

t2\_cat\_5  
(TMaCMqH5RRUXSF53eU95MTfJkh3APWLBjMS)

October 27, 2020

Let  $v2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v11\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v1\_cat\_5 : \iota \Rightarrow o$  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  $k3\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k13\_mcart\_1 : \iota \Rightarrow \iota$  be given. Let  $k4\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k14\_mcart\_1 : \iota \Rightarrow \iota$  be given. Let  $k4\_tarski : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_domain\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k2\_xtuple\_0 : \iota \Rightarrow \iota$  be given. Let  $k15\_mcart\_1 : \iota \Rightarrow \iota$  be given. Let  $k16\_mcart\_1 : \iota \Rightarrow \iota$  be given. Let  $k1\_xtuple\_0 : \iota \Rightarrow \iota$  be given. Let  $l1\_graph\_1 : \iota \Rightarrow o$  be given. Let  $k2\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $l1\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l5\_struct\_0 : \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. \forall X3. \forall X4. \forall X5. \\ & (k13\_mcart\_1 (k4\_tarski (k4\_tarski X0 X1) X2) = X0) \wedge ((k14\_mcart\_1 \\ & (k4\_tarski (k4\_tarski X0 X1) X2) = X1) \wedge ((k15\_mcart\_1 (k4\_tarski \\ & X5 (k4\_tarski X3 X4)) = X3) \wedge (k16\_mcart\_1 (k4\_tarski X5 (k4\_tarski \\ & X3 X4)) = X4))) \end{aligned} \tag{1}$$

Assume the following.

$$\forall X0. \forall X1. (k1\_xtuple\_0 (k4\_tarski X0 X1) = X0) \wedge (k2\_xtuple\_0 (k4\_tarski X0 X1) = X1) \tag{2}$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge \\ & (l1\_graph\_1 X0))) \wedge (m1\_subset\_1 X1 (u4\_struct\_0 X0))) \Rightarrow (k4\_graph\_1 \\ & X0 X1 = k2\_graph\_1 X0 X1) \end{aligned} \tag{3}$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge \\ & (l1\_graph\_1 X0))) \wedge (m1\_subset\_1 X1 (u4\_struct\_0 X0))) \Rightarrow (k3\_graph\_1 \\ & X0 X1 = k1\_graph\_1 X0 X1) \end{aligned} \tag{4}$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.((\neg v1\_xboole\_0 X0)\wedge \\ & ((\neg v1\_xboole\_0 X1)\wedge((m1\_subset\_1 X2 X0)\wedge(m1\_subset\_1 X3 X1))))\Rightarrow \\ & (k1\_domain\_1 X0 X1 X2 X3 = k4\_tarski X2 X3) \end{aligned} \quad (5)$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0 X0)\wedge(l1\_struct\_0 X0))\Rightarrow(\neg v1\_xboole\_0 (u1\_struct\_0 X0)) \quad (6)$$

Assume the following.

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

Assume the following.

$$\forall X0.(l1\_graph\_1 X0)\Rightarrow(l5\_struct\_0 X0) \quad (8)$$

Assume the following.

$$\forall X0.(l1\_cat\_1 X0)\Rightarrow(l1\_graph\_1 X0) \quad (9)$$

Assume the following.

$$\forall X0.\forall X1.((l1\_graph\_1 X0)\wedge(m1\_subset\_1 X1 (u4\_struct\_0 X0)))\Rightarrow(m1\_subset\_1 (k2\_graph\_1 X0 X1) (u1\_struct\_0 X0)) \quad (10)$$

Assume the following.

$$\forall X0.\forall X1.((l1\_graph\_1 X0)\wedge(m1\_subset\_1 X1 (u4\_struct\_0 X0)))\Rightarrow(m1\_subset\_1 (k1\_graph\_1 X0 X1) (u1\_struct\_0 X0)) \quad (11)$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 X0)\wedge(l1\_cat\_1 \\ & X0)))\Rightarrow((v1\_cat\_5 X0)\Leftrightarrow(\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 \\ & X0))\Rightarrow(\exists X2.X1 = k4\_tarski (k1\_domain\_1 (u1\_struct\_0 X0) \\ & (u1\_struct\_0 X0) (k3\_graph\_1 X0 X1) (k4\_graph\_1 X0 X1)) X2))) \end{aligned} \quad (12)$$

**Theorem 1**

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0)\wedge((\neg v11\_struct\_0 X0)\wedge((v1\_cat\_5 \\ & X0)\wedge(l1\_cat\_1 X0))))\Rightarrow(\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 \\ & X0))\Rightarrow((k3\_graph\_1 X0 X1 = k13\_mcart\_1 X1)\wedge((k4\_graph\_1 X0 X1 = k14\_mcart\_1 \\ & X1)\wedge(X1 = k4\_tarski (k1\_domain\_1 (u1\_struct\_0 X0) (u1\_struct\_0 \\ & X0) (k3\_graph\_1 X0 X1) (k4\_graph\_1 X0 X1)) (k2\_xtuple\_0 X1)))))) \end{aligned}$$