# t23_cat_4 (TMU7yaxcisTwCsKVtSuek7W3WHLBmnaDp6U)

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 $v3\_cat\_4 : \iota \Rightarrow o$ be given. Let $l1\_cat\_4 : \iota \Rightarrow o$ be given. Let $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $u1\_struct\_0 : \iota \Rightarrow \iota$ be given. Let $k2\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k1\_xboole\_0 : \iota$ be given. Let $k2\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $l1\_cat\_1 : \iota \Rightarrow o$ be given. Let $m1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $r2\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k5\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k8\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k4\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k7\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k3\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $v10\_cat\_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $u1\_cat\_4 : \iota \Rightarrow \iota$ be given. Let $k4\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k2\_binop\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $u4\_struct\_0 : \iota \Rightarrow \iota$ be given. Let $u3\_cat\_4 : \iota \Rightarrow \iota$ be given. Let $u4\_cat\_4 : \iota \Rightarrow \iota$ be given. Let $k5\_binop\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $u2\_cat\_4 : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall X0.((\neg v2\_struct\_0\ X0) \wedge ((\neg v11\_struct\_0\ X0) \wedge ((v2\_cat\_1\ X0) \wedge ((v3\_cat\_1\ X0) \wedge ((v4\_cat\_1\ X0) \wedge ((v5\_cat\_1\ X0) \wedge ((v6\_cat\_1\ X0) \wedge (l1\_cat\_1\ X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1\ X1\ (u1\_struct\_0\ X0)) \Rightarrow (\forall X2.(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0)) \Rightarrow (\forall X3.(m1\_subset\_1\ X3\ (u1\_struct\_0\ X0)) \Rightarrow (\neg(k2\_cat\_1\ X0\ X1\ X2 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1\ X0\ X1\ X3 \neq k1\_xboole\_0) \wedge (\neg\forall X4.(m1\_cat\_1\ X4\ X0\ X1\ X2) \Rightarrow (\forall X5.(m1\_cat\_1\ X5\ X0\ X1\ X3) \Rightarrow ((r2\_cat\_3\ X0\ X1\ X4\ X5) \Leftrightarrow (\forall X6.(m1\_subset\_1\ X6\ (u1\_struct\_0\ X0)) \Rightarrow (\neg(k2\_cat\_1\ X0\ X6\ X2 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1\ X0\ X6\ X3 \neq k1\_xboole\_0) \wedge (\neg(k2\_cat\_1\ X0\ X6\ X1 \neq k1\_xboole\_0) \wedge (\forall X7.(m1\_cat\_1\ X7\ X0\ X6\ X2) \Rightarrow (\forall X8.(m1\_cat\_1\ X8\ X0\ X6\ X3) \Rightarrow (\exists X9.(m1\_cat\_1\ X9\ X0\ X6\ X1) \wedge (\forall X10.(m1\_cat\_1\ X10\ X0\ X6\ X1) \Rightarrow (((k5\_cat\_1\ X0\ X6\ X1\ X2\ X10\ X4 = X7) \wedge (k5\_cat\_1\ X0\ X6\ X1\ X3\ X10\ X5 = X8)) \Leftrightarrow (X9 = X10)))))))))))))))))))))))) \tag{1}$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge((v2\_cat\_1\ X0)\wedge((v3\_cat\_1\ X0)\wedge((v4\_cat\_1\ X0)\wedge((v5\_cat\_1\ X0)\wedge((v6\_cat\_1\ X0)\wedge((v3\_cat\_4\ X0)\wedge(l1\_cat\_4\ X0))))))))\Rightarrow(\forall X1.(m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\Rightarrow(\forall X2.(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))\Rightarrow((k2\_cat\_1\ X0\ (k2\_cat\_4\ X0\ X1\ X2)\ X1\neq k1\_xboole\_0)\wedge(k2\_cat\_1\ X0\ (k2\_cat\_4\ X0\ X1\ X2)\ X2\neq k1\_xboole\_0)))) \tag{2}$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge((v2\_cat\_1\ X0)\wedge((v3\_cat\_1\ X0)\wedge((v4\_cat\_1\ X0)\wedge((v5\_cat\_1\ X0)\wedge((v6\_cat\_1\ X0)\wedge((v3\_cat\_4\ X0)\wedge(l1\_cat\_4\ X0))))))))\wedge((m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\wedge(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))))\Rightarrow(k8\_cat\_4\ X0\ X1\ X2 = k4\_cat\_4\ X0\ X1\ X2) \tag{3}$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge((v2\_cat\_1\ X0)\wedge((v3\_cat\_1\ X0)\wedge((v4\_cat\_1\ X0)\wedge((v5\_cat\_1\ X0)\wedge((v6\_cat\_1\ X0)\wedge((v3\_cat\_4\ X0)\wedge(l1\_cat\_4\ X0))))))))\wedge((m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\wedge(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))))\Rightarrow(k7\_cat\_4\ X0\ X1\ X2 = k3\_cat\_4\ X0\ X1\ X2) \tag{4}$$

Assume the following.

$$\forall X0.(l1\_cat\_4\ X0)\Rightarrow(l1\_cat\_1\ X0) \tag{5}$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge((v2\_cat\_1\ X0)\wedge((v3\_cat\_1\ X0)\wedge((v4\_cat\_1\ X0)\wedge((v5\_cat\_1\ X0)\wedge((v6\_cat\_1\ X0)\wedge((v3\_cat\_4\ X0)\wedge(l1\_cat\_4\ X0))))))))\wedge((m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\wedge(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))))\Rightarrow(m1\_cat\_1\ (k8\_cat\_4\ X0\ X1\ X2)\ X0\ (k2\_cat\_4\ X0\ X1\ X2)\ X2) \tag{6}$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge((v2\_cat\_1\ X0)\wedge((v3\_cat\_1\ X0)\wedge((v4\_cat\_1\ X0)\wedge((v5\_cat\_1\ X0)\wedge((v6\_cat\_1\ X0)\wedge((v3\_cat\_4\ X0)\wedge(l1\_cat\_4\ X0))))))))\wedge((m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\wedge(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))))\Rightarrow(m1\_cat\_1\ (k7\_cat\_4\ X0\ X1\ X2)\ X0\ (k2\_cat\_4\ X0\ X1\ X2)\ X1) \tag{7}$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.(((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge(l1\_cat\_4\ X0)))\wedge((m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\wedge(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))))\Rightarrow(m1\_subset\_1\ (k2\_cat\_4\ X0\ X1\ X2)\ (u1\_struct\_0\ X0)) \tag{8}$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge((v2\_cat\_1\ X0)\wedge((v3\_cat\_1\ X0)\wedge((v4\_cat\_1\ X0)\wedge((v5\_cat\_1\ X0)\wedge((v6\_cat\_1\ X0)\wedge(l1\_cat\_4\ X0)))))))\Rightarrow((v3\_cat\_4\ X0)\Leftrightarrow((v10\_cat\_1\ (u1\_cat\_4\ X0)\ X0)\wedge(\forall X1.(m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\Rightarrow(\forall X2.(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))\Rightarrow((k4\_graph\_1\ X0\ (k2\_binop\_1\ (u1\_struct\_0\ X0)\ (u1\_struct\_0\ X0)\ (u4\_struct\_0\ X0)\ (u3\_cat\_4\ X0)\ X1\ X2) = X1)\wedge((k4\_graph\_1\ X0\ (k2\_binop\_1\ (u1\_struct\_0\ X0)\ (u1\_struct\_0\ X0)\ (u4\_struct\_0\ X0)\ (u4\_cat\_4\ X0)\ X1\ X2) = X2)\wedge(r2\_cat\_3\ X0\ (k5\_binop\_1\ (u1\_struct\_0\ X0)\ (u2\_cat\_4\ X0)\ X1\ X2)\ (k2\_binop\_1\ (u1\_struct\_0\ X0)\ (u1\_struct\_0\ X0)\ (u4\_struct\_0\ X0)\ (u3\_cat\_4\ X0)\ X1\ X2)\ (k2\_binop\_1\ (u1\_struct\_0\ X0)\ (u1\_struct\_0\ X0)\ (u4\_struct\_0\ X0)\ (u4\_cat\_4\ X0)\ X1\ X2)))))))) \tag{9}$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge(l1\_cat\_4\ X0)))\Rightarrow(\forall X1.(m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\Rightarrow(\forall X2.(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))\Rightarrow(k4\_cat\_4\ X0\ X1\ X2 = k2\_binop\_1\ (u1\_struct\_0\ X0)\ (u1\_struct\_0\ X0)\ (u4\_struct\_0\ X0)\ (u4\_cat\_4\ X0)\ X1\ X2))) \tag{10}$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge(l1\_cat\_4\ X0)))\Rightarrow(\forall X1.(m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\Rightarrow(\forall X2.(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))\Rightarrow(k3\_cat\_4\ X0\ X1\ X2 = k2\_binop\_1\ (u1\_struct\_0\ X0)\ (u1\_struct\_0\ X0)\ (u4\_struct\_0\ X0)\ (u3\_cat\_4\ X0)\ X1\ X2))) \tag{11}$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge(l1\_cat\_4\ X0)))\Rightarrow(\forall X1.(m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\Rightarrow(\forall X2.(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))\Rightarrow(k2\_cat\_4\ X0\ X1\ X2 = k5\_binop\_1\ (u1\_struct\_0\ X0)\ (u2\_cat\_4\ X0)\ X1\ X2))) \tag{12}$$

**Theorem 1**

$$\forall X0.((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge((v2\_cat\_1\ X0)\wedge((v3\_cat\_1\ X0)\wedge((v4\_cat\_1\ X0)\wedge((v5\_cat\_1\ X0)\wedge((v6\_cat\_1\ X0)\wedge((v3\_cat\_4\ X0)\wedge(l1\_cat\_4\ X0)))))))))\Rightarrow(\forall X1.(m1\_subset\_1\ X1\ (u1\_struct\_0\ X0))\Rightarrow(\forall X2.(m1\_subset\_1\ X2\ (u1\_struct\_0\ X0))\Rightarrow(\forall X3.(m1\_subset\_1\ X3\ (u1\_struct\_0\ X0))\Rightarrow(\neg(k2\_cat\_1\ X0\ X1\ X2{\neq}k1\_xboole\_0)\wedge((k2\_cat\_1\ X0\ X1\ X3{\neq}k1\_xboole\_0)\wedge(k2\_cat\_1\ X0\ X1\ (k2\_cat\_4\ X0\ X2\ X3) = k1\_xboole\_0))))))$$