

### t13\_cat\_3

(TMTduPnb9fme4W54SZTTi4u2hcPkY7zG9pN)

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  $v1\_funct\_1 : \iota \Rightarrow o$  be given. Let  $v1\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u4\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_zfmisc\_1 : \iota \Rightarrow \iota$  be given. Let  $k2\_zfmisc\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r2\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k5\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_oppcat\_1 : \iota \Rightarrow \iota$  be given. Let  $v1\_cat\_1 : \iota \Rightarrow o$  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  $k5\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k6\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  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.

$$\begin{aligned} & \forall X0. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))))) \Rightarrow ((\neg v2\_struct\_0 (k2\_oppcat\_1 X0)) \wedge \\ & ((\neg v11\_struct\_0 (k2\_oppcat\_1 X0)) \wedge ((v1\_cat\_1 (k2\_oppcat\_1 X0)) \wedge \\ & ((v2\_cat\_1 (k2\_oppcat\_1 X0)) \wedge ((v3\_cat\_1 (k2\_oppcat\_1 X0)) \wedge \\ & (v4\_cat\_1 (k2\_oppcat\_1 X0)) \wedge ((v5\_cat\_1 (k2\_oppcat\_1 X0)) \wedge (v6\_cat\_1 \\ & (k2\_oppcat\_1 X0)))))))))) \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. ((v1\_relat\_1 X1) \wedge ((v5\_relat\_1 \\ & X1 X0) \wedge (v1\_funct\_1 X1))) \Rightarrow (m1\_subset\_1 (k7\_partfun1 X0 X1 X2) X0) \end{aligned} \tag{3}$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 X0) \wedge \\ & ((v2\_cat\_1 X0) \wedge (v3\_cat\_1 X0) \wedge (v4\_cat\_1 X0) \wedge (v5\_cat\_1 X0) \wedge \\ & ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))) \wedge (m1\_subset\_1 X1 (u4\_struct\_0 \\ & X0)) \Rightarrow (m1\_subset\_1 (k5\_oppcat\_1 X0 X1) (u4\_struct\_0 (k2\_oppcat\_1 \\ & X0))) \end{aligned} \quad (4)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 \\ & X0) \wedge ((v2\_cat\_1 X0) \wedge (v3\_cat\_1 X0) \wedge (v4\_cat\_1 X0) \wedge (v5\_cat\_1 \\ & X0) \wedge (v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))) \wedge ((v1\_funct\_1 X2) \wedge \\ & (v1\_funct\_2 X2 X1 (u4\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 \\ & (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0)))))) \Rightarrow ((v1\_funct\_1 (k4\_cat\_3 \\ & X0 X1 X2)) \wedge ((v1\_funct\_2 (k4\_cat\_3 X0 X1 X2) X1 (u4\_struct\_0 (k2\_oppcat\_1 \\ & X0))) \wedge (m1\_subset\_1 (k4\_cat\_3 X0 X1 X2) (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & X1 (u4\_struct\_0 (k2\_oppcat\_1 X0))))))) \end{aligned} \quad (5)$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge (v3\_cat\_1 X0) \wedge (v4\_cat\_1 X0) \wedge (v5\_cat\_1 X0) \wedge (v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))) \Rightarrow ((\neg v2\_struct\_0 (k2\_oppcat\_1 X0)) \wedge \\ & ((\neg v11\_struct\_0 (k2\_oppcat\_1 X0)) \wedge (v1\_cat\_1 (k2\_oppcat\_1 X0)) \wedge \\ & (l1\_cat\_1 (k2\_oppcat\_1 X0)))) \end{aligned} \quad (6)$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge (v3\_cat\_1 X0) \wedge (v4\_cat\_1 X0) \wedge (v5\_cat\_1 X0) \wedge (v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))) \Rightarrow (\forall X1. (m1\_subset\_1 X1 (u4\_struct\_0 \\ & (k2\_oppcat\_1 X0)) \Rightarrow (k6\_oppcat\_1 X0 X1 = k5\_oppcat\_1 (k2\_oppcat\_1 \\ & X0) X1))) \end{aligned} \quad (7)$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge (v3\_cat\_1 X0) \wedge (v4\_cat\_1 X0) \wedge (v5\_cat\_1 X0) \wedge (v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))) \Rightarrow (\forall X1. (m1\_subset\_1 X1 (u4\_struct\_0 \\ & X0)) \Rightarrow (k5\_oppcat\_1 X0 X1 = X1)) \end{aligned} \quad (8)$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1. \forall X2. ((v1\_funct\_1 \\
& X2) \wedge ((v1\_funct\_2 X2 X1 (u4\_struct\_0 (k2\_oppcat\_1 X0))) \wedge (m1\_subset\_1 \\
& X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 (u4\_struct\_0 (k2\_oppcat\_1 X0))))))) \Rightarrow \\
& (\forall X3. ((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 X3 X1 (u4\_struct\_0 \\
& X0)) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 (u4\_struct\_0 \\
& X0)))))) \Rightarrow ((X3 = k5\_cat\_3 X0 X1 X2) \Leftrightarrow (\forall X4. (X4 \in X1) \Rightarrow (k7\_partfun1 \\
& (u4\_struct\_0 X0) X3 X4 = k6\_oppcat\_1 X0 (k7\_partfun1 (u4\_struct\_0 \\
& (k2\_oppcat\_1 X0)) X2 X4))))))
\end{aligned} \tag{9}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1. \forall X2. ((v1\_funct\_1 \\
& X2) \wedge ((v1\_funct\_2 X2 X1 (u4\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0)))))) \Rightarrow (\forall X3. ((v1\_funct\_1 \\
& X3) \wedge ((v1\_funct\_2 X3 X1 (u4\_struct\_0 (k2\_oppcat\_1 X0))) \wedge (m1\_subset\_1 \\
& X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 (u4\_struct\_0 (k2\_oppcat\_1 X0))))))) \Rightarrow \\
& ((X3 = k4\_cat\_3 X0 X1 X2) \Leftrightarrow (\forall X4. (X4 \in X1) \Rightarrow (k7\_partfun1 (u4\_struct\_0 \\
& (k2\_oppcat\_1 X0)) X3 X4 = k5\_oppcat\_1 X0 (k7\_partfun1 (u4\_struct\_0 \\
& X0) X2 X4))))))
\end{aligned} \tag{10}$$

Assume the following.

$$\forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1))) \Rightarrow ((v4\_relat\_1 X2 X0) \wedge (v5\_relat\_1 X2 X1)) \tag{11}$$

Assume the following.

$$\forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1))) \Rightarrow (v1\_relat\_1 X2) \tag{12}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0. \forall X1. ((\neg v2\_struct\_0 X1) \wedge ((\neg v11\_struct\_0 X1) \wedge \\
& ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 X1) \wedge ((v5\_cat\_1 X1) \wedge \\
& ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1))))))) \Rightarrow (\forall X2. ((v1\_funct\_1 \\
& X2) \wedge ((v1\_funct\_2 X2 X0 (u4\_struct\_0 X1)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X0 (u4\_struct\_0 X1)))))) \Rightarrow (r2\_funct\_2 X0 (u4\_struct\_0 \\
& X1) (k5\_cat\_3 X1 X0 (k4\_cat\_3 X1 X0 X2)) X2))
\end{aligned}$$