

## t9\_cat\_3

(TMPrg7o3TNDwappcJXcRU6cMsJkE836nNb6)

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  $u4\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $r2\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k2\_tarski : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_oppcat\_1 : \iota \Rightarrow \iota$  be given. Let  $k4\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k5\_funct\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k5\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_funct\_1 : \iota \Rightarrow o$  be given. Let  $v1\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_zfmisc\_1 : \iota \Rightarrow \iota$  be given. Let  $k2\_zfmisc\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $k4\_funct\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $g1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_cat\_1 : \iota \Rightarrow o$  be given. Let  $l5\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l1\_graph\_1 : \iota \Rightarrow o$  be given. Let  $u2\_graph\_1 : \iota \Rightarrow \iota$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $u1\_graph\_1 : \iota \Rightarrow \iota$  be given. Let  $u1\_cat\_1 : \iota \Rightarrow \iota$  be given. Let  $v1\_relat\_1 : \iota \Rightarrow o$  be given. Let  $v5\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k7\_partfun1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v4\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. \forall X3. (((v1\_funct\_1 X2) \wedge \\ & ((v1\_funct\_2 X2 X0 X1) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & X0 X1)))))) \wedge ((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 X3 X0 X1) \wedge (m1\_subset\_1 \\ & X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1)))))) \Rightarrow ((r2\_funct\_2 X0 X1 X2 \\ & X3) \Leftrightarrow (X2 = X3)) \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. \forall X3. \forall X4. ((\neg v1\_xboole\_0 \\ & X0) \wedge ((m1\_subset\_1 X3 X0) \wedge (m1\_subset\_1 X4 X0))) \Rightarrow (k5\_funct\_4 X0 \\ & X1 X2 X3 X4 = k4\_funct\_4 X1 X2 X3 X4) \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.\forall X3.\forall X4.(((v1\_funct\_1 \\
& X2)\wedge((v1\_funct\_2 X2 X1 X0)\wedge(m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\
& X1 X0))))\wedge(((v1\_funct\_1 X3)\wedge((v1\_funct\_2 X3 X1 X0)\wedge(m1\_subset\_1 \\
& X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 X0))))\wedge((v1\_funct\_1 X4)\wedge(m1\_subset\_1 \\
& X4 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 X1 X1) X1))))))\Rightarrow(\forall X5. \\
& \forall X6.\forall X7.\forall X8.\forall X9.(g1\_cat\_1 X0 X1 X2 \\
& X3 X4 = g1\_cat\_1 X5 X6 X7 X8 X9)\Rightarrow((X0 = X5)\wedge((X1 = X6)\wedge((X2 = X7)\wedge((X3 = \\
& X8)\wedge(X4 = X9))))))
\end{aligned} \tag{3}$$

Assume the following.

$$\begin{aligned}
& \forall X0.(((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 X0)\wedge((v2\_cat\_1 \\
& X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 X0)\wedge((v6\_cat\_1 \\
& X0)\wedge(l1\_cat\_1 X0))))))\Rightarrow((\neg v2\_struct\_0 (k2\_oppcat\_1 X0))\wedge \\
& ((\neg v11\_struct\_0 (k2\_oppcat\_1 X0))\wedge((v1\_cat\_1 (k2\_oppcat\_1 X0))\wedge \\
& ((v2\_cat\_1 (k2\_oppcat\_1 X0))\wedge((v3\_cat\_1 (k2\_oppcat\_1 X0))\wedge( \\
& (v4\_cat\_1 (k2\_oppcat\_1 X0))\wedge((v5\_cat\_1 (k2\_oppcat\_1 X0))\wedge(v6\_cat\_1 \\
& (k2\_oppcat\_1 X0))))))))))
\end{aligned} \tag{4}$$

Assume the following.

$$\forall X0.(((\neg v11\_struct\_0 X0)\wedge(l5\_struct\_0 X0))\Rightarrow(\neg v1\_xboole\_0 \\
(u4\_struct\_0 X0)) \tag{5}$$

Assume the following.

$$\begin{aligned}
& \forall X0.(l1\_graph\_1 X0)\Rightarrow((v1\_funct\_1 (u2\_graph\_1 X0))\wedge(( \\
& v1\_funct\_2 (u2\_graph\_1 X0) (u4\_struct\_0 X0) (u1\_struct\_0 X0))\wedge \\
& (m1\_subset\_1 (u2\_graph\_1 X0) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u4\_struct\_0 \\
& X0) (u1\_struct\_0 X0))))))
\end{aligned} \tag{6}$$

Assume the following.

$$\begin{aligned}
& \forall X0.(l1\_graph\_1 X0)\Rightarrow((v1\_funct\_1 (u1\_graph\_1 X0))\wedge(( \\
& v1\_funct\_2 (u1\_graph\_1 X0) (u4\_struct\_0 X0) (u1\_struct\_0 X0))\wedge \\
& (m1\_subset\_1 (u1\_graph\_1 X0) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u4\_struct\_0 \\
& X0) (u1\_struct\_0 X0))))))
\end{aligned} \tag{7}$$

Assume the following.

$$\begin{aligned}
& \forall X0.(l1\_cat\_1 X0)\Rightarrow((v1\_funct\_1 (u1\_cat\_1 X0))\wedge(m1\_subset\_1 \\
& (u1\_cat\_1 X0) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 (u4\_struct\_0 \\
& X0) (u4\_struct\_0 X0)) (u4\_struct\_0 X0))))))
\end{aligned} \tag{8}$$

Assume the following.

$$\forall X0.(l1\_graph\_1 X0)\Rightarrow(l5\_struct\_0 X0) \tag{9}$$

Assume the following.

$$\forall X0.(l1\_cat\_1 X0) \Rightarrow (l1\_graph\_1 X0) \quad (10)$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.((v1\_relat\_1 X1) \wedge ((v5\_relat\_1 X1 X0) \wedge (v1\_funct\_1 X1))) \Rightarrow (m1\_subset\_1 (k7\_partfun1 X0 X1 X2) X0) \quad (11)$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.\forall X3.\forall X4.((\neg v1\_xboole\_0 X0) \wedge ((m1\_subset\_1 X3 X0) \wedge (m1\_subset\_1 X4 X0))) \Rightarrow ((v1\_funct\_1 (k5\_funct\_4 X0 X1 X2 X3 X4)) \wedge ((v1\_funct\_2 (k5\_funct\_4 X0 X1 X2 X3 X4) (k2\_tarski X1 X2) X0) \wedge (m1\_subset\_1 (k5\_funct\_4 X0 X1 X2 X3 X4) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_tarski X1 X2) X0)))))) \quad (12)$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow ((\neg v2\_struct\_0 (k2\_oppcat\_1 X0)) \wedge ((\neg v11\_struct\_0 (k2\_oppcat\_1 X0)) \wedge ((v1\_cat\_1 (k2\_oppcat\_1 X0)) \wedge (l1\_cat\_1 (k2\_oppcat\_1 X0)))))) \quad (13)$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 X0)) \Rightarrow (k5\_oppcat\_1 X0 X1 = X1)) \quad (14)$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.\forall X2.((v1\_funct\_1 X2) \wedge ((v1\_funct\_2 X2 X1 (u4\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0)))))) \Rightarrow (\forall X3.((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 X3 X1 (u4\_struct\_0 (k2\_oppcat\_1 X0)) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 (u4\_struct\_0 (k2\_oppcat\_1 X0)))))) \Rightarrow ((X3 = k4\_cat\_3 X0 X1 X2) \Leftrightarrow (\forall X4.(X4 \in X1) \Rightarrow (k7\_partfun1 (u4\_struct\_0 (k2\_oppcat\_1 X0)) X3 X4 = k5\_oppcat\_1 X0 (k7\_partfun1 (u4\_struct\_0 X0) X2 X4)))))) \quad (15)$$

Assume the following.

$$\begin{aligned} \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (k2\_oppcat\_1 X0 = g1\_cat\_1 (u1\_struct\_0 \\ X0) (u4\_struct\_0 X0) (u2\_graph\_1 X0) (u1\_graph\_1 X0) (k1\_oppcat\_1 \\ (u4\_struct\_0 X0) (u4\_struct\_0 X0) (u4\_struct\_0 X0) (u1\_cat\_1 X0))) \end{aligned} \quad (16)$$

Assume the following.

$$\forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1))) \Rightarrow ((v4\_relat\_1 X2 X0) \wedge (v5\_relat\_1 X2 X1)) \quad (17)$$

Assume the following.

$$\forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1))) \Rightarrow (v1\_relat\_1 X2) \quad (18)$$

Assume the following.

$$\forall X0. (l1\_cat\_1 X0) \Rightarrow ((v1\_cat\_1 X0) \Rightarrow (X0 = g1\_cat\_1 (u1\_struct\_0 X0) (u4\_struct\_0 X0) (u1\_graph\_1 X0) (u2\_graph\_1 X0) (u1\_cat\_1 X0))) \quad (19)$$

**Theorem 1**

$$\begin{aligned} \forall X0. \forall X1. \forall X2. ((\neg v2\_struct\_0 X2) \wedge ((\neg v11\_struct\_0 \\ X2) \wedge ((v2\_cat\_1 X2) \wedge ((v3\_cat\_1 X2) \wedge ((v4\_cat\_1 X2) \wedge ((v5\_cat\_1 \\ X2) \wedge ((v6\_cat\_1 X2) \wedge (l1\_cat\_1 X2)))))))) \Rightarrow (\forall X3. (m1\_subset\_1 \\ X3 (u4\_struct\_0 X2)) \Rightarrow (\forall X4. (m1\_subset\_1 X4 (u4\_struct\_0 \\ X2)) \Rightarrow ((X0 \neq X1) \Rightarrow (r2\_funct\_2 (k2\_tarski X0 X1) (u4\_struct\_0 (k2\_oppcat\_1 \\ X2)) (k4\_cat\_3 X2 (k2\_tarski X0 X1) (k5\_funct\_4 (u4\_struct\_0 X2) \\ X0 X1 X3 X4)) (k5\_funct\_4 (u4\_struct\_0 (k2\_oppcat\_1 X2)) X0 X1 (k5\_oppcat\_1 \\ X2 X3) (k5\_oppcat\_1 X2 X4)))))) \end{aligned}$$