

# t9\_cat\_4 (TMUFwn- Htnf1rStiXBYaMEpQPmPntJ6nJX9b)

October 27, 2020

Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k5\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $u4\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $r2\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k2\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v2\_cat\_1 : \iota \Rightarrow o$  be given. Let  $v2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v11\_struct\_0 : \iota \Rightarrow o$  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  $v2\_cat\_4 : \iota \Rightarrow o$  be given. Let  $l1\_cat\_4 : \iota \Rightarrow o$  be given. Let  $l1\_cat\_1 : \iota \Rightarrow o$  be given. Let  $l1\_graph\_1 : \iota \Rightarrow o$  be given. Let  $k3\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (u1\_struct\_0 \\ & (k5\_cat\_4 X0 X1))) \Rightarrow (\forall X3. (m1\_subset\_1 X3 (u1\_struct\_0 ( \\ & k5\_cat\_4 X0 X1))) \Rightarrow (\forall X4. (m1\_subset\_1 X4 (u4\_struct\_0 (k5\_cat\_4 \\ & X0 X1))) \Rightarrow (X4 \in k2\_cat\_1 (k5\_cat\_4 X0 X1) X2 X3))) \end{aligned} \quad (1)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (u4\_struct\_0 \\ & (k5\_cat\_4 X0 X1))) \Rightarrow (\forall X3. (m1\_subset\_1 X3 (u4\_struct\_0 ( \\ & k5\_cat\_4 X0 X1))) \Rightarrow (X2 = X3)) \end{aligned} \quad (2)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (u1\_struct\_0 \\ & (k5\_cat\_4 X0 X1))) \Rightarrow (\forall X3. (m1\_subset\_1 X3 (u1\_struct\_0 ( \\ & k5\_cat\_4 X0 X1))) \Rightarrow (X2 = X3)) \end{aligned} \quad (3)$$

Assume the following.

$$\forall X0. \forall X1. v2\_cat\_1 (k5\_cat\_4 X0 X1) \quad (4)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (\neg v2\_struct\_0 (k5\_cat\_4 X0 X1)) \wedge ((\neg v11\_struct\_0 \\ & (k5\_cat\_4 X0 X1)) \wedge ((v2\_cat\_1 (k5\_cat\_4 X0 X1)) \wedge ((v3\_cat\_1 (k5\_cat\_4 \\ & X0 X1)) \wedge ((v4\_cat\_1 (k5\_cat\_4 X0 X1)) \wedge ((v5\_cat\_1 (k5\_cat\_4 X0 X1)) \wedge \\ & ((v6\_cat\_1 (k5\_cat\_4 X0 X1)) \wedge (v2\_cat\_4 (k5\_cat\_4 X0 X1)))))))) \end{aligned} \quad (5)$$

Assume the following.

$$\forall X0.\exists X1.m1\_subset\_1 X1 X0 \quad (6)$$

Assume the following.

$$\forall X0.(l1\_cat\_4 X0)\Rightarrow(l1\_cat\_1 X0) \quad (7)$$

Assume the following.

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

Assume the following.

$$\forall X0.\forall X1.(v2\_cat\_4 (k5\_cat\_4 X0 X1))\wedge(l1\_cat\_4 (k5\_cat\_4 X0 X1)) \quad (9)$$

Assume the following.

$$\forall X0.\forall X1.(((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 X0)\wedge(l1\_graph\_1 X0)))\wedge(m1\_subset\_1 X1 (u4\_struct\_0 X0)))\Rightarrow(m1\_subset\_1 (k3\_graph\_1 X0 X1) (u1\_struct\_0 X0)) \quad (10)$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.((l1\_cat\_1 X0)\wedge((m1\_subset\_1 X1 (u4\_struct\_0 X0))\wedge(m1\_subset\_1 X2 (u4\_struct\_0 X0))))\Rightarrow(m1\_subset\_1 (k1\_cat\_1 X0 X1 X2) (u4\_struct\_0 X0)) \quad (11)$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 X0)\wedge((v2\_cat\_1 X0)\wedge((v3\_cat\_1 X0)\wedge((v4\_cat\_1 X0)\wedge((v5\_cat\_1 X0)\wedge((v6\_cat\_1 X0)\wedge(l1\_cat\_1 X0))))))))\Rightarrow(\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 X0))\Rightarrow(\forall X2.(m1\_subset\_1 X2 (u4\_struct\_0 X0))\Rightarrow(\forall X3. \\ & (m1\_subset\_1 X3 (u4\_struct\_0 X0))\Rightarrow((r2\_cat\_3 X0 X1 X2 X3)\Leftrightarrow((k3\_graph\_1 X0 X2 = X1)\wedge((k3\_graph\_1 X0 X3 = X1)\wedge(\forall X4.(m1\_subset\_1 X4 (u1\_struct\_0 X0))\Rightarrow(\forall X5.(m1\_subset\_1 X5 (u4\_struct\_0 X0))\Rightarrow \\ & (\forall X6.(m1\_subset\_1 X6 (u4\_struct\_0 X0))\Rightarrow(\neg(X5 \in k2\_cat\_1 X0 X4 (k4\_graph\_1 X0 X2))\wedge((X6 \in k2\_cat\_1 X0 X4 (k4\_graph\_1 X0 X3))\wedge \\ & (\forall X7.(m1\_subset\_1 X7 (u4\_struct\_0 X0))\Rightarrow(\neg(X7 \in k2\_cat\_1 X0 X4 X1)\wedge(\forall X8.(m1\_subset\_1 X8 (u4\_struct\_0 X0))\Rightarrow((X8 \in k2\_cat\_1 X0 X4 X1)\Rightarrow(((k1\_cat\_1 X0 X8 X2 = X5)\wedge(k1\_cat\_1 X0 X8 X3 = X6))\Leftrightarrow \\ & (X7 = X8)))))))))))))) \quad (12) \end{aligned}$$

**Theorem 1**

$$\forall X0.\forall X1.\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 (k5\_cat\_4 X0 X1)))\Rightarrow(\forall X3.(m1\_subset\_1 X3 (u4\_struct\_0 (k5\_cat\_4 X0 X1)))\Rightarrow(\forall X4.(m1\_subset\_1 X4 (u4\_struct\_0 (k5\_cat\_4 X0 X1)))\Rightarrow(r2\_cat\_3 (k5\_cat\_4 X0 X1) X2 X3 X4)))$$