

t2\_gate\_4  
(TMT9TPzdpjDvUcZRGRheoSf6mWmGXaCR3cE)

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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. \forall X39. \forall X40. \forall X41. \\
& \forall X42. \forall X43. \forall X44. \forall X45. \forall X46. \\
& \forall X47. \forall X48. \forall X49. \neg(\neg v1\_xboole\_0 X16) \wedge ((\neg \\
& (\neg v1\_xboole\_0 X33) \wedge (v1\_xboole\_0 (k4\_gate\_1 X49 (k2\_gate\_1 X0 \\
& X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X49 (k2\_gate\_1 X0 X32))) \wedge \\
& (v1\_xboole\_0 X33)) \wedge ((\neg(\neg v1\_xboole\_0 X34) \wedge (v1\_xboole\_0 (k4\_gate\_1 \\
& X17 (k2\_gate\_1 X1 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X17 (k2\_gate\_1 \\
& X1 X32))) \wedge (v1\_xboole\_0 X34)) \wedge ((\neg(\neg v1\_xboole\_0 X35) \wedge (v1\_xboole\_0 \\
& (k4\_gate\_1 X18 (k2\_gate\_1 X2 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 \\
& X18 (k2\_gate\_1 X2 X32))) \wedge (v1\_xboole\_0 X35)) \wedge ((\neg(\neg v1\_xboole\_0 \\
& X36) \wedge (v1\_xboole\_0 (k4\_gate\_1 X19 (k2\_gate\_1 X3 X32)))) \wedge ((\neg(\neg \\
& v1\_xboole\_0 (k4\_gate\_1 X19 (k2\_gate\_1 X3 X32))) \wedge (v1\_xboole\_0 \\
& X36)) \wedge ((\neg(\neg v1\_xboole\_0 X37) \wedge (v1\_xboole\_0 (k4\_gate\_1 X20 (k2\_gate\_1 \\
& X4 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X20 (k2\_gate\_1 X4 X32))) \wedge \\
& (v1\_xboole\_0 X37)) \wedge ((\neg(\neg v1\_xboole\_0 X38) \wedge (v1\_xboole\_0 (k4\_gate\_1 \\
& X21 (k2\_gate\_1 X5 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X21 (k2\_gate\_1 \\
& X5 X32))) \wedge (v1\_xboole\_0 X38)) \wedge ((\neg(\neg v1\_xboole\_0 X39) \wedge (v1\_xboole\_0 \\
& (k4\_gate\_1 X22 (k2\_gate\_1 X6 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 \\
& X22 (k2\_gate\_1 X6 X32))) \wedge (v1\_xboole\_0 X39)) \wedge ((\neg(\neg v1\_xboole\_0 \\
& X40) \wedge (v1\_xboole\_0 (k4\_gate\_1 X23 (k2\_gate\_1 X7 X32)))) \wedge ((\neg(\neg \\
& v1\_xboole\_0 (k4\_gate\_1 X23 (k2\_gate\_1 X7 X32))) \wedge (v1\_xboole\_0 \\
& X40)) \wedge ((\neg(\neg v1\_xboole\_0 X41) \wedge (v1\_xboole\_0 (k4\_gate\_1 X24 (k2\_gate\_1 \\
& X8 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X24 (k2\_gate\_1 X8 X32))) \wedge \\
& (v1\_xboole\_0 X41)) \wedge ((\neg(\neg v1\_xboole\_0 X42) \wedge (v1\_xboole\_0 (k4\_gate\_1 \\
& X25 (k2\_gate\_1 X9 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X25 (k2\_gate\_1 \\
& X9 X32))) \wedge (v1\_xboole\_0 X42)) \wedge ((\neg(\neg v1\_xboole\_0 X43) \wedge (v1\_xboole\_0 \\
& (k4\_gate\_1 X26 (k2\_gate\_1 X10 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 \\
& X26 (k2\_gate\_1 X10 X32))) \wedge (v1\_xboole\_0 X43)) \wedge ((\neg(\neg v1\_xboole\_0 \\
& X44) \wedge (v1\_xboole\_0 (k4\_gate\_1 X27 (k2\_gate\_1 X11 X32)))) \wedge ((\neg(\neg \\
& v1\_xboole\_0 (k4\_gate\_1 X27 (k2\_gate\_1 X11 X32))) \wedge (v1\_xboole\_0 \\
& X44)) \wedge ((\neg(\neg v1\_xboole\_0 X45) \wedge (v1\_xboole\_0 (k4\_gate\_1 X28 (k2\_gate\_1 \\
& X12 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X28 (k2\_gate\_1 X12 X32))) \wedge \\
& (v1\_xboole\_0 X45)) \wedge ((\neg(\neg v1\_xboole\_0 X46) \wedge (v1\_xboole\_0 (k4\_gate\_1 \\
& X29 (k2\_gate\_1 X13 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X29 (k2\_gate\_1 \\
& X13 X32))) \wedge (v1\_xboole\_0 X46)) \wedge ((\neg(\neg v1\_xboole\_0 X47) \wedge (v1\_xboole\_0 \\
& (k4\_gate\_1 X30 (k2\_gate\_1 X14 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 \\
& X30 (k2\_gate\_1 X14 X32))) \wedge (v1\_xboole\_0 X47)) \wedge ((\neg(\neg v1\_xboole\_0 \\
& X48) \wedge (v1\_xboole\_0 (k4\_gate\_1 X31 (k2\_gate\_1 X15 X32)))) \wedge ((\neg(\neg \\
& v1\_xboole\_0 (k4\_gate\_1 X31 (k2\_gate\_1 X15 X32))) \wedge (v1\_xboole\_0 \\
& X48)) \wedge ((\neg(\neg v1\_xboole\_0 X32) \wedge (v1\_xboole\_0 (k2\_gate\_1 X16 X32))) \wedge \\
& ((\neg(\neg v1\_xboole\_0 (k2\_gate\_1 X16 X32)) \wedge (v1\_xboole\_0 X32)) \wedge ((\neg \\
& v1\_xboole\_0 X31) \wedge (v1\_xboole\_0 (k4\_gate\_1 X48 (k2\_gate\_1 X15 X32)))) \wedge ((\neg \\
& v1\_xboole\_0 (k4\_gate\_1 X48 (k2\_gate\_1 X15 X32))) \wedge (v1\_xboole\_0 X31)) \wedge ((\neg(\neg v1\_xboole\_0 X30) \wedge (v1\_xboole\_0 (k4\_gate\_1 \\
& X47 (k2\_gate\_1 X14 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X47 (k2\_gate\_1 \\
& X14 X32))) \wedge (v1\_xboole\_0 X30)) \wedge ((\neg(\neg v1\_xboole\_0 X29) \wedge (v1\_xboole\_0 \\
& (k4\_gate\_1 X46 (k2\_gate\_1 X13 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 \\
& X46 (k2\_gate\_1 X13 X32))) \wedge (v1\_xboole\_0 X29)) \wedge ((\neg(\neg v1\_xboole\_0 \\
& X28) \wedge (v1\_xboole\_0 (k4\_gate\_1 X45 (k2\_gate\_1 X12 X32)))) \wedge ((\neg(\neg \\
& v1\_xboole\_0 (k4\_gate\_1 X45 (k2\_gate\_1 X12 X32))) \wedge (v1\_xboole\_0 \\
& X28)) \wedge ((\neg(\neg v1\_xboole\_0 X27) \wedge (v1\_xboole\_0 (k4\_gate\_1 X44 (k2\_gate\_1 \\
& X11 X32)))) \wedge ((\neg(\neg v1\_xboole\_0 (k4\_gate\_1 X44 (k2\_gate\_1 X11 X32))) \wedge
\end{aligned}$$