

t43\_cat\_4 (TMdms-  
FusARKZEZKxf7zzxypMFUzhDCFX9qC)

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Let  $v2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v11\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v2\_cat\_1 : \iota \Rightarrow o$  be given. Let  $v3\_cat\_1 : \iota \Rightarrow o$  be given. Let  $v4\_cat\_1 : \iota \Rightarrow o$  be given. Let  $v5\_cat\_1 : \iota \Rightarrow o$  be given. Let  $v6\_cat\_1 : \iota \Rightarrow o$  be given. Let  $v3\_cat\_4 : \iota \Rightarrow o$  be given. Let  $l1\_cat\_4 : \iota \Rightarrow o$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $m1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k2\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_xboole\_0 : \iota$  be given. Let  $k5\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k18\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k9\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $l1\_cat\_1 : \iota \Rightarrow o$  be given. Let  $k8\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k7\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned}
 & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
 & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
 & X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))))) \Rightarrow (\forall X1.(m1\_subset\_1 \\
 & X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\
 & X0)) \Rightarrow (\forall X3.(m1\_subset\_1 X3 (u1\_struct\_0 X0)) \Rightarrow (\forall X4. \\
 & (m1\_subset\_1 X4 (u1\_struct\_0 X0)) \Rightarrow (\forall X5.(m1\_subset\_1 X5 \\
 & (u1\_struct\_0 X0)) \Rightarrow (\forall X6.(m1\_cat\_1 X6 X0 X1 X2) \Rightarrow (\forall X7. \\
 & (m1\_cat\_1 X7 X0 X3 X4) \Rightarrow (\forall X8.(m1\_cat\_1 X8 X0 X5 X1) \Rightarrow (\forall X9. \\
 & (m1\_cat\_1 X9 X0 X5 X3) \Rightarrow (\neg(k2\_cat\_1 X0 X1 X2 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 \\
 & X0 X3 X4 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 X0 X5 X1 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 \\
 & X0 X5 X3 \neq k1\_xboole\_0) \wedge (k5\_cat\_1 X0 X5 (k2\_cat\_4 X0 X1 X3) (k2\_cat\_4 \\
 & X0 X2 X4) (k9\_cat\_4 X0 X1 X3 X5 X8 X9) (k18\_cat\_4 X0 X1 X2 X3 X4 X6 X7) \neq \\
 & k9\_cat\_4 X0 X2 X4 X5 (k5\_cat\_1 X0 X5 X1 X2 X8 X6) (k5\_cat\_1 X0 X5 X3 X4 \\
 & X9 X7))))))))))))))
 \end{aligned}$$

(1)

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\
& (m1\_subset\_1 X3 (u1\_struct\_0 X0)) \Rightarrow (\forall X4.(m1\_subset\_1 X4 \\
& (u1\_struct\_0 X0)) \Rightarrow (\forall X5.(m1\_cat\_1 X5 X0 X1 X2) \Rightarrow (\forall X6. \\
& (m1\_cat\_1 X6 X0 X2 X3) \Rightarrow (\forall X7.(m1\_cat\_1 X7 X0 X3 X4) \Rightarrow (\neg (k2\_cat\_1 \\
& X0 X1 X2 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 X0 X2 X3 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 \\
& X0 X3 X4 \neq k1\_xboole\_0) \wedge (k5\_cat\_1 X0 X1 X2 X4 X5 (k5\_cat\_1 X0 X2 X3 X4 \\
& X6 X7) \neq k5\_cat\_1 X0 X1 X3 X4 (k5\_cat\_1 X0 X1 X2 X3 X5 X6) X7))))))))))
\end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\
& (m1\_subset\_1 X3 (u1\_struct\_0 X0)) \Rightarrow (\neg (k2\_cat\_1 X0 X1 X2 \neq k1\_xboole\_0) \wedge \\
& ((k2\_cat\_1 X0 X2 X3 \neq k1\_xboole\_0) \wedge (k2\_cat\_1 X0 X1 X3 = k1\_xboole\_0))))))
\end{aligned} \tag{3}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 \\
& X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\
& X0)) \Rightarrow ((k2\_cat\_1 X0 (k2\_cat\_4 X0 X1 X2) X1 \neq k1\_xboole\_0) \wedge (k2\_cat\_1 \\
& X0 (k2\_cat\_4 X0 X1 X2) X2 \neq k1\_xboole\_0)))
\end{aligned} \tag{4}$$

Assume the following.

$$\forall X0.(l1\_cat\_4 X0) \Rightarrow (l1\_cat\_1 X0) \tag{5}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. \forall X2. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 \\
& X0) \wedge ((v2\_cat\_1 X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 \\
& X0) \wedge ((v6\_cat\_1 X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))) \wedge (( \\
& m1\_subset\_1 X1 (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (u1\_struct\_0 \\
& X0))) \Rightarrow (m1\_cat\_1 (k8\_cat\_4 X0 X1 X2) X0 (k2\_cat\_4 X0 X1 X2) X2)
\end{aligned} \tag{6}$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 \\ & X0)\wedge((v2\_cat\_1 X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 \\ & X0)\wedge((v6\_cat\_1 X0)\wedge((v3\_cat\_4 X0)\wedge(l1\_cat\_4 X0))))))))))\wedge(( \\ & m1\_subset\_1 X1 (u1\_struct\_0 X0))\wedge(m1\_subset\_1 X2 (u1\_struct\_0 \\ & X0))))\Rightarrow(m1\_cat\_1 (k7\_cat\_4 X0 X1 X2) X0 (k2\_cat\_4 X0 X1 X2) X1) \end{aligned} \quad (7)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.\forall X4.\forall X5. \\ & (((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 X0)\wedge((v2\_cat\_1 X0)\wedge((v3\_cat\_1 \\ & X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 X0)\wedge((v6\_cat\_1 X0)\wedge(l1\_cat\_1 \\ & X0))))))))))\wedge((m1\_subset\_1 X1 (u1\_struct\_0 X0))\wedge((m1\_subset\_1 \\ & X2 (u1\_struct\_0 X0))\wedge((m1\_subset\_1 X3 (u1\_struct\_0 X0))\wedge((m1\_cat\_1 \\ & X4 X0 X1 X2)\wedge(m1\_cat\_1 X5 X0 X2 X3))))))\Rightarrow(m1\_cat\_1 (k5\_cat\_1 X0 X1 \\ & X2 X3 X4 X5) X0 X1 X3) \end{aligned} \quad (8)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 \\ & X0)\wedge(l1\_cat\_4 X0)))\wedge((m1\_subset\_1 X1 (u1\_struct\_0 X0))\wedge(m1\_subset\_1 \\ & X2 (u1\_struct\_0 X0))))\Rightarrow(m1\_subset\_1 (k2\_cat\_4 X0 X1 X2) (u1\_struct\_0 \\ & X0)) \end{aligned} \quad (9)$$

Assume the following.

$$\begin{aligned} & \forall X0.(((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 X0)\wedge((v2\_cat\_1 \\ & X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 X0)\wedge((v6\_cat\_1 \\ & X0)\wedge((v3\_cat\_4 X0)\wedge(l1\_cat\_4 X0))))))))))\Rightarrow(\forall X1.(m1\_subset\_1 \\ & X1 (u1\_struct\_0 X0))\Rightarrow(\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\ & X0))\Rightarrow(\forall X3.(m1\_subset\_1 X3 (u1\_struct\_0 X0))\Rightarrow(\forall X4. \\ & (m1\_subset\_1 X4 (u1\_struct\_0 X0))\Rightarrow(\forall X5.(m1\_cat\_1 X5 X0 \\ & X1 X2)\Rightarrow(\forall X6.(m1\_cat\_1 X6 X0 X3 X4)\Rightarrow(k18\_cat\_4 X0 X1 X2 X3 X4 \\ & X5 X6 = k9\_cat\_4 X0 X2 X4 (k2\_cat\_4 X0 X1 X3) (k5\_cat\_1 X0 (k2\_cat\_4 \\ & X0 X1 X3) X1 X2 (k7\_cat\_4 X0 X1 X3) X5) (k5\_cat\_1 X0 (k2\_cat\_4 X0 X1 X3) \\ & X3 X4 (k8\_cat\_4 X0 X1 X3) X6))))))))) \end{aligned} \quad (10)$$

**Theorem 1**

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))))) \Rightarrow (\forall X1.(m1\_subset\_1 \\ & X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\ & X0)) \Rightarrow (\forall X3.(m1\_subset\_1 X3 (u1\_struct\_0 X0)) \Rightarrow (\forall X4. \\ & (m1\_subset\_1 X4 (u1\_struct\_0 X0)) \Rightarrow (\forall X5.(m1\_subset\_1 X5 \\ & (u1\_struct\_0 X0)) \Rightarrow (\forall X6.(m1\_subset\_1 X6 (u1\_struct\_0 X0)) \Rightarrow \\ & (\forall X7.(m1\_cat\_1 X7 X0 X1 X2) \Rightarrow (\forall X8.(m1\_cat\_1 X8 X0 X3 \\ & X4) \Rightarrow (\forall X9.(m1\_cat\_1 X9 X0 X5 X1) \Rightarrow (\forall X10.(m1\_cat\_1 \\ & X10 X0 X6 X3) \Rightarrow (\neg(k2\_cat\_1 X0 X1 X2 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 X0 X3 \\ & X4 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 X0 X5 X1 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 \\ & X0 X6 X3 \neq k1\_xboole\_0) \wedge (k5\_cat\_1 X0 (k2\_cat\_4 X0 X5 X6) (k2\_cat\_4 \\ & X0 X1 X3) (k2\_cat\_4 X0 X2 X4) (k18\_cat\_4 X0 X5 X1 X6 X3 X9 X10) (k18\_cat\_4 \\ & X0 X1 X2 X3 X4 X7 X8) \neq k18\_cat\_4 X0 X5 X2 X6 X4 (k5\_cat\_1 X0 X5 X1 X2 X9 X7) \\ & (k5\_cat\_1 X0 X6 X3 X4 X10 X8)))))))))))))) \end{aligned}$$