

## t40\_cat\_4

(TMYkhtP8c6Cr858XfJPEkwwUMTCRLLbcUB8)

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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  $k18\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $l1\_cat\_1 : \iota \Rightarrow o$  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  $k9\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k7\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k8\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\ & (m1\_cat\_1 X3 X0 X1 X2) \Rightarrow ((k2\_cat\_1 X0 X1 X2 \neq k1\_xboole\_0) \Rightarrow (k5\_cat\_1 \\ & X0 X1 X2 X2 X3 (k4\_cat\_1 X0 X2) = X3)))))) \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 \\ & X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\ & X0)) \Rightarrow (k9\_cat\_4 X0 X1 X2 (k2\_cat\_4 X0 X1 X2) (k7\_cat\_4 X0 X1 X2) (k8\_cat\_4 \\ & X0 X1 X2) = k4\_cat\_1 X0 (k2\_cat\_4 X0 X1 X2)))) \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))))) \Rightarrow (\forall X1.(m1\_subset\_1 \\ & X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\ & X0)) \Rightarrow ((k2\_cat\_1 X0 (k2\_cat\_4 X0 X1 X2) X1 \neq k1\_xboole\_0) \wedge (k2\_cat\_1 \\ & X0 (k2\_cat\_4 X0 X1 X2) X2 \neq k1\_xboole\_0)))) \end{aligned} \quad (3)$$

Assume the following.

$$\forall X0.(l1\_cat\_4 X0) \Rightarrow (l1\_cat\_1 X0) \quad (4)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 \\ & X0) \wedge ((v2\_cat\_1 X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 \\ & X0) \wedge ((v6\_cat\_1 X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))))) \wedge (( \\ & m1\_subset\_1 X1 (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (u1\_struct\_0 \\ & X0))) \Rightarrow (m1\_cat\_1 (k8\_cat\_4 X0 X1 X2) X0 (k2\_cat\_4 X0 X1 X2) X2) \end{aligned} \quad (5)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 \\ & X0) \wedge ((v2\_cat\_1 X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 \\ & X0) \wedge ((v6\_cat\_1 X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))))) \wedge (( \\ & m1\_subset\_1 X1 (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (u1\_struct\_0 \\ & X0))) \Rightarrow (m1\_cat\_1 (k7\_cat\_4 X0 X1 X2) X0 (k2\_cat\_4 X0 X1 X2) X1) \end{aligned} \quad (6)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.(((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge \\ & ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))) \wedge (m1\_subset\_1 \\ & X1 (u1\_struct\_0 X0)) \Rightarrow (m1\_cat\_1 (k4\_cat\_1 X0 X1) X0 X1 X1) \end{aligned} \quad (7)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 \\ & X0) \wedge (l1\_cat\_4 X0))) \wedge ((m1\_subset\_1 X1 (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 \\ & X2 (u1\_struct\_0 X0)))) \Rightarrow (m1\_subset\_1 (k2\_cat\_4 X0 X1 X2) (u1\_struct\_0 \\ & X0)) \end{aligned} \quad (8)$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 \\
& X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X3.(m1\_subset\_1 X3 (u1\_struct\_0 X0)) \Rightarrow (\forall X4. \\
& (m1\_subset\_1 X4 (u1\_struct\_0 X0)) \Rightarrow (\forall X5.(m1\_cat\_1 X5 X0 \\
& X1 X2) \Rightarrow (\forall X6.(m1\_cat\_1 X6 X0 X3 X4) \Rightarrow (k18\_cat\_4 X0 X1 X2 X3 X4 \\
& X5 X6 = k9\_cat\_4 X0 X2 X4 (k2\_cat\_4 X0 X1 X3) (k5\_cat\_1 X0 (k2\_cat\_4 \\
& X0 X1 X3) X1 X2 (k7\_cat\_4 X0 X1 X3) X5) (k5\_cat\_1 X0 (k2\_cat\_4 X0 X1 X3) \\
& X3 X4 (k8\_cat\_4 X0 X1 X3) X6))))))))) \tag{9}
\end{aligned}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge ((v3\_cat\_4 X0) \wedge (l1\_cat\_4 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 \\
& X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\
& X0)) \Rightarrow (k18\_cat\_4 X0 X1 X1 X2 X2 (k4\_cat\_1 X0 X1) (k4\_cat\_1 X0 X2) = k4\_cat\_1 \\
& X0 (k2\_cat\_4 X0 X1 X2))))
\end{aligned}$$