

## t55\_cat\_1

(TMS5Zb6CC19Z7wXqTq7HbwoXFszWdFtwMEh)

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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  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $v10\_cat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $r1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $m1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k4\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_tarski : \iota \Rightarrow \iota$  be given. Let  $k1\_xboole\_0 : \iota$  be given. Let  $k5\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0)) \Rightarrow ((v10\_cat\_1 X1 X0) \Rightarrow (\forall X2.(m1\_cat\_1 X2 X0 X1 X1) \Rightarrow (k4\_cat\_1 \\ & X0 X1 = X2)))) \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0)) \Rightarrow ((v10\_cat\_1 X1 X0) \Leftrightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\ & X0)) \Rightarrow (\exists X3.(m1\_cat\_1 X3 X0 X2 X1) \wedge (k2\_cat\_1 X0 X2 X1 = k1\_tarski \\ & X3)))))) \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow ((r1\_cat\_1 \\ & X0 X1 X2) \Leftrightarrow ((k2\_cat\_1 X0 X1 X2 \neq k1\_xboole\_0) \wedge ((k2\_cat\_1 X0 X2 X1 \neq \\ & k1\_xboole\_0) \wedge (\exists X3.(m1\_cat\_1 X3 X0 X1 X2) \wedge (\exists X4.( \\ & m1\_cat\_1 X4 X0 X2 X1) \wedge ((k5\_cat\_1 X0 X2 X1 X2 X4 X3 = k4\_cat\_1 X0 X2) \wedge \\ & (k5\_cat\_1 X0 X1 X2 X1 X3 X4 = k4\_cat\_1 X0 X1)))))))))) \end{aligned} \tag{3}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.\forall X3.\forall X4.\forall X5. \\
& (((\neg v2\_struct\_0 X0)\wedge(\neg v11\_struct\_0 X0)\wedge(v2\_cat\_1 X0)\wedge(v3\_cat\_1 \\
& \quad X0)\wedge(v4\_cat\_1 X0)\wedge(v5\_cat\_1 X0)\wedge(v6\_cat\_1 X0)\wedge(l1\_cat\_1 \\
& \quad X0))))\wedge((m1\_subset\_1 X1 (u1\_struct\_0 X0))\wedge(m1\_subset\_1 \\
& \quad X2 (u1\_struct\_0 X0))\wedge(m1\_subset\_1 X3 (u1\_struct\_0 X0))\wedge(m1\_cat\_1 \\
& \quad X4 X0 X1 X2)\wedge(m1\_cat\_1 X5 X0 X2 X3))))\Rightarrow(m1\_cat\_1 (k5\_cat\_1 X0 X1 \\
& \quad X2 X3 X4 X5) X0 X1 X3)
\end{aligned} \tag{4}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0)\wedge(\neg v11\_struct\_0 X0)\wedge(v2\_cat\_1 \\
& \quad X0)\wedge(v3\_cat\_1 X0)\wedge(v4\_cat\_1 X0)\wedge(v5\_cat\_1 X0)\wedge(v6\_cat\_1 \\
& \quad X0)\wedge(l1\_cat\_1 X0))))\Rightarrow(\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& \quad X0))\Rightarrow((v10\_cat\_1 X1 X0)\Leftrightarrow(\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\
& \quad X0))\Rightarrow((k2\_cat\_1 X0 X2 X1\neq k1\_xboole\_0)\wedge(\exists X3.(m1\_cat\_1 \\
& \quad X3 X0 X2 X1)\wedge(\forall X4.(m1\_cat\_1 X4 X0 X2 X1)\Rightarrow(X3 = X4))))))
\end{aligned} \tag{5}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0)\wedge(\neg v11\_struct\_0 X0)\wedge(v2\_cat\_1 \\
& \quad X0)\wedge(v3\_cat\_1 X0)\wedge(v4\_cat\_1 X0)\wedge(v5\_cat\_1 X0)\wedge(v6\_cat\_1 \\
& \quad X0)\wedge(l1\_cat\_1 X0))))\Rightarrow(\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& \quad X0))\Rightarrow(\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0))\Rightarrow(((v10\_cat\_1 \\
& \quad X1 X0)\wedge(v10\_cat\_1 X2 X0))\Rightarrow(r1\_cat\_1 X0 X1 X2)))
\end{aligned}$$