

## t12\_cat\_5

(TMZFMQ5sVjizScPFnkarVEzrCLqAjsVYQP<sub>r</sub>)

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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  $v3\_cat\_5 : \iota \Rightarrow o$  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  $l1\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $l5\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l1\_graph\_1 : \iota \Rightarrow o$  be given. Let  $v2\_cat\_5 : \iota \Rightarrow o$  be given. Let  $k4\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_tarski : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k10\_cat\_1 : \iota \Rightarrow \iota$  be given. Let  $u4\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k3\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $m2\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k9\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\forall X0. ((\neg v2\_struct\_0 X0) \wedge (l1\_struct\_0 X0)) \Rightarrow (\neg v1\_xboole\_0 (u1\_struct\_0 X0)) \quad (1)$$

Assume the following.

$$\forall X0. (l5\_struct\_0 X0) \Rightarrow (l1\_struct\_0 X0) \quad (2)$$

Assume the following.

$$\forall X0. (l1\_graph\_1 X0) \Rightarrow (l5\_struct\_0 X0) \quad (3)$$

Assume the following.

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

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 ((v3\_cat\_5 X0) \Leftrightarrow ((v2\_cat\_5 (u1\_struct\_0 \\
& X0)) \wedge ((\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2. \\
& ((\neg v2\_struct\_0 X2) \wedge ((\neg v11\_struct\_0 X2) \wedge ((v2\_cat\_1 X2) \wedge ((v3\_cat\_1 \\
& X2) \wedge ((v4\_cat\_1 X2) \wedge ((v5\_cat\_1 X2) \wedge ((v6\_cat\_1 X2) \wedge (l1\_cat\_1 \\
& X2)))))))) \Rightarrow ((X1 = X2) \Rightarrow (k4\_cat\_1 X0 X1 = k4\_tarski (k4\_tarski X2 \\
& X2) (k10\_cat\_1 X2)))))) \wedge ((\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.((\neg v2\_struct\_0 X2) \wedge ((\neg v11\_struct\_0 X2) \wedge (( \\
& v2\_cat\_1 X2) \wedge ((v3\_cat\_1 X2) \wedge ((v4\_cat\_1 X2) \wedge ((v5\_cat\_1 X2) \wedge ( \\
& (v6\_cat\_1 X2) \wedge (l1\_cat\_1 X2)))))))) \Rightarrow (\forall X3.((\neg v2\_struct\_0 \\
& X3) \wedge ((\neg v11\_struct\_0 X3) \wedge ((v2\_cat\_1 X3) \wedge ((v3\_cat\_1 X3) \wedge ((v4\_cat\_1 \\
& X3) \wedge ((v5\_cat\_1 X3) \wedge ((v6\_cat\_1 X3) \wedge (l1\_cat\_1 X3)))))))) \Rightarrow (\neg( \\
& X2 = k3\_graph\_1 X0 X1) \wedge ((X3 = k4\_graph\_1 X0 X1) \wedge (\forall X4.(m2\_cat\_1 \\
& X4 X2 X3) \Rightarrow (X1 \neq k4\_tarski (k4\_tarski X2 X3) X4)))))) \wedge (\forall X1. \\
& (m1\_subset\_1 X1 (u4\_struct\_0 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 \\
& (u4\_struct\_0 X0)) \Rightarrow (\forall X3.((\neg v2\_struct\_0 X3) \wedge ((\neg v11\_struct\_0 \\
& X3) \wedge ((v2\_cat\_1 X3) \wedge ((v3\_cat\_1 X3) \wedge ((v4\_cat\_1 X3) \wedge ((v5\_cat\_1 \\
& X3) \wedge ((v6\_cat\_1 X3) \wedge (l1\_cat\_1 X3)))))))) \Rightarrow (\forall X4.((\neg v2\_struct\_0 \\
& X4) \wedge ((\neg v11\_struct\_0 X4) \wedge ((v2\_cat\_1 X4) \wedge ((v3\_cat\_1 X4) \wedge ((v4\_cat\_1 \\
& X4) \wedge ((v5\_cat\_1 X4) \wedge ((v6\_cat\_1 X4) \wedge (l1\_cat\_1 X4)))))))) \Rightarrow (\forall X5. \\
& ((\neg v2\_struct\_0 X5) \wedge ((\neg v11\_struct\_0 X5) \wedge ((v2\_cat\_1 X5) \wedge ((v3\_cat\_1 \\
& X5) \wedge ((v4\_cat\_1 X5) \wedge ((v5\_cat\_1 X5) \wedge ((v6\_cat\_1 X5) \wedge (l1\_cat\_1 \\
& X5)))))))) \Rightarrow (\forall X6.(m2\_cat\_1 X6 X3 X4) \Rightarrow (\forall X7.(m2\_cat\_1 \\
& X7 X4 X5) \Rightarrow (((X1 = k4\_tarski (k4\_tarski X3 X4) X6) \wedge (X2 = k4\_tarski \\
& (k4\_tarski X4 X5) X7)) \Rightarrow (k1\_cat\_1 X0 X1 X2 = k4\_tarski (k4\_tarski \\
& X3 X5) (k9\_cat\_1 X3 X4 X5 X6 X7))))))))))
\end{aligned} \tag{5}$$

Assume the following.

$$\begin{aligned}
& \forall X0.(\neg v1\_xboole\_0 X0) \Rightarrow ((v2\_cat\_5 X0) \Leftrightarrow (\forall X1.(m1\_subset\_1 \\
& X1 X0) \Rightarrow ((\neg v2\_struct\_0 X1) \wedge ((\neg v11\_struct\_0 X1) \wedge ((v2\_cat\_1 X1) \wedge \\
& ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 X1) \wedge ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge \\
& (l1\_cat\_1 X1))))))))))
\end{aligned} \tag{6}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge ((v3\_cat\_5 X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 \\
& X1 (u1\_struct\_0 X0)) \Rightarrow ((\neg v2\_struct\_0 X1) \wedge ((\neg v11\_struct\_0 X1) \wedge \\
& ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 X1) \wedge ((v5\_cat\_1 X1) \wedge \\
& ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1))))))))))
\end{aligned}$$