

# t19\_sublemma (TMQCbEoUFraTpAjd- NiovB71z4HtQMu7ymu)

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Let  $m1\_qc\_lang1 : \iota \Rightarrow o$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $m1\_valuat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $m2\_subset\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k16\_subst1 : \iota \Rightarrow \iota$  be given. Let  $k38\_subst1 : \iota \Rightarrow \iota$  be given. Let  $m2\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k3\_qc\_lang1 : \iota \Rightarrow \iota$  be given. Let  $k2\_valuat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r1\_valuat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k39\_subst1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r1\_sublemma : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_sublemma : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_sublemma : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k5\_sublemma : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k37\_subst1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k20\_subst1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k13\_qc\_lang1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r2\_relset\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k9\_qc\_lang1 : \iota \Rightarrow \iota$  be given. Let  $k3\_cqc\_lang : \iota \Rightarrow \iota$  be given. Let  $k6\_cqc\_lang : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_zfmisc\_1 : \iota \Rightarrow \iota$  be given. Let  $k2\_zfmisc\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $m1\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v1\_funct\_1 : \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned} \forall X0.(m1\_qc\_lang1 X0) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (k16\_subst1 \\ X0)) \Rightarrow (k37\_subst1 X0 (k20\_subst1 X0 X1) = k13\_qc\_lang1 X0 (k37\_subst1 \\ X0 X1))) \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned} \forall X0.(m1\_qc\_lang1 X0) \Rightarrow (\forall X1.(\neg v1\_xboole\_0 X1) \Rightarrow ( \\ \forall X2.(m2\_funct\_2 X2 (k3\_qc\_lang1 X0) X1 (k2\_valuat\_1 X0 X1)) \Rightarrow \\ (\forall X3.(m2\_subset\_1 X3 (k16\_subst1 X0) (k38\_subst1 X0)) \Rightarrow \\ (r2\_relset\_1 (k3\_qc\_lang1 X0) X1 (k3\_sublemma X0 X3 X1 X2) (k3\_sublemma \\ X0 (k5\_sublemma X0 X3) X1 X2)))))) \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned} \forall X0.(m1\_qc\_lang1 X0) \Rightarrow (\forall X1.(\neg v1\_xboole\_0 X1) \Rightarrow ( \\ \forall X2.(m2\_funct\_2 X2 (k3\_qc\_lang1 X0) X1 (k2\_valuat\_1 X0 X1)) \Rightarrow \\ (\forall X3.(m2\_subset\_1 X3 (k9\_qc\_lang1 X0) (k3\_cqc\_lang X0)) \Rightarrow \\ (\forall X4.(m1\_valuat\_1 X4 X0 X1) \Rightarrow ((r1\_valuat\_1 X0 X1 (k6\_cqc\_lang \\ X0 X3) X4 X2) \Leftrightarrow (\neg r1\_valuat\_1 X0 X1 X3 X4 X2)))))) \end{aligned} \tag{3}$$

Assume the following.

$$\begin{aligned} \forall X0.(m1\_qc\_lang1\ X0) \Rightarrow (\forall X1.(\neg v1\_xboole\_0\ X1) \Rightarrow ( \\ \forall X2.(m1\_valuat\_1\ X2\ X0\ X1) \Rightarrow (\forall X3.(m2\_funct\_2\ X3\ ( \\ k3\_qc\_lang1\ X0)\ X1\ (k2\_valuat\_1\ X0\ X1)) \Rightarrow (\forall X4.(m2\_subset\_1 \\ X4\ (k16\_subst1\ X0)\ (k38\_subst1\ X0)) \Rightarrow ((\neg r1\_sublemma\ X0\ X4\ X1 \\ (k1\_sublemma\ X0\ X1\ X3\ (k3\_sublemma\ X0\ X4\ X1\ X3))\ X2) \Leftrightarrow (r1\_sublemma \\ X0\ (k5\_sublemma\ X0\ X4)\ X1\ (k1\_sublemma\ X0\ X1\ X3\ (k3\_sublemma\ X0\ X4 \\ X1\ X3))\ X2)))))) \end{aligned} \quad (4)$$

Assume the following.

$$\begin{aligned} \forall X0.\forall X1.\forall X2.\forall X3.((m1\_subset\_1\ X2 \\ (k1\_zfmisc\_1\ (k2\_zfmisc\_1\ X0\ X1))) \wedge (m1\_subset\_1\ X3\ (k1\_zfmisc\_1 \\ (k2\_zfmisc\_1\ X0\ X1)))) \Rightarrow ((r2\_relset\_1\ X0\ X1\ X2\ X3) \Leftrightarrow (X2 = X3)) \end{aligned} \quad (5)$$

Assume the following.

$$\begin{aligned} \forall X0.\forall X1.((\neg v1\_xboole\_0\ X0) \wedge ((\neg v1\_xboole\_0\ X1) \wedge \\ (m1\_subset\_1\ X1\ (k1\_zfmisc\_1\ X0)))) \Rightarrow (\forall X2.(m2\_subset\_1 \\ X2\ X0\ X1) \Leftrightarrow (m1\_subset\_1\ X2\ X1)) \end{aligned} \quad (6)$$

Assume the following.

$$\begin{aligned} \forall X0.\forall X1.\forall X2.((\neg v1\_xboole\_0\ X1) \wedge (m1\_funct\_2 \\ X2\ X0\ X1)) \Rightarrow (\forall X3.(m2\_funct\_2\ X3\ X0\ X1\ X2) \Leftrightarrow (m1\_subset\_1\ X3 \\ X2)) \end{aligned} \quad (7)$$

Assume the following.

$$\begin{aligned} \forall X0.\forall X1.((m1\_qc\_lang1\ X0) \wedge (m1\_subset\_1\ X1\ (k3\_cqc\_lang \\ X0))) \Rightarrow (k6\_cqc\_lang\ X0\ X1 = k13\_qc\_lang1\ X0\ X1) \end{aligned} \quad (8)$$

Assume the following.

$$\begin{aligned} \forall X0.\forall X1.((m1\_qc\_lang1\ X0) \wedge (m1\_subset\_1\ X1\ (k38\_subst1 \\ X0))) \Rightarrow (k5\_sublemma\ X0\ X1 = k20\_subst1\ X0\ X1) \end{aligned} \quad (9)$$

Assume the following.

$$\begin{aligned} \forall X0.\forall X1.((m1\_qc\_lang1\ X0) \wedge (m1\_subset\_1\ X1\ (k38\_subst1 \\ X0))) \Rightarrow (k39\_subst1\ X0\ X1 = k37\_subst1\ X0\ X1) \end{aligned} \quad (10)$$

Assume the following.

$$\forall X0.(m1\_qc\_lang1\ X0) \Rightarrow (\neg v1\_xboole\_0\ (k38\_subst1\ X0)) \quad (11)$$

Assume the following.

$$\forall X0.(m1\_qc\_lang1\ X0) \Rightarrow (\neg v1\_xboole\_0\ (k3\_cqc\_lang\ X0)) \quad (12)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.((\neg v1\_xboole\_0 X0)\wedge((\neg v1\_xboole\_0 X1)\wedge \\ & (m1\_subset\_1 X1 (k1\_zfmisc\_1 X0))))\Rightarrow(\forall X2.(m2\_subset\_1 \\ & X2 X0 X1)\Rightarrow(m1\_subset\_1 X2 X0)) \end{aligned} \quad (13)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.((m1\_qc\_lang1 X0)\wedge(m1\_subset\_1 X1 (k38\_subst1 \\ & X0)))\Rightarrow(m2\_subset\_1 (k5\_sublemma X0 X1) (k16\_subst1 X0) (k38\_subst1 \\ & X0)) \end{aligned} \quad (14)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.((m1\_qc\_lang1 X0)\wedge \\ & ((m1\_subset\_1 X1 (k38\_subst1 X0))\wedge((\neg v1\_xboole\_0 X2)\wedge(m1\_subset\_1 \\ & X3 (k2\_valuat\_1 X0 X2))))\Rightarrow((v1\_funct\_1 (k3\_sublemma X0 X1 X2 X3))\wedge \\ & (m1\_subset\_1 (k3\_sublemma X0 X1 X2 X3) (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & (k3\_qc\_lang1 X0) X2)))) \end{aligned} \quad (15)$$

Assume the following.

$$\begin{aligned} & \forall X0.(m1\_qc\_lang1 X0)\Rightarrow(m1\_subset\_1 (k3\_cqc\_lang X0) (k1\_zfmisc\_1 \\ & (k9\_qc\_lang1 X0))) \end{aligned} \quad (16)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.((m1\_qc\_lang1 X0)\wedge(m1\_subset\_1 X1 (k38\_subst1 \\ & X0)))\Rightarrow(m2\_subset\_1 (k39\_subst1 X0 X1) (k9\_qc\_lang1 X0) (k3\_cqc\_lang \\ & X0)) \end{aligned} \quad (17)$$

Assume the following.

$$\begin{aligned} & \forall X0.(m1\_qc\_lang1 X0)\Rightarrow(m1\_subset\_1 (k38\_subst1 X0) ( \\ & k1\_zfmisc\_1 (k16\_subst1 X0))) \end{aligned} \quad (18)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.((m1\_qc\_lang1 X0)\wedge(\neg v1\_xboole\_0 X1))\Rightarrow \\ & (m1\_funct\_2 (k2\_valuat\_1 X0 X1) (k3\_qc\_lang1 X0) X1) \end{aligned} \quad (19)$$

Assume the following.

$$\begin{aligned} & \forall X0.(v1\_xboole\_0 X0)\Rightarrow(\forall X1.(m1\_subset\_1 X1 (k1\_zfmisc\_1 \\ & X0))\Rightarrow(v1\_xboole\_0 X1)) \end{aligned} \quad (20)$$

**Theorem 1**

$$\begin{aligned} & \forall X0.(m1\_qc\_lang1\ X0) \Rightarrow (\forall X1.(\neg v1\_xboole\_0\ X1) \Rightarrow ( \\ & \quad \forall X2.(m1\_valuat\_1\ X2\ X0\ X1) \Rightarrow (\forall X3.(m2\_subset\_1\ X3 \\ & \quad (k16\_subst1\ X0)\ (k38\_subst1\ X0)) \Rightarrow ((\forall X4.(m2\_funct\_2 \\ & \quad X4\ (k3\_qc\_lang1\ X0)\ X1\ (k2\_valuat\_1\ X0\ X1)) \Rightarrow ((r1\_valuat\_1\ X0\ X1 \\ & \quad (k39\_subst1\ X0\ X3)\ X2\ X4) \Leftrightarrow (r1\_sublemma\ X0\ X3\ X1\ (k1\_sublemma\ X0 \\ & \quad X1\ X4\ (k3\_sublemma\ X0\ X3\ X1\ X4))\ X2))) \Rightarrow (\forall X4.(m2\_funct\_2\ X4 \\ & \quad (k3\_qc\_lang1\ X0)\ X1\ (k2\_valuat\_1\ X0\ X1)) \Rightarrow ((r1\_valuat\_1\ X0\ X1\ (k39\_subst1 \\ & \quad X0\ (k5\_sublemma\ X0\ X3))\ X2\ X4) \Leftrightarrow (r1\_sublemma\ X0\ (k5\_sublemma\ X0\ X3) \\ & \quad X1\ (k1\_sublemma\ X0\ X1\ X4\ (k3\_sublemma\ X0\ (k5\_sublemma\ X0\ X3)\ X1\ X4)) \\ & \quad X2)))))) \end{aligned}$$