

### t3\_gate\_4

(TMHiUzygrbFKFbrZaeqo6XUXpS9YMBnzm3r)

October 27, 2020

Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $k4\_gate\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_gate\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\forall X0. \forall X1. ((\neg v1\_xboole\_0 X0) \wedge (\neg v1\_xboole\_0 X1)) \Rightarrow (v1\_xboole\_0 (k4\_gate\_1 X0 X1)) \quad (1)$$

Assume the following.

$$\forall X0. \forall X1. ((v1\_xboole\_0 X0) \wedge (v1\_xboole\_0 X1)) \Rightarrow (v1\_xboole\_0 (k4\_gate\_1 X0 X1)) \quad (2)$$

Assume the following.

$$\forall X0. \forall X1. ((v1\_xboole\_0 X0) \wedge (\neg v1\_xboole\_0 X1)) \Rightarrow (\neg v1\_xboole\_0 (k4\_gate\_1 X0 X1)) \quad (3)$$

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.

$$\forall X0. \forall X1. k4\_gate\_1 X0 X1 = k4\_gate\_1 X1 X0 \quad (6)$$

Assume the following.

$$\forall X0. \forall X1. k2\_gate\_1 X0 X1 = k2\_gate\_1 X1 X0 \quad (7)$$

**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. (v1\_xboole\_0 X37) \Rightarrow ((v1\_xboole\_0 X0) \vee \\
& \quad (((\neg v1\_xboole\_0 X25) \wedge (v1\_xboole\_0 (k4\_gate\_1 X38 X24))) \vee (((\neg v1\_xboole\_0 \\
& \quad \neg v1\_xboole\_0 (k4\_gate\_1 X38 X24)) \wedge (v1\_xboole\_0 X25)) \vee (((\neg v1\_xboole\_0 \\
& \quad X26) \wedge (v1\_xboole\_0 (k4\_gate\_1 X13 (k2\_gate\_1 X1 X25)))) \vee (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 X13 (k2\_gate\_1 X1 X25))) \wedge (v1\_xboole\_0 X26)) \vee (((\neg v1\_xboole\_0 \\
& \quad X27) \wedge (v1\_xboole\_0 (k4\_gate\_1 X14 (k2\_gate\_1 X2 X25)))) \vee (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 X14 (k2\_gate\_1 X2 X25))) \wedge (v1\_xboole\_0 X27)) \vee (((\neg v1\_xboole\_0 \\
& \quad X28) \wedge (v1\_xboole\_0 (k4\_gate\_1 X15 (k2\_gate\_1 X3 X25)))) \vee (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 X15 (k2\_gate\_1 X3 X25))) \wedge (v1\_xboole\_0 X28)) \vee (((\neg v1\_xboole\_0 \\
& \quad X29) \wedge (v1\_xboole\_0 (k4\_gate\_1 X16 (k2\_gate\_1 X4 X25)))) \vee (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 X16 (k2\_gate\_1 X4 X25))) \wedge (v1\_xboole\_0 X29)) \vee (((\neg v1\_xboole\_0 \\
& \quad X30) \wedge (v1\_xboole\_0 (k4\_gate\_1 X17 (k2\_gate\_1 X5 X25)))) \vee (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 X17 (k2\_gate\_1 X5 X25))) \wedge (v1\_xboole\_0 X30)) \vee (((\neg v1\_xboole\_0 \\
& \quad X31) \wedge (v1\_xboole\_0 (k4\_gate\_1 X18 (k2\_gate\_1 X6 X25)))) \vee (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 X18 (k2\_gate\_1 X6 X25))) \wedge (v1\_xboole\_0 X31)) \vee (((\neg v1\_xboole\_0 \\
& \quad X32) \wedge (v1\_xboole\_0 (k4\_gate\_1 X19 (k2\_gate\_1 X7 X25)))) \vee (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 X19 (k2\_gate\_1 X7 X25))) \wedge (v1\_xboole\_0 X32)) \vee (((\neg v1\_xboole\_0 \\
& \quad X33) \wedge (v1\_xboole\_0 (k4\_gate\_1 X20 (k2\_gate\_1 X8 X25)))) \vee (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 X20 (k2\_gate\_1 X8 X25))) \wedge (v1\_xboole\_0 X33)) \vee (((\neg v1\_xboole\_0 \\
& \quad X34) \wedge (v1\_xboole\_0 (k4\_gate\_1 X21 (k2\_gate\_1 X9 X25)))) \vee (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 X21 (k2\_gate\_1 X9 X25))) \wedge (v1\_xboole\_0 X34)) \vee (((\neg v1\_xboole\_0 \\
& \quad X35) \wedge (v1\_xboole\_0 (k4\_gate\_1 X22 (k2\_gate\_1 X10 X25)))) \vee (((\neg \\
& \quad v1\_xboole\_0 (k4\_gate\_1 X22 (k2\_gate\_1 X10 X25))) \wedge (v1\_xboole\_0 \\
& \quad X35)) \vee (((\neg v1\_xboole\_0 X36) \wedge (v1\_xboole\_0 (k4\_gate\_1 X23 (k2\_gate\_1 \\
& \quad X11 X25)))) \vee (((\neg v1\_xboole\_0 (k4\_gate\_1 X23 (k2\_gate\_1 X11 X25))) \wedge \\
& \quad (v1\_xboole\_0 X36)) \vee (((\neg v1\_xboole\_0 X36) \wedge (v1\_xboole\_0 (k4\_gate\_1 \\
& \quad (k4\_gate\_1 X23 (k2\_gate\_1 X11 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 X11 \\
& \quad X38)))) \wedge (((\neg v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X23 (k2\_gate\_1 \\
& \quad X11 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 X11 X38)))) \wedge (v1\_xboole\_0 X36)) \wedge \\
& \quad (((\neg v1\_xboole\_0 X35) \wedge (v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X22 \\
& \quad (k2\_gate\_1 X10 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 X10 X38)))) \wedge (((\neg \\
& \quad \neg v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X22 (k2\_gate\_1 X10 X24)) \\
& \quad (k4\_gate\_1 X37 (k2\_gate\_1 X10 X38)))) \wedge (v1\_xboole\_0 X35)) \wedge (((\neg \\
& \quad \neg v1\_xboole\_0 X34) \wedge (v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X21 (k2\_gate\_1 \\
& \quad X9 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 X9 X38)))) \wedge (((\neg v1\_xboole\_0 \\
& \quad (k4\_gate\_1 (k4\_gate\_1 X21 (k2\_gate\_1 X9 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 \\
& \quad X9 X38)))) \wedge (v1\_xboole\_0 X34)) \wedge (((\neg v1\_xboole\_0 X33) \wedge (v1\_xboole\_0 \\
& \quad (k4\_gate\_1 (k4\_gate\_1 X20 (k2\_gate\_1 X8 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 \\
& \quad X8 X38)))) \wedge (((\neg v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X20 (k2\_gate\_1 \\
& \quad X8 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 X8 X38)))) \wedge (v1\_xboole\_0 X33)) \wedge \\
& \quad (((\neg v1\_xboole\_0 X32) \wedge (v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X19 \\
& \quad (k2\_gate\_1 X7 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 X7 X38)))) \wedge (((\neg \\
& \quad \neg v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X19 (k2\_gate\_1 X7 X24)) (k4\_gate\_1 \\
& \quad X37 (k2\_gate\_1 X7 X38)))) \wedge (v1\_xboole\_0 X32)) \wedge (((\neg v1\_xboole\_0 \\
& \quad X31) \wedge (v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X18 (k2\_gate\_1 X6 X24)) \\
& \quad (k4\_gate\_1 X37 (k2\_gate\_1 X6 X38)))) \wedge (((\neg v1\_xboole\_0 (k4\_gate\_1 \\
& \quad (k4\_gate\_1 X18 (k2\_gate\_1 X6 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 X6 \\
& \quad X38)))) \wedge (v1\_xboole\_0 X31)) \wedge (((\neg v1\_xboole\_0 X30) \wedge (v1\_xboole\_0 \\
& \quad (k4\_gate\_1 (k4\_gate\_1 X17 (k2\_gate\_1 X5 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 \\
& \quad X5 X38)))) \wedge (((\neg v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X17 (k2\_gate\_1 \\
& \quad X5 X24)) (k4\_gate\_1 X37 (k2\_gate\_1 X5 X38)))) \wedge (v1\_xboole\_0 X30)) \wedge \\
& \quad (((\neg v1\_xboole\_0 X29) \wedge (v1\_xboole\_0 (k4\_gate\_1 (k4\_gate\_1 X16 \\
\end{aligned}$$