

# t11\_oppcat\_1

(TMTsS789M4WtNcz7zcHxzWHVP1S2SCpv6Ae)

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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  $k2\_oppcat\_1 : \iota \Rightarrow \iota$  be given. Let  $m1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k3\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k6\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k5\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $u4\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k2\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_xboole\_0 : \iota$  be given. Let  $k7\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $l1\_graph\_1 : \iota \Rightarrow o$  be given. Let  $v1\_cat\_1 : \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & (k2\_oppcat\_1 X0))) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\ & (k2\_oppcat\_1 X0))) \Rightarrow (\forall X3.(m1\_cat\_1 X3 (k2\_oppcat\_1 X0) \\ & X1 X2) \Rightarrow (k5\_oppcat\_1 X0 (k6\_oppcat\_1 X0 X3) = X3)))) \end{aligned} \quad (1)$$

Assume the following.

$$\forall X0. \forall X1. \neg (X0 \in X1) \wedge (v1\_xboole\_0 X1) \quad (2)$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge (l1\_cat\_1 \\ & X0))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 X0)) \Rightarrow (m1\_cat\_1 \\ & X1 X0 (k3\_graph\_1 X0 X1) (k4\_graph\_1 X0 X1))) \end{aligned} \quad (3)$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge (l1\_cat\_1 \\ & X0))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 X0)) \Rightarrow (\forall X2. \\ & (m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow (\forall X3.(m1\_subset\_1 X3 \\ & (u1\_struct\_0 X0)) \Rightarrow ((X1 \in k2\_cat\_1 X0 X2 X3) \Leftrightarrow ((k3\_graph\_1 X0 X1 = \\ & X2) \wedge (k4\_graph\_1 X0 X1 = X3)))))) \end{aligned} \quad (4)$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ & X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow ((k2\_cat\_1 \\ & X0 X1 X2 \neq k1\_xboole\_0) \Rightarrow (\forall X3.(m1\_cat\_1 X3 X0 X1 X2) \Rightarrow ((k3\_graph\_1 \\ & (k2\_oppcat\_1 X0) (k7\_oppcat\_1 X0 X1 X2 X3) = k4\_graph\_1 X0 X3) \wedge (k4\_graph\_1 \\ & (k2\_oppcat\_1 X0) (k7\_oppcat\_1 X0 X1 X2 X3) = k3\_graph\_1 X0 X3)))))) \end{aligned} \quad (5)$$

Assume the following.

$$v1\_xboole\_0 \quad k1\_xboole\_0 \quad (6)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 \\ & X0) \wedge (l1\_cat\_1 X0))) \wedge ((m1\_subset\_1 X1 (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 \\ & X2 (u1\_struct\_0 X0)))) \Rightarrow (\forall X3.(m1\_cat\_1 X3 X0 X1 X2) \Rightarrow (m1\_subset\_1 \\ & X3 (u4\_struct\_0 X0))) \end{aligned} \quad (7)$$

Assume the following.

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

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge \\ & ((v2\_cat\_1 X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge \\ & ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))))) \wedge (m1\_subset\_1 X1 (u4\_struct\_0 \\ & (k2\_oppcat\_1 X0))) \Rightarrow (m1\_subset\_1 (k6\_oppcat\_1 X0 X1) (u4\_struct\_0 \\ & X0)) \end{aligned} \quad (9)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge \\ & (l1\_graph\_1 X0))) \wedge (m1\_subset\_1 X1 (u4\_struct\_0 X0))) \Rightarrow (m1\_subset\_1 \\ & (k4\_graph\_1 X0 X1) (u1\_struct\_0 X0)) \end{aligned} \quad (10)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge \\ & (l1\_graph\_1 X0))) \wedge (m1\_subset\_1 X1 (u4\_struct\_0 X0))) \Rightarrow (m1\_subset\_1 \\ & (k3\_graph\_1 X0 X1) (u1\_struct\_0 X0)) \end{aligned} \quad (11)$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow ((\neg v2\_struct\_0 (k2\_oppcat\_1 X0)) \wedge \\ & ((\neg v11\_struct\_0 (k2\_oppcat\_1 X0)) \wedge ((v1\_cat\_1 (k2\_oppcat\_1 X0)) \wedge \\ & (l1\_cat\_1 (k2\_oppcat\_1 X0)))))) \end{aligned} \quad (12)$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow ((k2\_cat\_1 \\
& X0 X1 X2 \neq k1\_xboole\_0) \Rightarrow (\forall X3.(m1\_cat\_1 X3 X0 X1 X2) \Rightarrow (k7\_oppcat\_1 \\
& X0 X1 X2 X3 = X3))))))
\end{aligned} \tag{13}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge (l1\_cat\_1 \\
& X0))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2. \\
& (m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow ((k2\_cat\_1 X0 X1 X2 \neq k1\_xboole\_0) \Rightarrow \\
& (\forall X3.(m1\_subset\_1 X3 (u4\_struct\_0 X0)) \Rightarrow ((m1\_cat\_1 X3 X0 \\
& X1 X2) \Leftrightarrow (X3 \in k2\_cat\_1 X0 X1 X2))))))
\end{aligned} \tag{14}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 \\
& X0)) \Rightarrow (k5\_oppcat\_1 X0 X1 = X1))
\end{aligned} \tag{15}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& (k2\_oppcat\_1 X0)) \Rightarrow (\forall X2.(m1\_subset\_1 X2 (u1\_struct\_0 \\
& (k2\_oppcat\_1 X0)) \Rightarrow (\forall X3.(m1\_cat\_1 X3 (k2\_oppcat\_1 X0) \\
& X1 X2) \Rightarrow ((k3\_graph\_1 X0 (k6\_oppcat\_1 X0 X3) = k4\_graph\_1 (k2\_oppcat\_1 \\
& X0) X3) \wedge (k4\_graph\_1 X0 (k6\_oppcat\_1 X0 X3) = k3\_graph\_1 (k2\_oppcat\_1 \\
& X0) X3))))))
\end{aligned}$$