

## t18\_cat\_3

(TML67buwjErHJ4eLPyXgqcZM1aeqvfpBA m)

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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  $l1\_cat\_1 : \iota \Rightarrow o$  be given. Let  $v1\_funct\_1 : \iota \Rightarrow o$  be given. Let  $v1\_funct\_2 : \iota \Rightarrow \iota \Rightarrow o$  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  $r2\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k2\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k8\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $k7\_partfun1 : \iota \Rightarrow \iota \Rightarrow \iota$  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  $k1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $l1\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l5\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l1\_graph\_1 : \iota \Rightarrow o$  be given. Let  $v1\_relat\_1 : \iota \Rightarrow o$  be given. Let  $v5\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v4\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (\neg v1\_xboole\_0 X1) \Rightarrow (\forall X2. ((v1\_funct\_1 \\ & X2) \wedge ((v1\_funct\_2 X2 X0 X1) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & X0 X1)))))) \Rightarrow (\forall X3. ((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 X3 X0 X1) \wedge \\ & (m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1)))))) \Rightarrow ((\forall X4. \\ & (X4 \in X0) \Rightarrow (k7\_partfun1 X1 X2 X4 = k7\_partfun1 X1 X3 X4)) \Rightarrow (r2\_funct\_2 \\ & X0 X1 X2 X3))) \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1. (m1\_subset\_1 X1 (u4\_struct\_0 \\ & X0)) \Rightarrow (\forall X2. (m1\_subset\_1 X2 (u4\_struct\_0 X0)) \Rightarrow ((k3\_graph\_1 \\ & X0 X2 = k4\_graph\_1 X0 X1) \Rightarrow ((k3\_graph\_1 X0 (k1\_cat\_1 X0 X1 X2) = k3\_graph\_1 \\ & X0 X1) \wedge (k4\_graph\_1 X0 (k1\_cat\_1 X0 X1 X2) = k4\_graph\_1 X0 X2)))))) \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.(((v1\_funct\_1 X2)\wedge \\ & ((v1\_funct\_2 X2 X0 X1)\wedge(m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & X0 X1)))))\wedge((v1\_funct\_1 X3)\wedge((v1\_funct\_2 X3 X0 X1)\wedge(m1\_subset\_1 \\ & X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1))))))\Rightarrow((r2\_funct\_2 X0 X1 X2 \\ & X3)\Rightarrow(r2\_funct\_2 X0 X1 X3 X2)) \end{aligned} \quad (3)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.(((v1\_funct\_1 X2)\wedge \\ & ((v1\_funct\_2 X2 X0 X1)\wedge(m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & X0 X1)))))\wedge((v1\_funct\_1 X3)\wedge((v1\_funct\_2 X3 X0 X1)\wedge(m1\_subset\_1 \\ & X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1))))))\Rightarrow((r2\_funct\_2 X0 X1 X2 \\ & X3)\Leftrightarrow(X2 = X3)) \end{aligned} \quad (4)$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0 X0)\wedge(l1\_struct\_0 X0))\Rightarrow(\neg v1\_xboole\_0 (u1\_struct\_0 X0)) \quad (5)$$

Assume the following.

$$\forall X0.(l5\_struct\_0 X0)\Rightarrow(l1\_struct\_0 X0) \quad (6)$$

Assume the following.

$$\forall X0.(l1\_graph\_1 X0)\Rightarrow(l5\_struct\_0 X0) \quad (7)$$

Assume the following.

$$\forall X0.(l1\_cat\_1 X0)\Rightarrow(l1\_graph\_1 X0) \quad (8)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.(((\neg v2\_struct\_0 \\ & X0)\wedge((\neg v11\_struct\_0 X0)\wedge((v2\_cat\_1 X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 \\ & X0)\wedge((v5\_cat\_1 X0)\wedge((v6\_cat\_1 X0)\wedge(l1\_cat\_1 X0))))))))\wedge((( \\ & v1\_funct\_1 X2)\wedge((v1\_funct\_2 X2 X1 (u4\_struct\_0 X0))\wedge(m1\_subset\_1 \\ & X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0))))))\wedge((v1\_funct\_1 \\ & X3)\wedge((v1\_funct\_2 X3 X1 (u4\_struct\_0 X0))\wedge(m1\_subset\_1 X3 (k1\_zfmisc\_1 \\ & (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0))))))\Rightarrow((v1\_funct\_1 (k8\_cat\_3 \\ & X0 X1 X2 X3)\wedge((v1\_funct\_2 (k8\_cat\_3 X0 X1 X2 X3) X1 (u4\_struct\_0 \\ & X0))\wedge(m1\_subset\_1 (k8\_cat\_3 X0 X1 X2 X3) (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & X1 (u4\_struct\_0 X0)))))) \end{aligned} \quad (9)$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.((v1\_relat\_1 X1)\wedge((v5\_relat\_1 X1 X0)\wedge(v1\_funct\_1 X1)))\Rightarrow(m1\_subset\_1 (k7\_partfun1 X0 X1 X2) X0) \quad (10)$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 \\
& X0)\wedge((v2\_cat\_1 X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 \\
& X0)\wedge((v6\_cat\_1 X0)\wedge(l1\_cat\_1 X0))))))))\wedge((v1\_funct\_1 X2)\wedge \\
& (v1\_funct\_2 X2 X1 (u4\_struct\_0 X0))\wedge(m1\_subset\_1 X2 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0))))))\Rightarrow((v1\_funct\_1 (k3\_cat\_3 \\
& X0 X1 X2))\wedge((v1\_funct\_2 (k3\_cat\_3 X0 X1 X2) X1 (u1\_struct\_0 X0))\wedge \\
& (m1\_subset\_1 (k3\_cat\_3 X0 X1 X2) (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 ( \\
& u1\_struct\_0 X0))))))
\end{aligned} \tag{11}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 \\
& X0)\wedge((v2\_cat\_1 X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 \\
& X0)\wedge((v6\_cat\_1 X0)\wedge(l1\_cat\_1 X0))))))))\wedge((v1\_funct\_1 X2)\wedge \\
& (v1\_funct\_2 X2 X1 (u4\_struct\_0 X0))\wedge(m1\_subset\_1 X2 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0))))))\Rightarrow((v1\_funct\_1 (k2\_cat\_3 \\
& X0 X1 X2))\wedge((v1\_funct\_2 (k2\_cat\_3 X0 X1 X2) X1 (u1\_struct\_0 X0))\wedge \\
& (m1\_subset\_1 (k2\_cat\_3 X0 X1 X2) (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 ( \\
& u1\_struct\_0 X0))))))
\end{aligned} \tag{12}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 X0)\wedge((v2\_cat\_1 \\
& X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 X0)\wedge((v6\_cat\_1 \\
& X0)\wedge(l1\_cat\_1 X0))))))))\Rightarrow(\forall X1.\forall X2.((v1\_funct\_1 \\
& X2)\wedge((v1\_funct\_2 X2 X1 (u4\_struct\_0 X0))\wedge(m1\_subset\_1 X2 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0))))))\Rightarrow(\forall X3.((v1\_funct\_1 \\
& X3)\wedge((v1\_funct\_2 X3 X1 (u4\_struct\_0 X0))\wedge(m1\_subset\_1 X3 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0))))))\Rightarrow(\forall X4.((v1\_funct\_1 \\
& X4)\wedge((v1\_funct\_2 X4 X1 (u4\_struct\_0 X0))\wedge(m1\_subset\_1 X4 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0))))))\Rightarrow((X4 = k8\_cat\_3 X0 X1 X2 X3)\Leftrightarrow \\
& (\forall X5.(X5 \in X1)\Rightarrow(k7\_partfun1 (u4\_struct\_0 X0) X4 X5 = k1\_cat\_1 \\
& X0 (k7\_partfun1 (u4\_struct\_0 X0) X3 X5) (k7\_partfun1 (u4\_struct\_0 \\
& X0) X2 X5))))))
\end{aligned} \tag{13}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1. \forall X2. ((v1\_funct\_1 \\
& X2) \wedge ((v1\_funct\_2 X2 X1 (u4\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0)))))) \Rightarrow (\forall X3. ((v1\_funct\_1 \\
& X3) \wedge ((v1\_funct\_2 X3 X1 (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u1\_struct\_0 X0)))))) \Rightarrow ((X3 = k3\_cat\_3 X0 X1 X2) \Leftrightarrow \\
& (\forall X4. (X4 \in X1) \Rightarrow (k7\_partfun1 (u1\_struct\_0 X0) X3 X4 = k4\_graph\_1 \\
& X0 (k7\_partfun1 (u4\_struct\_0 X0) X2 X4))))))
\end{aligned} \tag{14}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1. \forall X2. ((v1\_funct\_1 \\
& X2) \wedge ((v1\_funct\_2 X2 X1 (u4\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u4\_struct\_0 X0)))))) \Rightarrow (\forall X3. ((v1\_funct\_1 \\
& X3) \wedge ((v1\_funct\_2 X3 X1 (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X1 (u1\_struct\_0 X0)))))) \Rightarrow ((X3 = k2\_cat\_3 X0 X1 X2) \Leftrightarrow \\
& (\forall X4. (X4 \in X1) \Rightarrow (k7\_partfun1 (u1\_struct\_0 X0) X3 X4 = k3\_graph\_1 \\
& X0 (k7\_partfun1 (u4\_struct\_0 X0) X2 X4))))))
\end{aligned} \tag{15}$$

Assume the following.

$$\forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1))) \Rightarrow ((v4\_relat\_1 X2 X0) \wedge (v5\_relat\_1 X2 X1)) \tag{16}$$

Assume the following.

$$\forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1))) \Rightarrow (v1\_relat\_1 X2) \tag{17}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0. \forall X1. ((\neg v2\_struct\_0 X1) \wedge ((\neg v11\_struct\_0 X1) \wedge \\
& ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 X1) \wedge ((v5\_cat\_1 X1) \wedge \\
& ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1)))))))) \Rightarrow (\forall X2. ((v1\_funct\_1 \\
& X2) \wedge ((v1\_funct\_2 X2 X0 (u4\_struct\_0 X1)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X0 (u4\_struct\_0 X1)))))) \Rightarrow (\forall X3. ((v1\_funct\_1 \\
& X3) \wedge ((v1\_funct\_2 X3 X0 (u4\_struct\_0 X1)) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 X0 (u4\_struct\_0 X1)))))) \Rightarrow ((r2\_funct\_2 X0 (u1\_struct\_0 \\
& X1) (k2\_cat\_3 X1 X0 X2) (k3\_cat\_3 X1 X0 X3)) \Rightarrow ((r2\_funct\_2 X0 (u1\_struct\_0 \\
& X1) (k2\_cat\_3 X1 X0 (k8\_cat\_3 X1 X0 X2 X3)) (k2\_cat\_3 X1 X0 X3)) \wedge (r2\_funct\_2 \\
& X0 (u1\_struct\_0 X1) (k3\_cat\_3 X1 X0 (k8\_cat\_3 X1 X0 X2 X3)) (k3\_cat\_3 \\
& X1 X0 X2))))))
\end{aligned}$$