X33) (k1\_gate\_1 X32))))\wedge(v1\_xbo \\
& X12))\wedge((\neg(\neg v1\_xboole\_0 X13)\wedge(v1\_xboole\_0 (k14\_gate\_1 X35 X \\
& 3 (k1\_gate\_1 X33) X32))))\wedge((\neg(\neg v1\_xboole\_0 (k14\_gate\_1 X35 X \\
& k1\_gate\_1 X33) X32))\wedge(v1\_xboole\_0 X13))\wedge((\neg(\neg v1\_xboole\_0 X \\
& (v1\_xboole\_0 (k14\_gate\_1 X35 X34 X33 (k1\_gate\_1 X32))))\wedge((\neg \\
& v1\_xboole\_0 (k14\_gate\_1 X35 X34 X33 (k1\_gate\_1 X32))))\wedge(v1\_xbo \\
& X14))\wedge((\neg(\neg v1\_xboole\_0 X15)\wedge(v1\_xboole\_0 (k14\_gate\_1 X35 X \\
& X33 X32))))\wedge((\neg(\neg v1\_xboole\_0 (k14\_gate\_1 X35 X34 X33 X32))\wedge(v1 \\
& X15))\wedge((\neg(\neg v1\_xboole\_0 X16)\wedge(v1\_xboole\_0 (k14\_gate\_1 (k1\_gate \\
& X39) (k1\_gate\_1 X38) (k1\_gate\_1 X37) (k1\_gate\_1 X36))))\wedge((\neg \\
& v1\_xboole\_0 (k14\_gate\_1 (k1\_gate\_1 X39) (k1\_gate\_1 X38) (k1\_gate \\
& X37) (k1\_gate\_1 X36))))\wedge(v1\_xboole\_0 X16))\wedge((\neg(\neg v1\_xboole \\
& X17)\wedge(v1\_xboole\_0 (k14\_gate\_1 (k1\_gate\_1 X39) (k1\_gate\_1 X3 \\
& (k1\_gate\_1 X37) X36))))\wedge((\neg(\neg v1\_xboole\_0 (k14\_gate\_1 (k1\_gate \\
& X39) (k1\_gate\_1 X38) (k1\_gate\_1 X37) X36))))\wedge(v1\_xboole\_0 X \\
\end{aligned}$$