

t38_cat_4 (TMdEed-
pRb5aQD2GVqWqZyYvdUzrXiab31SX)

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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 $r1_cat_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k2_cat_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k5_cat_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k17_cat_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k16_cat_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k4_cat_1 : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k2_cat_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k1_xboole_0 : \iota$ 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. Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge ((v2_cat_1 \\
& X0) \wedge ((v3_cat_1 X0) \wedge ((v4_cat_1 X0) \wedge ((v5_cat_1 X0) \wedge ((v6_cat_1 \\
& X0) \wedge ((v3_cat_4 X0) \wedge (l1_cat_4 X0)))))))))) \Rightarrow (\forall X1.(m1_subset_1 \\
& X1 (u1_struct_0 X0)) \Rightarrow (\forall X2.(m1_subset_1 X2 (u1_struct_0 \\
& X0)) \Rightarrow (\forall X3.(m1_subset_1 X3 (u1_struct_0 X0)) \Rightarrow ((k5_cat_1 \\
& X0 (k2_cat_4 X0 X1 (k2_cat_4 X0 X2 X3)) (k2_cat_4 X0 (k2_cat_4 X0 X1 \\
& X2) X3) (k2_cat_4 X0 X1 (k2_cat_4 X0 X2 X3)) (k17_cat_4 X0 X1 X2 X3) \\
& (k16_cat_4 X0 X1 X2 X3) = k4_cat_1 X0 (k2_cat_4 X0 X1 (k2_cat_4 X0 X2 \\
& X3))) \wedge (k5_cat_1 X0 (k2_cat_4 X0 (k2_cat_4 X0 X1 X2) X3) (k2_cat_4 \\
& X0 X1 (k2_cat_4 X0 X2 X3)) (k2_cat_4 X0 (k2_cat_4 X0 X1 X2) X3) (k16_cat_4 \\
& X0 X1 X2 X3) (k17_cat_4 X0 X1 X2 X3) = k4_cat_1 X0 (k2_cat_4 X0 (k2_cat_4 \\
& X0 X1 X2) X3))))))
\end{aligned}$$

(1)

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge ((v2_cat_1 \\ & X0) \wedge ((v3_cat_1 X0) \wedge ((v4_cat_1 X0) \wedge ((v5_cat_1 X0) \wedge ((v6_cat_1 \\ & X0) \wedge ((v3_cat_4 X0) \wedge (l1_cat_4 X0)))))))))) \Rightarrow (\forall X1.(m1_subset_1 \\ & X1 (u1_struct_0 X0)) \Rightarrow (\forall X2.(m1_subset_1 X2 (u1_struct_0 \\ & X0)) \Rightarrow (\forall X3.(m1_subset_1 X3 (u1_struct_0 X0)) \Rightarrow ((k2_cat_1 \\ & X0 (k2_cat_4 X0 (k2_cat_4 X0 X1 X2) X3) (k2_cat_4 X0 X1 (k2_cat_4 X0 \\ & X2 X3)) \neq k1_xboole.0) \wedge (k2_cat_1 X0 (k2_cat_4 X0 X1 (k2_cat_4 X0 \\ & X2 X3)) (k2_cat_4 X0 (k2_cat_4 X0 X1 X2) X3) \neq k1_xboole.0)))))) \end{aligned} \quad (2)$$

Assume the following.

$$\forall X0.(l1_cat_4 X0) \Rightarrow (l1_cat_1 X0) \quad (3)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.(((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 \\ & X0) \wedge (l1_cat_4 X0))) \wedge ((m1_subset_1 X1 (u1_struct_0 X0)) \wedge (m1_subset_1 \\ & X2 (u1_struct_0 X0)))) \Rightarrow (m1_subset_1 (k2_cat_4 X0 X1 X2) (u1_struct_0 \\ & X0)) \end{aligned} \quad (4)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.(((\neg v2_struct_0 \\ & X0) \wedge ((\neg v11_struct_0 X0) \wedge ((v2_cat_1 X0) \wedge ((v3_cat_1 X0) \wedge ((v4_cat_1 \\ & X0) \wedge ((v5_cat_1 X0) \wedge ((v6_cat_1 X0) \wedge ((v3_cat_4 X0) \wedge (l1_cat_4 \\ & X0)))))))))) \wedge ((m1_subset_1 X1 (u1_struct_0 X0)) \wedge ((m1_subset_1 \\ & X2 (u1_struct_0 X0)) \wedge (m1_subset_1 X3 (u1_struct_0 X0)))))) \Rightarrow (m1_cat_1 \\ & (k17_cat_4 X0 X1 X2 X3) X0 (k2_cat_4 X0 X1 (k2_cat_4 X0 X2 X3)) (k2_cat_4 \\ & X0 (k2_cat_4 X0 X1 X2) X3)) \end{aligned} \quad (5)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.(((\neg v2_struct_0 \\ & X0) \wedge ((\neg v11_struct_0 X0) \wedge ((v2_cat_1 X0) \wedge ((v3_cat_1 X0) \wedge ((v4_cat_1 \\ & X0) \wedge ((v5_cat_1 X0) \wedge ((v6_cat_1 X0) \wedge ((v3_cat_4 X0) \wedge (l1_cat_4 \\ & X0)))))))))) \wedge ((m1_subset_1 X1 (u1_struct_0 X0)) \wedge ((m1_subset_1 \\ & X2 (u1_struct_0 X0)) \wedge (m1_subset_1 X3 (u1_struct_0 X0)))))) \Rightarrow (m1_cat_1 \\ & (k16_cat_4 X0 X1 X2 X3) X0 (k2_cat_4 X0 (k2_cat_4 X0 X1 X2) X3) (k2_cat_4 \\ & X0 X1 (k2_cat_4 X0 X2 X3))) \end{aligned} \quad (6)$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge ((v2_cat_1 \\
& X0) \wedge ((v3_cat_1 X0) \wedge ((v4_cat_1 X0) \wedge ((v5_cat_1 X0) \wedge ((v6_cat_1 \\
& X0) \wedge (l1_cat_1 X0))))))) \Rightarrow (\forall X1.(m1_subset_1 X1 (u1_struct_0 \\
& X0)) \Rightarrow (\forall X2.(m1_subset_1 X2 (u1_struct_0 X0)) \Rightarrow ((r1_cat_1 \\
& X0 X1 X2) \Leftrightarrow ((k2_cat_1 X0 X1 X2 \neq k1_xboole_0) \wedge ((k2_cat_1 X0 X2 X1 \neq \\
& k1_xboole_0) \wedge (\exists X3.(m1_cat_1 X3 X0 X1 X2) \wedge (\exists X4.(\\
& m1_cat_1 X4 X0 X2 X1) \wedge ((k5_cat_1 X0 X2 X1 X2 X4 X3 = k4_cat_1 X0 X2) \wedge \\
& (k5_cat_1 X0 X1 X2 X1 X3 X4 = k4_cat_1 X0 X1))))))))))
\end{aligned} \tag{7}$$

Theorem 1

$$\begin{aligned}
& \forall X0.((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge ((v2_cat_1 \\
& X0) \wedge ((v3_cat_1 X0) \wedge ((v4_cat_1 X0) \wedge ((v5_cat_1 X0) \wedge ((v6_cat_1 \\
& X0) \wedge ((v3_cat_4 X0) \wedge (l1_cat_4 X0)))))))) \Rightarrow (\forall X1.(m1_subset_1 \\
& X1 (u1_struct_0 X0)) \Rightarrow (\forall X2.(m1_subset_1 X2 (u1_struct_0 \\
& X0)) \Rightarrow (\forall X3.(m1_subset_1 X3 (u1_struct_0 X0)) \Rightarrow (r1_cat_1 \\
& X0 (k2_cat_4 X0 (k2_cat_4 X0 X1 X2) X3) (k2_cat_4 X0 X1 (k2_cat_4 X0 \\
& X2 X3))))))
\end{aligned}$$