

## t31\_oppcat\_1

(TMQQdkr2RVe9WCSShbtKtK6cMYJ1W1NyR7r)

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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  $m1\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k3\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $u4\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k4\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k7\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_funct\_1 : \iota \Rightarrow o$  be given. Let  $v1\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_zfmisc\_1 : \iota \Rightarrow \iota$  be given. Let  $k2\_zfmisc\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned}
 & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
 & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
 & X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge ((\neg \\
 & v11\_struct\_0 X1) \wedge ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 \\
 & X1) \wedge ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1))))))) \Rightarrow (\forall X2. \\
 & (m1\_oppcat\_1 X2 X0 X1) \Rightarrow (\forall X3.(m1\_subset\_1 X3 (u1\_struct\_0 \\
 & X0)) \Rightarrow (\forall X4.(m1\_subset\_1 X4 (u1\_struct\_0 X1)) \Rightarrow ((k3\_funct\_2 \\
 & (u4\_struct\_0 X0) (u4\_struct\_0 X1) X2 (k4\_cat\_1 X0 X3) = k4\_cat\_1 \\
 & X1 X4) \Rightarrow (k3\_funct\_2 (u1\_struct\_0 X0) (u1\_struct\_0 X1) (k7\_cat\_1 \\
 & X0 X1 X2) X3 = X4))))))
 \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned}
 & \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge \\
 & ((v2\_cat\_1 X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge \\
 & ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0))))))) \wedge ((\neg v2\_struct\_0 X1) \wedge ((\neg \\
 & v11\_struct\_0 X1) \wedge ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 X1) \wedge \\
 & ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1)))))))) \Rightarrow (\forall X2. \\
 & (m1\_oppcat\_1 X2 X0 X1) \Rightarrow ((v1\_funct\_1 X2) \wedge ((v1\_funct\_2 X2 (u4\_struct\_0 \\
 & X0) (u4\_struct\_0 X1)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\
 & (u4\_struct\_0 X0) (u4\_struct\_0 X1))))))
 \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge (( \\
& \neg v11\_struct\_0 X1) \wedge ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 \\
& X1) \wedge ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1))))))) \Rightarrow (\forall X2. \\
& ((v1\_funct\_1 X2) \wedge ((v1\_funct\_2 X2 (u4\_struct\_0 X0) (u4\_struct\_0 \\
& X1)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u4\_struct\_0 \\
& X0) (u4\_struct\_0 X1)))))) \Rightarrow ((m1\_oppcat\_1 X2 X0 X1) \Leftrightarrow ((\forall X3. \\
& (m1\_subset\_1 X3 (u1\_struct\_0 X0)) \Rightarrow (\exists X4.(m1\_subset\_1 X4 \\
& (u1\_struct\_0 X1)) \wedge (k3\_funct\_2 (u4\_struct\_0 X0) (u4\_struct\_0 \\
& X1) X2 (k4\_cat\_1 X0 X3) = k4\_cat\_1 X1 X4))) \wedge ((\forall X3.(m1\_subset\_1 \\
& X3 (u4\_struct\_0 X0)) \Rightarrow ((k3\_funct\_2 (u4\_struct\_0 X0) (u4\_struct\_0 \\
& X1) X2 (k4\_cat\_1 X0 (k3\_graph\_1 X0 X3)) = k4\_cat\_1 X1 (k4\_graph\_1 \\
& X1 (k3\_funct\_2 (u4\_struct\_0 X0) (u4\_struct\_0 X1) X2 X3))) \wedge (k3\_funct\_2 \\
& (u4\_struct\_0 X0) (u4\_struct\_0 X1) X2 (k4\_cat\_1 X0 (k4\_graph\_1 X0 \\
& X3)) = k4\_cat\_1 X1 (k3\_graph\_1 X1 (k3\_funct\_2 (u4\_struct\_0 X0) ( \\
& u4\_struct\_0 X1) X2 X3)))))) \wedge (\forall X3.(m1\_subset\_1 X3 (u4\_struct\_0 \\
& X0)) \Rightarrow (\forall X4.(m1\_subset\_1 X4 (u4\_struct\_0 X0)) \Rightarrow ((k3\_graph\_1 \\
& X0 X4 = k4\_graph\_1 X0 X3) \Rightarrow (k3\_funct\_2 (u4\_struct\_0 X0) (u4\_struct\_0 \\
& X1) X2 (k1\_cat\_1 X0 X3 X4) = k1\_cat\_1 X1 (k3\_funct\_2 (u4\_struct\_0 \\
& X0) (u4\_struct\_0 X1) X2 X4) (k3\_funct\_2 (u4\_struct\_0 X0) (u4\_struct\_0 \\
& X1) X2 X3))))))))) \tag{3}
\end{aligned}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge (( \\
& \neg v11\_struct\_0 X1) \wedge ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 \\
& X1) \wedge ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1))))))) \Rightarrow (\forall X2. \\
& (m1\_oppcat\_1 X2 X0 X1) \Rightarrow (\forall X3.(m1\_subset\_1 X3 (u1\_struct\_0 \\
& X0)) \Rightarrow (k3\_funct\_2 (u4\_struct\_0 X0) (u4\_struct\_0 X1) X2 (k4\_cat\_1 \\
& X0 X3) = k4\_cat\_1 X1 (k3\_funct\_2 (u1\_struct\_0 X0) (u1\_struct\_0 X1) \\
& (k7\_cat\_1 X0 X1 X2) X3))))))
\end{aligned}$$