

t57\_cat\_3 (TMTGJMaL-  
CYvY2Ew5P58vZZDfUY6bKJkpT8K)

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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  $l1\_cat\_1 : \iota \Rightarrow o$  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  $r2\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k2\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_xboole\_0 : \iota$  be given. Let  $v1\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k5\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\
& (m1\_subset\_1 X3 (u1\_struct\_0 X0)) \Rightarrow (\neg(k2\_cat\_1 X0 X1 X2 \neq k1\_xboole\_0) \wedge \\
& ((k2\_cat\_1 X0 X1 X3 \neq k1\_xboole\_0) \wedge (\neg \forall X4.(m1\_cat\_1 X4 X0 \\
& X1 X2) \Rightarrow (\forall X5.(m1\_cat\_1 X5 X0 X1 X3) \Rightarrow (r2\_cat\_3 X0 X1 X4 X5) \Leftrightarrow \\
& (\forall X6.(m1\_subset\_1 X6 (u1\_struct\_0 X0)) \Rightarrow (\neg(k2\_cat\_1 X0 \\
& X6 X2 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 X0 X6 X3 \neq k1\_xboole\_0) \wedge (\neg(k2\_cat\_1 \\
& X0 X6 X1 \neq k1\_xboole\_0) \wedge (\forall X7.(m1\_cat\_1 X7 X0 X6 X2) \Rightarrow (\forall X8. \\
& (m1\_cat\_1 X8 X0 X6 X3) \Rightarrow (\exists X9.(m1\_cat\_1 X9 X0 X6 X1) \wedge (\forall X10. \\
& (m1\_cat\_1 X10 X0 X6 X1) \Rightarrow (((k5\_cat\_1 X0 X6 X1 X2 X10 X4 = X7) \wedge (k5\_cat\_1 \\
& X0 X6 X1 X3 X10 X5 = X8)) \Leftrightarrow (X9 = X10))))))))))))))
\end{aligned} \tag{1}$$

Assume the following.

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

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0)\wedge(\neg v11\_struct\_0 \\ & X0)\wedge(l1\_cat\_1 X0))\wedge((m1\_subset\_1 X1 (u1\_struct\_0 X0))\wedge(m1\_subset\_1 \\ & X2 (u1\_struct\_0 X0))))\Rightarrow(\exists X3.m1\_cat\_1 X3 X0 X1 X2) \end{aligned} \quad (3)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.(((\neg v2\_struct\_0 X0)\wedge(\neg v11\_struct\_0 X0)\wedge \\ & ((v5\_cat\_1 X0)\wedge((v6\_cat\_1 X0)\wedge(l1\_cat\_1 X0))))\wedge(m1\_subset\_1 \\ & X1 (u1\_struct\_0 X0))\Rightarrow(m1\_cat\_1 (k4\_cat\_1 X0 X1) X0 X1 X1) \end{aligned} \quad (4)$$

Assume the following.

$$\begin{aligned} & \forall X0.(((\neg v2\_struct\_0 X0)\wedge(\neg v11\_struct\_0 X0)\wedge((v2\_cat\_1 \\ & X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 X0)\wedge((v6\_cat\_1 \\ & X0)\wedge(l1\_cat\_1 X0))))))))\Rightarrow(\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0))\Rightarrow(\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0))\Rightarrow(\forall X3. \\ & (m1\_cat\_1 X3 X0 X1 X2)\Rightarrow((v1\_cat\_3 X3 X0 X1 X2)\Leftrightarrow((k2\_cat\_1 X0 X1 X2\neq \\ & k1\_xboole\_0)\wedge((k2\_cat\_1 X0 X2 X1\neq k1\_xboole\_0)\wedge(\exists X4.( \\ & m1\_cat\_1 X4 X0 X2 X1)\wedge(k5\_cat\_1 X0 X2 X1 X2 X4 X3 = k4\_cat\_1 X0 X2)))))))) \end{aligned} \quad (5)$$

**Theorem 1**

$$\begin{aligned} & \forall X0.(((\neg v2\_struct\_0 X0)\wedge(\neg v11\_struct\_0 X0)\wedge((v2\_cat\_1 \\ & X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 X0)\wedge((v6\_cat\_1 \\ & X0)\wedge(l1\_cat\_1 X0))))))))\Rightarrow(\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0))\Rightarrow(\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0))\Rightarrow(\forall X3. \\ & (m1\_subset\_1 X3 (u1\_struct\_0 X0))\Rightarrow(\forall X4.(m1\_cat\_1 X4 X0 \\ & X1 X2)\Rightarrow(\forall X5.(m1\_cat\_1 X5 X0 X1 X3)\Rightarrow((r2\_cat\_3 X0 X1 X4 X5)\Rightarrow \\ & ((k2\_cat\_1 X0 X1 X2 = k1\_xboole\_0)\vee((k2\_cat\_1 X0 X1 X3 = k1\_xboole\_0)\vee \\ & ((k2\_cat\_1 X0 X2 X3 = k1\_xboole\_0)\vee((k2\_cat\_1 X0 X3 X2 = k1\_xboole\_0)\vee \\ & ((v1\_cat\_3 X4 X0 X1 X2)\wedge(v1\_cat\_3 X5 X0 X1 X3)))))))))) \end{aligned}$$