

## l39\_oppcat\_1

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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  $m2\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k2\_oppcat\_1 : \iota \Rightarrow \iota$  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  $k9\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k7\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  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  $k6\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_cat\_1 : \iota \Rightarrow o$  be given. Let  $m1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k5\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned}
 & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
 & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
 & X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge ((\neg \\
 & v11\_struct\_0 X1) \wedge ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 \\
 & X1) \wedge ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1))))))) \Rightarrow (\forall X2. \\
 & (m2\_cat\_1 X2 X0 X1) \Rightarrow (\forall X3.(m1\_subset\_1 X3 (u1\_struct\_0 X0)) \Rightarrow \\
 & (k3\_funct\_2 (u4\_struct\_0 X0) (u4\_struct\_0 X1) X2 (k4\_cat\_1 X0 X3) = \\
 & k4\_cat\_1 X1 (k3\_funct\_2 (u1\_struct\_0 X0) (u1\_struct\_0 X1) (k7\_cat\_1 \\
 & X0 X1 X2) X3))))))
 \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned}
 & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
 & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
 & X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
 & X0)) \Rightarrow (k3\_oppcat\_1 (k2\_oppcat\_1 X0) (k3\_oppcat\_1 X0 X1) = X1))
 \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge ((\neg \\
& v11\_struct\_0 X1) \wedge ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 \\
& X1) \wedge ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1))))))) \Rightarrow (\forall X2. \\
& ((v1\_funct\_1 X2) \wedge ((v1\_funct\_2 X2 (u4\_struct\_0 (k2\_oppcat\_1 X0)) \\
& (u4\_struct\_0 X1)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\
& (u4\_struct\_0 (k2\_oppcat\_1 X0)) (u4\_struct\_0 X1)))))) \Rightarrow (\forall X3. \\
& (m1\_subset\_1 X3 (u4\_struct\_0 (k2\_oppcat\_1 X0)) \Rightarrow (k3\_funct\_2 \\
& (u4\_struct\_0 X0) (u4\_struct\_0 X1) (k9\_oppcat\_1 X0 X1 X2) (k6\_oppcat\_1 \\
& X0 X3) = k3\_funct\_2 (u4\_struct\_0 (k2\_oppcat\_1 X0)) (u4\_struct\_0 \\
& X1) X2 X3)))
\end{aligned} \tag{3}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\
& (k2\_oppcat\_1 X0)) \Rightarrow (k6\_oppcat\_1 X0 (k4\_cat\_1 (k2\_oppcat\_1 X0) \\
& X1) = k4\_cat\_1 X0 (k4\_oppcat\_1 X0 X1)))
\end{aligned} \tag{4}$$

Assume the following.

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

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\
& X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\
& X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow ((\neg v2\_struct\_0 (k2\_oppcat\_1 X0)) \wedge \\
& ((\neg v11\_struct\_0 (k2\_oppcat\_1 X0)) \wedge ((v1\_cat\_1 (k2\_oppcat\_1 X0)) \wedge \\
& ((v2\_cat\_1 (k2\_oppcat\_1 X0)) \wedge ((v3\_cat\_1 (k2\_oppcat\_1 X0)) \wedge \\
& (v4\_cat\_1 (k2\_oppcat\_1 X0)) \wedge ((v5\_cat\_1 (k2\_oppcat\_1 X0)) \wedge (v6\_cat\_1 \\
& (k2\_oppcat\_1 X0))))))))))
\end{aligned} \tag{6}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 X0) \wedge \\
& ((v2\_cat\_1 X0) \wedge (v3\_cat\_1 X0) \wedge (v4\_cat\_1 X0) \wedge (v5\_cat\_1 X0) \wedge \\
& ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))) \wedge ((\neg v2\_struct\_0 X1) \wedge (\neg \\
& v11\_struct\_0 X1) \wedge (v2\_cat\_1 X1) \wedge (v3\_cat\_1 X1) \wedge (v4\_cat\_1 X1) \wedge \\
& ((v5\_cat\_1 X1) \wedge (v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1)))))) \Rightarrow (\forall X2. \\
& (m2\_cat\_1 X2 X0 X1) \Rightarrow ((v1\_funct\_1 X2) \wedge ((v1\_funct\_2 X2 (u4\_struct\_0 \\
& X0) (u4\_struct\_0 X1)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\
& (u4\_struct\_0 X0) (u4\_struct\_0 X1))))))
\end{aligned} \tag{7}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. \forall X2. (((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 \\
& X0) \wedge (l1\_cat\_1 X0)) \wedge (m1\_subset\_1 X1 (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 \\
& X2 (u1\_struct\_0 X0))) \Rightarrow (\forall X3. (m1\_cat\_1 X3 X0 X1 X2) \Rightarrow (m1\_subset\_1 \\
& X3 (u4\_struct\_0 X0)))
\end{aligned} \tag{8}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 X0) \wedge \\
& ((v2\_cat\_1 X0) \wedge (v3\_cat\_1 X0) \wedge (v4\_cat\_1 X0) \wedge (v5\_cat\_1 X0) \wedge \\
& ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))) \wedge (m1\_subset\_1 X1 (u4\_struct\_0 \\
& X0)) \Rightarrow (m1\_subset\_1 (k5\_oppcat\_1 X0 X1) (u4\_struct\_0 (k2\_oppcat\_1 \\
& X0)))
\end{aligned} \tag{9}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 X0) \wedge \\
& ((v5\_cat\_1 X0) \wedge (v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))) \wedge (m1\_subset\_1 \\
& X1 (u1\_struct\_0 X0)) \Rightarrow (m1\_cat\_1 (k4\_cat\_1 X0 X1) X0 X1 X1)
\end{aligned} \tag{10}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge (\neg v11\_struct\_0 X0) \wedge \\
& ((v2\_cat\_1 X0) \wedge (v3\_cat\_1 X0) \wedge (v4\_cat\_1 X0) \wedge (v5\_cat\_1 X0) \wedge \\
& ((v6\_cat\_1 X0) \wedge (l1\_cat\_1 X0)))))) \wedge (m1\_subset\_1 X1 (u1\_struct\_0 \\
& X0)) \Rightarrow (m1\_subset\_1 (k3\_oppcat\_1 X0 X1) (u1\_struct\_0 (k2\_oppcat\_1 \\
& X0)))
\end{aligned} \tag{11}$$

Assume the following.

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

Assume the following.

$$\begin{aligned} \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 \\ X0)) \Rightarrow (k5\_oppcat\_1 X0 X1 = X1)) \end{aligned} \quad (13)$$

Assume the following.

$$\begin{aligned} \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ (k2\_oppcat\_1 X0)) \Rightarrow (k4\_oppcat\_1 X0 X1 = k3\_oppcat\_1 (k2\_oppcat\_1 \\ X0) X1)) \end{aligned} \quad (14)$$

Assume the following.

$$\begin{aligned} \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 \\ X0)) \Rightarrow (k3\_oppcat\_1 X0 X1 = X1)) \end{aligned} \quad (15)$$

**Theorem 1**

$$\begin{aligned} \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge (( \\ \neg v11\_struct\_0 X1) \wedge ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 \\ X1) \wedge ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1)))))))) \Rightarrow (\forall X2. \\ (m2\_cat\_1 X2 (k2\_oppcat\_1 X0) X1) \Rightarrow (\forall X3.(m1\_subset\_1 X3 \\ (u1\_struct\_0 X0)) \Rightarrow (k3\_funct\_2 (u4\_struct\_0 X0) (u4\_struct\_0 \\ X1) (k9\_oppcat\_1 X0 X1 X2) (k4\_cat\_1 X0 X3) = k4\_cat\_1 X1 (k3\_funct\_2 \\ (u1\_struct\_0 (k2\_oppcat\_1 X0)) (u1\_struct\_0 X1) (k7\_cat\_1 (k2\_oppcat\_1 \\ X0) X1 X2) (k3\_oppcat\_1 X0 X3)))))) \end{aligned}$$