

## t76\_sublemma

(TMcwdit7vN3h9kfnLKMZkkFrnoFBbVx1di3)

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Let  $m1\_qc\_lang1 : \iota \Rightarrow o$  be given. Let  $m2\_subset\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k9\_qc\_lang1 : \iota \Rightarrow \iota$  be given. Let  $k3\_cqc\_lang : \iota \Rightarrow \iota$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $m1\_valuat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  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  $v1\_funct\_1 : \iota \Rightarrow o$  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  $k2\_qc\_lang1 : \iota \Rightarrow \iota$  be given. Let  $k1\_relset\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k24\_qc\_lang1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_funct\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r1\_xboole\_0 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $r1\_valuat\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_sublemma : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k14\_sublemma : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k6\_cqc\_lang : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k13\_qc\_lang1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $m1\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned} & \forall X0.(m1\_qc\_lang1 X0) \Rightarrow (\forall X1.(m1\_subset\_1 X1 (k9\_qc\_lang1 \\ & X0)) \Rightarrow (k24\_qc\_lang1 X0 (k13\_qc\_lang1 X0 X1) = k24\_qc\_lang1 X0 X1)) \end{aligned} \quad (1)$$

Assume the following.

$$\begin{aligned} & \forall X0.(m1\_qc\_lang1 X0) \Rightarrow (\forall X1.(\neg v1\_xboole\_0 X1) \Rightarrow ( \\ & \forall X2.(m2\_funct\_2 X2 (k3\_qc\_lang1 X0) X1 (k2\_valuat\_1 X0 X1)) \Rightarrow \\ & (\forall X3.(m2\_subset\_1 X3 (k9\_qc\_lang1 X0) (k3\_cqc\_lang X0)) \Rightarrow \\ & (\forall X4.(m1\_valuat\_1 X4 X0 X1) \Rightarrow ((r1\_valuat\_1 X0 X1 (k6\_cqc\_lang \\ & X0 X3) X4 X2) \Leftrightarrow (\neg r1\_valuat\_1 X0 X1 X3 X4 X2)))))) \end{aligned} \quad (2)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.((\neg v1\_xboole\_0 X0) \wedge ((\neg v1\_xboole\_0 X1) \wedge \\ & (m1\_subset\_1 X1 (k1\_zfmisc\_1 X0)))) \Rightarrow (\forall X2.(m2\_subset\_1 \\ & X2 X0 X1) \Leftrightarrow (m1\_subset\_1 X2 X1)) \end{aligned} \quad (3)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.((\neg v1\_xboole\_0 X1) \wedge (m1\_funct\_2 \\ & X2 X0 X1)) \Rightarrow (\forall X3.(m2\_funct\_2 X3 X0 X1 X2) \Leftrightarrow (m1\_subset\_1 X3 \\ & X2)) \end{aligned} \quad (4)$$

Assume the following.

$$\forall X0.\forall X1.((m1\_qc\_lang1 X0)\wedge(m1\_subset\_1 X1 (k3\_qc\_lang X0)))\Rightarrow(k6\_qc\_lang X0 X1 = k13\_qc\_lang1 X0 X1) \quad (5)$$

Assume the following.

$$\forall X0.(m1\_qc\_lang1 X0)\Rightarrow(\neg v1\_xboole\_0 (k3\_qc\_lang X0)) \quad (6)$$

Assume the following.

$$\forall X0.\forall X1.((\neg v1\_xboole\_0 X0)\wedge((\neg v1\_xboole\_0 X1)\wedge(m1\_subset\_1 X1 (k1\_zfmisc\_1 X0))))\Rightarrow(\forall X2.(m2\_subset\_1 X2 X0 X1)\Rightarrow(m1\_subset\_1 X2 X0)) \quad (7)$$

Assume the following.

$$\forall X0.(m1\_qc\_lang1 X0)\Rightarrow(m1\_subset\_1 (k3\_qc\_lang X0) (k1\_zfmisc\_1 (k9\_qc\_lang1 X0))) \quad (8)$$

Assume the following.

$$\forall X0.\forall X1.((m1\_qc\_lang1 X0)\wedge(\neg v1\_xboole\_0 X1))\Rightarrow(m1\_funct\_2 (k2\_valuat\_1 X0 X1) (k3\_qc\_lang1 X0) X1) \quad (9)$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.\forall X3.((m1\_qc\_lang1 X0)\wedge((\neg v1\_xboole\_0 X1)\wedge((m1\_subset\_1 X2 (k2\_valuat\_1 X0 X1))\wedge((v1\_funct\_1 X3)\wedge(m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k3\_qc\_lang1 X0) X1)))))))\Rightarrow(m2\_funct\_2 (k1\_sublemma X0 X1 X2 X3) (k3\_qc\_lang1 X0) X1 (k2\_valuat\_1 X0 X1)) \quad (10)$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.\forall X3.((m1\_qc\_lang1 X0)\wedge((\neg v1\_xboole\_0 X1)\wedge(((v1\_funct\_1 X2)\wedge(m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k3\_qc\_lang1 X0) X1))))\wedge((v1\_funct\_1 X3)\wedge(m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k3\_qc\_lang1 X0) X1)))))))\Rightarrow((v1\_funct\_1 (k14\_sublemma X0 X1 X2 X3))\wedge(m1\_subset\_1 (k14\_sublemma X0 X1 X2 X3) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k3\_qc\_lang1 X0) X1)))) \quad (11)$$

Assume the following.

$$\forall X0.(v1\_xboole\_0 X0)\Rightarrow(\forall X1.(m1\_subset\_1 X1 (k1\_zfmisc\_1 X0))\Rightarrow(v1\_xboole\_0 X1)) \quad (12)$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.(m1\_qc\_lang1\ X0) \Rightarrow (\forall X1.(m2\_subset\_1\ X1\ (k9\_qc\_lang1 \\
& \quad X0)\ (k3\_cqc\_lang\ X0)) \Rightarrow (\forall X2.(\neg v1\_xboole\_0\ X2) \Rightarrow (\forall X3. \\
& \quad (m1\_valuat\_1\ X3\ X0\ X2) \Rightarrow ((\forall X4.(m2\_funct\_2\ X4\ (k3\_qc\_lang1 \\
& \quad X0)\ X2\ (k2\_valuat\_1\ X0\ X2)) \Rightarrow (\forall X5.((v1\_funct\_1\ X5) \wedge (m1\_subset\_1 \\
& \quad X5\ (k1\_zfmisc\_1\ (k2\_zfmisc\_1\ (k3\_qc\_lang1\ X0)\ X2)))) \Rightarrow (\forall X6. \\
& \quad ((v1\_funct\_1\ X6) \wedge (m1\_subset\_1\ X6\ (k1\_zfmisc\_1\ (k2\_zfmisc\_1\ ( \\
& \quad k3\_qc\_lang1\ X0)\ X2)))) \Rightarrow (\forall X7.((v1\_funct\_1\ X7) \wedge (m1\_subset\_1 \\
& \quad X7\ (k1\_zfmisc\_1\ (k2\_zfmisc\_1\ (k3\_qc\_lang1\ X0)\ X2)))) \Rightarrow (((\forall X8. \\
& \quad (m2\_subset\_1\ X8\ (k2\_qc\_lang1\ X0)\ (k3\_qc\_lang1\ X0)) \Rightarrow (\neg(X8 \in k1\_relset\_1 \\
& \quad (k3\_qc\_lang1\ X0)\ X6) \wedge (X8 \in k24\_qc\_lang1\ X0\ X1))) \wedge ((\forall X8. \\
& \quad (m2\_subset\_1\ X8\ (k2\_qc\_lang1\ X0)\ (k3\_qc\_lang1\ X0)) \Rightarrow ((X8 \in k1\_relset\_1 \\
& \quad (k3\_qc\_lang1\ X0)\ X7) \Rightarrow (k1\_funct\_1\ X7\ X8 = k3\_funct\_2\ (k3\_qc\_lang1 \\
& \quad X0)\ X2\ X4\ X8))) \wedge (r1\_xboole\_0\ (k1\_relset\_1\ (k3\_qc\_lang1\ X0)\ X5) \\
& \quad (k1\_relset\_1\ (k3\_qc\_lang1\ X0)\ X7)))) \Rightarrow ((r1\_valuat\_1\ X0\ X2\ X1\ X3 \\
& \quad (k1\_sublemma\ X0\ X2\ X4\ X5)) \Leftrightarrow (r1\_valuat\_1\ X0\ X2\ X1\ X3\ (k1\_sublemma \\
& \quad X0\ X2\ X4\ (k14\_sublemma\ X0\ X2\ (k14\_sublemma\ X0\ X2\ X5\ X6)\ X7)))))) \Rightarrow \\
& \quad (\forall X4.(m2\_funct\_2\ X4\ (k3\_qc\_lang1\ X0)\ X2\ (k2\_valuat\_1\ X0 \\
& \quad X2)) \Rightarrow (\forall X5.((v1\_funct\_1\ X5) \wedge (m1\_subset\_1\ X5\ (k1\_zfmisc\_1 \\
& \quad (k2\_zfmisc\_1\ (k3\_qc\_lang1\ X0)\ X2)))) \Rightarrow (\forall X6.((v1\_funct\_1 \\
& \quad X6) \wedge (m1\_subset\_1\ X6\ (k1\_zfmisc\_1\ (k2\_zfmisc\_1\ (k3\_qc\_lang1\ X0) \\
& \quad X2)))) \Rightarrow (\forall X7.((v1\_funct\_1\ X7) \wedge (m1\_subset\_1\ X7\ (k1\_zfmisc\_1 \\
& \quad (k2\_zfmisc\_1\ (k3\_qc\_lang1\ X0)\ X2)))) \Rightarrow (((\forall X8.(m2\_subset\_1 \\
& \quad X8\ (k2\_qc\_lang1\ X0)\ (k3\_qc\_lang1\ X0)) \Rightarrow (\neg(X8 \in k1\_relset\_1\ (k3\_qc\_lang1 \\
& \quad X0)\ X6) \wedge (X8 \in k24\_qc\_lang1\ X0\ (k6\_cqc\_lang\ X0\ X1)))) \wedge ((\forall X8. \\
& \quad (m2\_subset\_1\ X8\ (k2\_qc\_lang1\ X0)\ (k3\_qc\_lang1\ X0)) \Rightarrow ((X8 \in k1\_relset\_1 \\
& \quad (k3\_qc\_lang1\ X0)\ X7) \Rightarrow (k1\_funct\_1\ X7\ X8 = k3\_funct\_2\ (k3\_qc\_lang1 \\
& \quad X0)\ X2\ X4\ X8))) \wedge (r1\_xboole\_0\ (k1\_relset\_1\ (k3\_qc\_lang1\ X0)\ X5) \\
& \quad (k1\_relset\_1\ (k3\_qc\_lang1\ X0)\ X7)))) \Rightarrow ((r1\_valuat\_1\ X0\ X2\ (k6\_cqc\_lang \\
& \quad X0\ X1)\ X3\ (k1\_sublemma\ X0\ X2\ X4\ X5)) \Leftrightarrow (r1\_valuat\_1\ X0\ X2\ (k6\_cqc\_lang \\
& \quad X0\ X1)\ X3\ (k1\_sublemma\ X0\ X2\ X4\ (k14\_sublemma\ X0\ X2\ (k14\_sublemma \\
& \quad X0\ X2\ X5\ X6)\ X7)))))) \Rightarrow
\end{aligned}$$