

# t51\_oppcat\_1 (TMT- Pud3kz7k7wuACW3URxF795DtKQRed3dz)

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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  $v1\_cat\_1 : \iota \Rightarrow o$  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  $u4\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_zfmisc\_1 : \iota \Rightarrow \iota$  be given. Let  $k2\_zfmisc\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r1\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k2\_oppcat\_1 : \iota \Rightarrow \iota$  be given. Let  $k10\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $g1\_cat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $l5\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l1\_graph\_1 : \iota \Rightarrow o$  be given. Let  $u2\_graph\_1 : \iota \Rightarrow \iota$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $u1\_graph\_1 : \iota \Rightarrow \iota$  be given. Let  $u1\_cat\_1 : \iota \Rightarrow \iota$  be given. Let  $k6\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k5\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_oppcat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned}
 & \forall X0. \forall X1. \forall X2. \forall X3. \forall X4. \forall X5. \\
 & ((\neg v1\_xboole\_0 X1) \wedge (\neg v1\_xboole\_0 X3) \wedge ((v1\_funct\_1 X4) \wedge ((v1\_funct\_2 X4 X0 X1) \wedge (m1\_subset\_1 X4 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1)))))) \wedge ((v1\_funct\_1 X5) \wedge ((v1\_funct\_2 X5 X2 X3) \wedge (m1\_subset\_1 X5 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X2 X3)))))) \Rightarrow ((r1\_funct\_2 X0 X1 X2 X3 X4 X5) \Leftrightarrow (X4 = X5))
 \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned}
 & \forall X0. \forall X1. \forall X2. \forall X3. \forall X4. ((v1\_funct\_1 X2) \wedge ((v1\_funct\_2 X2 X1 X0) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 X0)))))) \wedge (((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 X3 X1 X0) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X1 X0)))))) \wedge ((v1\_funct\_1 X4) \wedge (m1\_subset\_1 X4 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 X1 X1) X1)))))) \Rightarrow (\forall X5. \\
 & \forall X6. \forall X7. \forall X8. \forall X9. (g1\_cat\_1 X0 X1 X2 X3 X4 = g1\_cat\_1 X5 X6 X7 X8 X9) \Rightarrow ((X0 = X5) \wedge ((X1 = X6) \wedge ((X2 = X7) \wedge ((X3 = X8) \wedge (X4 = X9))))))
 \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned} \forall X0. (&(\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (&(\neg v2\_struct\_0 (k2\_oppcat\_1 X0)) \wedge \\ ((\neg v11\_struct\_0 (k2\_oppcat\_1 X0)) \wedge ((v1\_cat\_1 (k2\_oppcat\_1 X0)) \wedge & \\ ((v2\_cat\_1 (k2\_oppcat\_1 X0)) \wedge ((v3\_cat\_1 (k2\_oppcat\_1 X0)) \wedge ( & \\ (v4\_cat\_1 (k2\_oppcat\_1 X0)) \wedge ((v5\_cat\_1 (k2\_oppcat\_1 X0)) \wedge (v6\_cat\_1 & \\ (k2\_oppcat\_1 X0)))))))))) & \end{aligned} \quad (3)$$

Assume the following.

$$\forall X0. ((\neg v11\_struct\_0 X0) \wedge (l5\_struct\_0 X0)) \Rightarrow (\neg v1\_xboole\_0 (u4\_struct\_0 X0)) \quad (4)$$

Assume the following.

$$\begin{aligned} \forall X0. (l1\_graph\_1 X0) \Rightarrow (&(v1\_funct\_1 (u2\_graph\_1 X0)) \wedge (( \\ v1\_funct\_2 (u2\_graph\_1 X0) (u4\_struct\_0 X0) (u1\_struct\_0 X0)) \wedge & \\ (m1\_subset\_1 (u2\_graph\_1 X0) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u4\_struct\_0 & \\ X0) (u1\_struct\_0 X0)))))) & \end{aligned} \quad (5)$$

Assume the following.

$$\begin{aligned} \forall X0. (l1\_graph\_1 X0) \Rightarrow (&(v1\_funct\_1 (u1\_graph\_1 X0)) \wedge (( \\ v1\_funct\_2 (u1\_graph\_1 X0) (u4\_struct\_0 X0) (u1\_struct\_0 X0)) \wedge & \\ (m1\_subset\_1 (u1\_graph\_1 X0) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u4\_struct\_0 & \\ X0) (u1\_struct\_0 X0)))))) & \end{aligned} \quad (6)$$

Assume the following.

$$\begin{aligned} \forall X0. (l1\_cat\_1 X0) \Rightarrow (&(v1\_funct\_1 (u1\_cat\_1 X0)) \wedge (m1\_subset\_1 \\ (u1\_cat\_1 X0) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 (u4\_struct\_0 & \\ X0) (u4\_struct\_0 X0)) (u4\_struct\_0 X0)))))) & \end{aligned} \quad (7)$$

Assume the following.

$$\forall X0. (l1\_graph\_1 X0) \Rightarrow (l5\_struct\_0 X0) \quad (8)$$

Assume the following.

$$\forall X0. (l1\_cat\_1 X0) \Rightarrow (l1\_graph\_1 X0) \quad (9)$$

Assume the following.

$$\begin{aligned} \forall X0. (&(\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (&(\neg v2\_struct\_0 (k2\_oppcat\_1 X0)) \wedge \\ ((\neg v11\_struct\_0 (k2\_oppcat\_1 X0)) \wedge ((v1\_cat\_1 (k2\_oppcat\_1 X0)) \wedge & \\ (l1\_cat\_1 (k2\_oppcat\_1 X0)))))) & \end{aligned} \quad (10)$$

Assume the following.

$$\begin{aligned} \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 \\ (k2\_oppcat\_1 X0))) \Rightarrow (k6\_oppcat\_1 X0 X1 = k5\_oppcat\_1 (k2\_oppcat\_1 \\ X0) X1)) \end{aligned} \quad (11)$$

Assume the following.

$$\begin{aligned} \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (u4\_struct\_0 \\ X0)) \Rightarrow (k5\_oppcat\_1 X0 X1 = X1)) \end{aligned} \quad (12)$$

Assume the following.

$$\begin{aligned} \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (k2\_oppcat\_1 X0 = g1\_cat\_1 (u1\_struct\_0 \\ X0) (u4\_struct\_0 X0) (u2\_graph\_1 X0) (u1\_graph\_1 X0) (k1\_oppcat\_1 \\ (u4\_struct\_0 X0) (u4\_struct\_0 X0) (u4\_struct\_0 X0) (u1\_cat\_1 X0))) \end{aligned} \quad (13)$$

Assume the following.

$$\begin{aligned} \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ X0) \wedge (l1\_cat\_1 X0)))))))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge (( \\ \neg v11\_struct\_0 X1) \wedge ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 X1) \wedge ((v4\_cat\_1 \\ X1) \wedge ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 X1)))))))) \Rightarrow (\forall X2. \\ ((v1\_funct\_1 X2) \wedge ((v1\_funct\_2 X2 (u4\_struct\_0 X0) (u4\_struct\_0 \\ X1)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u4\_struct\_0 \\ X0) (u4\_struct\_0 X1)))))) \Rightarrow (\forall X3.((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 \\ X3 (u4\_struct\_0 (k2\_oppcat\_1 X0)) (u4\_struct\_0 X1)) \wedge (m1\_subset\_1 \\ X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u4\_struct\_0 (k2\_oppcat\_1 X0)) ( \\ u4\_struct\_0 X1)))))) \Rightarrow ((X3 = k10\_oppcat\_1 X0 X1 X2) \Leftrightarrow (\forall X4. \\ (m1\_subset\_1 X4 (u4\_struct\_0 (k2\_oppcat\_1 X0)) \Rightarrow (k3\_funct\_2 \\ (u4\_struct\_0 (k2\_oppcat\_1 X0)) (u4\_struct\_0 X1) X3 X4 = k3\_funct\_2 \\ (u4\_struct\_0 X0) (u4\_struct\_0 X1) X2 (k6\_oppcat\_1 X0 X4)))))) \end{aligned} \quad (14)$$

Assume the following.

$$\begin{aligned} \forall X0.(l1\_cat\_1 X0) \Rightarrow ((v1\_cat\_1 X0) \Rightarrow (X0 = g1\_cat\_1 (u1\_struct\_0 \\ X0) (u4\_struct\_0 X0) (u1\_graph\_1 X0) (u2\_graph\_1 X0) (u1\_cat\_1 \\ X0))) \end{aligned} \quad (15)$$

**Theorem 1**

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_1 X0))))))) \Rightarrow (\forall X1.((\neg v2\_struct\_0 X1) \wedge (( \\ & \neg v11\_struct\_0 X1) \wedge ((v1\_cat\_1 X1) \wedge ((v2\_cat\_1 X1) \wedge ((v3\_cat\_1 \\ & X1) \wedge ((v4\_cat\_1 X1) \wedge ((v5\_cat\_1 X1) \wedge ((v6\_cat\_1 X1) \wedge (l1\_cat\_1 \\ & X1)))))))))) \Rightarrow (\forall X2.((v1\_funct\_1 X2) \wedge ((v1\_funct\_2 X2 (u4\_struct\_0 \\ & X1) (u4\_struct\_0 X0)) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & (u4\_struct\_0 X1) (u4\_struct\_0 X0)))))) \Rightarrow (r1\_funct\_2 (u4\_struct\_0 \\ & (k2\_oppcat\_1 (k2\_oppcat\_1 X1)) (u4\_struct\_0 X0) (u4\_struct\_0 \\ & X1) (u4\_struct\_0 X0) (k10\_oppcat\_1 (k2\_oppcat\_1 X1) X0 (k10\_oppcat\_1 \\ & X1 X0 X2)) X2))) \end{aligned}$$