

# t29\_cat\_3 (TMTCRbepXxULwxyGhEfLEyh- LzgEGHg9usG2)

October 27, 2020

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  $v2\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v8\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v9\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  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  $k5\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0)) \Rightarrow (v8\_cat\_1 (k4\_cat\_1 X0 X1) X0 X1 X1)) \end{aligned} \quad (1)$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\ & (m1\_cat\_1 X3 X0 X1 X2) \Rightarrow ((k2\_cat\_1 X0 X1 X2 \neq k1\_xboole\_0) \Rightarrow (k5\_cat\_1 \\ & X0 X1 X1 X2 (k4\_cat\_1 X0 X1) X3 = X3)))))) \end{aligned} \quad (2)$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\ & (m1\_cat\_1 X3 X0 X1 X2) \Rightarrow ((k2\_cat\_1 X0 X1 X2 \neq k1\_xboole\_0) \Rightarrow (k5\_cat\_1 \\ & X0 X1 X2 X2 X3 (k4\_cat\_1 X0 X2) = X3)))))) \end{aligned} \quad (3)$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\
& (m1\_subset\_1 X3 (u1\_struct\_0 X0)) \Rightarrow (\forall X4.(m1\_subset\_1 X4 \\
& (u1\_struct\_0 X0)) \Rightarrow (\forall X5.(m1\_cat\_1 X5 X0 X1 X2) \Rightarrow (\forall X6. \\
& (m1\_cat\_1 X6 X0 X2 X3) \Rightarrow (\forall X7.(m1\_cat\_1 X7 X0 X3 X4) \Rightarrow (\neg(k2\_cat\_1 \\
& X0 X1 X2 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 X0 X2 X3 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 \\
& X0 X3 X4 \neq k1\_xboole\_0) \wedge (k5\_cat\_1 X0 X1 X2 X4 X5 (k5\_cat\_1 X0 X2 X3 X4 \\
& X6 X7) \neq k5\_cat\_1 X0 X1 X3 X4 (k5\_cat\_1 X0 X1 X2 X3 X5 X6) X7))))))))))
\end{aligned} \tag{4}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. \forall X2. \forall X3. \forall X4. \forall X5. \\
& (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 X0) \wedge ((v3\_cat\_1 \\
& X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 \\
& X0))))))) \wedge ((m1\_subset\_1 X1 (u1\_struct\_0 X0)) \wedge ((m1\_subset\_1 \\
& X2 (u1\_struct\_0 X0)) \wedge ((m1\_subset\_1 X3 (u1\_struct\_0 X0)) \wedge ((m1\_cat\_1 \\
& X4 X0 X1 X2) \wedge (m1\_cat\_1 X5 X0 X2 X3)))))) \Rightarrow (m1\_cat\_1 (k5\_cat\_1 X0 X1 \\
& X2 X3 X4 X5) X0 X1 X3)
\end{aligned} \tag{5}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge \\
& ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))) \wedge (m1\_subset\_1 \\
& X1 (u1\_struct\_0 X0))) \Rightarrow (m1\_cat\_1 (k4\_cat\_1 X0 X1) X0 X1 X1)
\end{aligned} \tag{6}$$

Assume the following.

$$\begin{aligned}
& \forall X0. ((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\
& (m1\_cat\_1 X3 X0 X1 X2) \Rightarrow ((v2\_cat\_3 X3 X0 X1 X2) \Leftrightarrow ((k2\_cat\_1 X0 X1 X2 \neq \\
& k1\_xboole\_0) \wedge ((k2\_cat\_1 X0 X2 X1 \neq k1\_xboole\_0) \wedge (\exists X4.( \\
& m1\_cat\_1 X4 X0 X2 X1) \wedge (k5\_cat\_1 X0 X1 X2 X1 X3 X4 = k4\_cat\_1 X0 X1))))))
\end{aligned} \tag{7}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\
& (m1\_cat\_1 X3 X0 X1 X2) \Rightarrow ((v9\_cat\_1 X3 X0 X1 X2) \Leftrightarrow ((k2\_cat\_1 X0 X1 X2 \neq \\
& k1\_xboole\_0) \wedge ((k2\_cat\_1 X0 X2 X1 \neq k1\_xboole\_0) \wedge (\exists X4.( \\
& m1\_cat\_1 X4 X0 X2 X1) \wedge ((k5\_cat\_1 X0 X2 X1 X2 X4 X3 = k4\_cat\_1 X0 X2) \wedge \\
& (k5\_cat\_1 X0 X1 X2 X1 X3 X4 = k4\_cat\_1 X0 X1))))))))))
\end{aligned} \tag{8}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\
& (m1\_cat\_1 X3 X0 X1 X2) \Rightarrow ((v8\_cat\_1 X3 X0 X1 X2) \Leftrightarrow ((k2\_cat\_1 X0 X1 X2 \neq \\
& k1\_xboole\_0) \wedge (\forall X4.(m1\_subset\_1 X4 (u1\_struct\_0 X0)) \Rightarrow \\
& ((k2\_cat\_1 X0 X2 X4 \neq k1\_xboole\_0) \Rightarrow (\forall X5.(m1\_cat\_1 X5 X0 X2 \\
& X4) \Rightarrow (\forall X6.(m1\_cat\_1 X6 X0 X2 X4) \Rightarrow ((k5\_cat\_1 X0 X1 X2 X4 X3 X5 = \\
& k5\_cat\_1 X0 X1 X2 X4 X3 X6) \Rightarrow (X5 = X6))))))))))
\end{aligned} \tag{9}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3. \\
& (m1\_cat\_1 X3 X0 X1 X2) \Rightarrow (((v2\_cat\_3 X3 X0 X1 X2) \wedge (v8\_cat\_1 X3 X0 X1 \\
& X2)) \Rightarrow (v9\_cat\_1 X3 X0 X1 X2))))))
\end{aligned}$$