

# t10\_cat\_4 (TM- LVtU1JnHH7HBNF4cE4CExBjjXohmpMuPm)

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Let  $v3\_cat\_4 : \iota \Rightarrow o$  be given. Let  $k5\_cat\_4 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $u4\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $r2\_cat\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v10\_cat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l1\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  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  $v2\_cat\_4 : \iota \Rightarrow o$  be given. Let  $l1\_cat\_4 : \iota \Rightarrow o$  be given. Let  $v1\_funct\_1 : \iota \Rightarrow o$  be given. Let  $u4\_cat\_4 : \iota \Rightarrow \iota$  be given. Let  $v1\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k2\_zfmisc\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_zfmisc\_1 : \iota \Rightarrow \iota$  be given. Let  $u3\_cat\_4 : \iota \Rightarrow \iota$  be given. Let  $u2\_cat\_4 : \iota \Rightarrow \iota$  be given. Let  $u1\_cat\_4 : \iota \Rightarrow \iota$  be given. Let  $l5\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l1\_graph\_1 : \iota \Rightarrow o$  be given. Let  $l1\_cat\_1 : \iota \Rightarrow o$  be given. Let  $k5\_binop\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_graph\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_binop\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (u1\_struct\_0 \\ & (k5\_cat\_4 X0 X1))) \Rightarrow (\forall X3. (m1\_subset\_1 X3 (u4\_struct\_0 ( \\ & k5\_cat\_4 X0 X1))) \Rightarrow (\forall X4. (m1\_subset\_1 X4 (u4\_struct\_0 (k5\_cat\_4 \\ & X0 X1))) \Rightarrow (r2\_cat\_3 (k5\_cat\_4 X0 X1) X2 X3 X4))) \end{aligned} \quad (1)$$

Assume the following.

$$\forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (u1\_struct\_0 (k5\_cat\_4 X0 X1))) \Rightarrow (v10\_cat\_1 X2 (k5\_cat\_4 X0 X1)) \quad (2)$$

Assume the following.

$$\forall X0. \forall X1. \forall X2. (m1\_subset\_1 X2 (u1\_struct\_0 (k5\_cat\_4 X0 X1))) \Rightarrow (\forall X3. (m1\_subset\_1 X3 (u1\_struct\_0 (k5\_cat\_4 X0 X1))) \Rightarrow (X2 = X3)) \quad (3)$$

Assume the following.

$$\forall X0. ((\neg v2\_struct\_0 X0) \wedge (l1\_struct\_0 X0)) \Rightarrow (\neg v1\_xboole\_0 (u1\_struct\_0 X0)) \quad (4)$$

Assume the following.

$$\begin{aligned} \forall X0. \forall X1. (&\neg v2\_struct\_0 (k5\_cat\_4 X0 X1)) \wedge ((\neg v11\_struct\_0 \\ &(k5\_cat\_4 X0 X1)) \wedge ((v2\_cat\_1 (k5\_cat\_4 X0 X1)) \wedge ((v3\_cat\_1 (k5\_cat\_4 \\ &X0 X1)) \wedge ((v4\_cat\_1 (k5\_cat\_4 X0 X1)) \wedge ((v5\_cat\_1 (k5\_cat\_4 X0 X1)) \wedge \\ &((v6\_cat\_1 (k5\_cat\_4 X0 X1)) \wedge (v2\_cat\_4 (k5\_cat\_4 X0 X1)))))))))) \end{aligned} \quad (5)$$

Assume the following.

$$\forall X0. \exists X1. m1\_subset\_1 X1 X0 \quad (6)$$

Assume the following.

$$\begin{aligned} \forall X0. (l1\_cat\_4 X0) \Rightarrow (&(v1\_funct\_1 (u4\_cat\_4 X0)) \wedge ((v1\_funct\_2 \\ &(u4\_cat\_4 X0) (k2\_zfmisc\_1 (u1\_struct\_0 X0) (u1\_struct\_0 X0)) \\ &(u4\_struct\_0 X0)) \wedge (m1\_subset\_1 (u4\_cat\_4 X0) (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ &(k2\_zfmisc\_1 (u1\_struct\_0 X0) (u1\_struct\_0 X0)) (u4\_struct\_0 \\ &X0)))))) \end{aligned} \quad (7)$$

Assume the following.

$$\begin{aligned} \forall X0. (l1\_cat\_4 X0) \Rightarrow (&(v1\_funct\_1 (u3\_cat\_4 X0)) \wedge ((v1\_funct\_2 \\ &(u3\_cat\_4 X0) (k2\_zfmisc\_1 (u1\_struct\_0 X0) (u1\_struct\_0 X0)) \\ &(u4\_struct\_0 X0)) \wedge (m1\_subset\_1 (u3\_cat\_4 X0) (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ &(k2\_zfmisc\_1 (u1\_struct\_0 X0) (u1\_struct\_0 X0)) (u4\_struct\_0 \\ &X0)))))) \end{aligned} \quad (8)$$

Assume the following.

$$\begin{aligned} \forall X0. (l1\_cat\_4 X0) \Rightarrow (&(v1\_funct\_1 (u2\_cat\_4 X0)) \wedge ((v1\_funct\_2 \\ &(u2\_cat\_4 X0) (k2\_zfmisc\_1 (u1\_struct\_0 X0) (u1\_struct\_0 X0)) \\ &(u1\_struct\_0 X0)) \wedge (m1\_subset\_1 (u2\_cat\_4 X0) (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ &(k2\_zfmisc\_1 (u1\_struct\_0 X0) (u1\_struct\_0 X0)) (u1\_struct\_0 \\ &X0)))))) \end{aligned} \quad (9)$$

Assume the following.

$$\forall X0. (l1\_cat\_4 X0) \Rightarrow (m1\_subset\_1 (u1\_cat\_4 X0) (u1\_struct\_0 X0)) \quad (10)$$

Assume the following.

$$\forall X0. (l5\_struct\_0 X0) \Rightarrow (l1\_struct\_0 X0) \quad (11)$$

Assume the following.

$$\forall X0. (l1\_graph\_1 X0) \Rightarrow (l5\_struct\_0 X0) \quad (12)$$

Assume the following.

$$\forall X0. (l1\_cat\_4 X0) \Rightarrow (l1\_cat\_1 X0) \quad (13)$$

Assume the following.

$$\forall X0.(l1\_cat\_1 X0) \Rightarrow (l1\_graph\_1 X0) \quad (14)$$

Assume the following.

$$\forall X0.\forall X1.(v2\_cat\_4 (k5\_cat\_4 X0 X1)) \wedge (l1\_cat\_4 (k5\_cat\_4 X0 X1)) \quad (15)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.(((v1\_funct\_1 X1) \wedge \\ & ((v1\_funct\_2 X1 (k2\_zfmisc\_1 X0 X0) X0) \wedge (m1\_subset\_1 X1 (k1\_zfmisc\_1 \\ & (k2\_zfmisc\_1 (k2\_zfmisc\_1 X0 X0) X0)))) \wedge ((m1\_subset\_1 X2 X0) \wedge \\ & (m1\_subset\_1 X3 X0))) \Rightarrow (m1\_subset\_1 (k5\_binop\_1 X0 X1 X2 X3) X0) \end{aligned} \quad (16)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.(((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge \\ & (l1\_graph\_1 X0))) \wedge (m1\_subset\_1 X1 (u4\_struct\_0 X0))) \Rightarrow (m1\_subset\_1 \\ & (k4\_graph\_1 X0 X1) (u1\_struct\_0 X0)) \end{aligned} \quad (17)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.\forall X4.\forall X5. \\ & (((\neg v1\_xboole\_0 X0) \wedge ((\neg v1\_xboole\_0 X1) \wedge ((v1\_funct\_1 X3) \wedge (( \\ & v1\_funct\_2 X3 (k2\_zfmisc\_1 X0 X1) X2) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 \\ & (k2\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1) X2)))) \wedge ((m1\_subset\_1 X4 X0) \wedge \\ & (m1\_subset\_1 X5 X1)))))) \Rightarrow (m1\_subset\_1 (k2\_binop\_1 X0 X1 X2 X3 X4 \\ & X5) X2) \end{aligned} \quad (18)$$

Assume the following.

$$\begin{aligned} & \forall X0.(((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge ((v2\_cat\_1 \\ & X0) \wedge ((v3\_cat\_1 X0) \wedge ((v4\_cat\_1 X0) \wedge ((v5\_cat\_1 X0) \wedge ((v6\_cat\_1 \\ & X0) \wedge (l1\_cat\_4 X0)))))))) \Rightarrow ((v3\_cat\_4 X0) \Leftrightarrow ((v10\_cat\_1 (u1\_cat\_4 \\ & X0) X0) \wedge (\forall X1.(m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (\forall X2. \\ & (m1\_subset\_1 X2 (u1\_struct\_0 X0)) \Rightarrow ((k4\_graph\_1 X0 (k2\_binop\_1 \\ & (u1\_struct\_0 X0) (u1\_struct\_0 X0) (u4\_struct\_0 X0) (u3\_cat\_4 X0) \\ & X1 X2) = X1) \wedge ((k4\_graph\_1 X0 (k2\_binop\_1 (u1\_struct\_0 X0) (u1\_struct\_0 \\ & X0) (u4\_struct\_0 X0) (u4\_cat\_4 X0) X1 X2) = X2) \wedge (r2\_cat\_3 X0 (k5\_binop\_1 \\ & (u1\_struct\_0 X0) (u2\_cat\_4 X0) X1 X2) (k2\_binop\_1 (u1\_struct\_0 \\ & X0) (u1\_struct\_0 X0) (u4\_struct\_0 X0) (u3\_cat\_4 X0) X1 X2) (k2\_binop\_1 \\ & (u1\_struct\_0 X0) (u1\_struct\_0 X0) (u4\_struct\_0 X0) (u4\_cat\_4 X0) \\ & X1 X2)))))))))) \end{aligned} \quad (19)$$

**Theorem 1**  $\forall X0.\forall X1.v3\_cat\_4 (k5\_cat\_4 X0 X1).$