t15_msafree3 (TM-REd8QxvE2ud6Qr9mFSWAipjWZN2p4of6H)

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Let $v11\_struct\_0 : \iota \Rightarrow o$ be given. Let $v1\_instalg1 : \iota \Rightarrow o$ be given. Let $l1\_msualg\_1 : \iota \Rightarrow o$ be given. Let $v1\_relat\_1 : \iota \Rightarrow o$ be given. Let $v2\_relat\_1 : \iota \Rightarrow o$ be given. Let $v4\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $u1\_struct\_0 : \iota \Rightarrow \iota$ be given. Let $v1\_funct\_1 : \iota \Rightarrow o$ be given. Let $v1\_partfun1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $m1\_dtconstr : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k5\_msafree : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k5\_trees\_3 : \iota \Rightarrow \iota$ be given. Let $k1\_msaterm : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $r8\_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k4\_msafree3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k3\_msafree3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $r2\_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $r6\_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k3\_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k2\_msafree3 : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $v1\_xboole\_0 : \iota \Rightarrow o$ be given. Let $v2\_struct\_0 : \iota \Rightarrow o$ be given. Let $v1\_lang1 : \iota \Rightarrow o$ be given. Let $l1\_struct\_0 : \iota \Rightarrow o$ be given. Let $m1\_trees\_3 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k1\_zfmisc\_1 : \iota \Rightarrow \iota$ be given. Let $l5\_struct\_0 : \iota \Rightarrow o$ be given. Let $l1\_lang1 : \iota \Rightarrow o$ be given. Let $v3\_trees\_3 : \iota \Rightarrow o$ be given. Let $v3\_trees\_2 : \iota \Rightarrow o$ be given. Let $v4\_funct\_1 : \iota \Rightarrow o$ be given. Assume the following.

$$\forall X0.\forall X1.((v1\_relat\_1\ X1)\wedge((v4\_relat\_1\ X1\ X0)\wedge((v1\_funct\_1\ X1)\wedge(v1\_partfun1\ X1\ X0))))\Rightarrow(\forall X2.((v1\_relat\_1\ X2)\wedge((v4\_relat\_1\ X2\ X0)\wedge((v1\_funct\_1\ X2)\wedge(v1\_partfun1\ X2\ X0))))\Rightarrow ((r2\_pboole\ X0\ X1\ X2)\Rightarrow(r6\_pboole\ X0\ (k3\_pboole\ X0\ X1\ X2)\ X1))) \tag{1}$$

Assume the following.

$$\forall X0.((\neg v11\_struct\_0\ X0)\wedge((v1\_instalg1\ X0)\wedge(l1\_msualg\_1\ X0)))\Rightarrow(\forall X1.((v1\_relat\_1\ X1)\wedge((v2\_relat\_1\ X1)\wedge((v4\_relat\_1\ X1\ (u1\_struct\_0\ X0))\wedge((v1\_funct\_1\ X1)\wedge(v1\_partfun1\ X1\ (u1\_struct\_0\ X0))))))\Rightarrow(\forall X2.(m1\_dtconstr\ X2\ (u1\_struct\_0\ (k5\_msafree\ X0\ X1))\ (k5\_trees\_3\ (u1\_struct\_0\ (k5\_msafree\ X0\ X1)))\ (k1\_msaterm\ X0\ X1))\Rightarrow(r2\_pboole\ (u1\_struct\_0\ X0)\ (k2\_msafree3\ X0\ X2)\ X1))) \tag{2}$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.((\neg v1\_xboole\_0\ X0)\wedge(((v1\_relat\_1\ X1)\wedge((v4\_relat\_1\ X1\ X0)\wedge((v1\_funct\_1\ X1)\wedge(v1\_partfun1\ X1\ X0))))\wedge((v1\_relat\_1\ X2)\wedge((v4\_relat\_1\ X2\ X0)\wedge((v1\_funct\_1\ X2)\wedge(v1\_partfun1\ X2\ X0))))))\Rightarrow((r8\_pboole\ X0\ X1\ X2)\Leftrightarrow(X1 = X2)) \tag{3}$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.(((v1\_relat\_1\ X1)\wedge((v4\_relat\_1\ X1\ X0)\wedge((v1\_funct\_1\ X1)\wedge(v1\_partfun1\ X1\ X0))))\wedge((v1\_relat\_1\ X2)\wedge((v4\_relat\_1\ X2\ X0)\wedge((v1\_funct\_1\ X2)\wedge(v1\_partfun1\ X2\ X0)))))\Rightarrow((r6\_pboole\ X0\ X1\ X2)\Leftrightarrow(X1 = X2)) \tag{4}$$

Assume the following.

$$\forall X0.\forall X1.(((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge(l1\_msualg\_1\ X0)))\wedge((v1\_relat\_1\ X1)\wedge((v4\_relat\_1\ X1\ (u1\_struct\_0\ X0))\wedge((v1\_funct\_1\ X1)\wedge(v1\_partfun1\ X1\ (u1\_struct\_0\ X0)))))\Rightarrow((\neg v2\_struct\_0\ (k5\_msafree\ X0\ X1))\wedge(v1\_lang1\ (k5\_msafree\ X0\ X1))) \tag{5}$$

Assume the following.

$$\forall X0.((\neg v2\_struct\_0\ X0)\wedge(l1\_struct\_0\ X0))\Rightarrow(\neg v1\_xboole\_0\ (u1\_struct\_0\ X0)) \tag{6}$$

Assume the following.

$$\forall X0.\forall X1.(((\neg v2\_struct\_0\ X0)\wedge((\neg v11\_struct\_0\ X0)\wedge(l1\_msualg\_1\ X0)))\wedge((v1\_relat\_1\ X1)\wedge((v2\_relat\_1\ X1)\wedge((v4\_relat\_1\ X1\ (u1\_struct\_0\ X0))\wedge((v1\_funct\_1\ X1)\wedge(v1\_partfun1\ X1\ (u1\_struct\_0\ X0)))))))\Rightarrow(\neg v1\_xboole\_0\ (k1\_msaterm\ X0\ X1)) \tag{7}$$

Assume the following.

$$\forall X0.(\neg v1\_xboole\_0\ X0)\Rightarrow(\forall X1.(m1\_trees\_3\ X1\ X0)\Rightarrow(\neg v1\_xboole\_0\ X1)) \tag{8}$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.((\neg v1\_xboole\_0\ X0)\wedge(((\neg v1\_xboole\_0\ X1)\wedge(m1\_trees\_3\ X1\ X0))\wedge((\neg v1\_xboole\_0\ X2)\wedge(m1\_subset\_1\ X2\ (k1\_zfmisc\_1\ X1)))))\Rightarrow(\forall X3.(m1\_dtconstr\ X3\ X0\ X1\ X2)\Rightarrow(m1\_subset\_1\ X3\ X1)) \tag{9}$$

Assume the following.

$$\forall X0.(l5\_struct\_0\ X0)\Rightarrow(l1\_struct\_0\ X0) \tag{10}$$

Assume the following.

$$\forall X0.(l1\_msualg\_1\ X0) \Rightarrow (l5\_struct\_0\ X0) \tag{11}$$

Assume the following.

$$\forall X0.(l1\_lang1\ X0) \Rightarrow (l1\_struct\_0\ X0) \tag{12}$$

Assume the following.

$$\forall X0.(\neg v1\_xboole\_0\ X0) \Rightarrow (m1\_trees\_3\ (k5\_trees\_3\ X0)\ X0) \tag{13}$$

Assume the following.

$$\begin{gathered}\forall X0.\forall X1.(((\neg v2\_struct\_0\ X0) \wedge ((\neg v11\_struct\_0\ X0) \wedge \\ (l1\_msualg\_1\ X0))) \wedge ((v1\_relat\_1\ X1) \wedge ((v4\_relat\_1\ X1\ (u1\_struct\_0\ \\ X0)) \wedge ((v1\_funct\_1\ X1) \wedge (v1\_partfun1\ X1\ (u1\_struct\_0\ X0)))))) \Rightarrow \\ (l1\_lang1\ (k5\_msafree\ X0\ X1))\end{gathered} \tag{14}$$

Assume the following.

$$\begin{gathered}\forall X0.\forall X1.\forall X2.(((v1\_relat\_1\ X1) \wedge ((v4\_relat\_1\ \\ X1\ X0) \wedge ((v1\_funct\_1\ X1) \wedge (v1\_partfun1\ X1\ X0)))) \wedge ((v1\_relat\_1\ \\ X2) \wedge ((v4\_relat\_1\ X2\ X0) \wedge ((v1\_funct\_1\ X2) \wedge (v1\_partfun1\ X2\ X0))))) \Rightarrow \\ ((v1\_relat\_1\ (k3\_pboole\ X0\ X1\ X2)) \wedge ((v4\_relat\_1\ (k3\_pboole\ X0\ \\ X1\ X2)\ X0) \wedge ((v1\_funct\_1\ (k3\_pboole\ X0\ X1\ X2)) \wedge (v1\_partfun1\ (k3\_pboole\ \\ X0\ X1\ X2)\ X0))))\end{gathered} \tag{15}$$

Assume the following.

$$\begin{gathered}\forall X0.\forall X1.((l1\_msualg\_1\ X0) \wedge ((\neg v1\_xboole\_0\ X1) \wedge \\ (v1\_relat\_1\ X1))) \Rightarrow ((v1\_relat\_1\ (k2\_msafree3\ X0\ X1)) \wedge ((v4\_relat\_1\ \\ (k2\_msafree3\ X0\ X1)\ (u1\_struct\_0\ X0)) \wedge ((v1\_funct\_1\ (k2\_msafree3\ \\ X0\ X1)) \wedge (v1\_partfun1\ (k2\_msafree3\ X0\ X1)\ (u1\_struct\_0\ X0)))))\end{gathered} \tag{16}$$

Assume the following.

$$\begin{gathered}\forall X0.\forall X1.(((\neg v2\_struct\_0\ X0) \wedge ((\neg v11\_struct\_0\ X0) \wedge \\ (l1\_msualg\_1\ X0))) \wedge ((v1\_relat\_1\ X1) \wedge ((v4\_relat\_1\ X1\ (u1\_struct\_0\ \\ X0)) \wedge ((v1\_funct\_1\ X1) \wedge (v1\_partfun1\ X1\ (u1\_struct\_0\ X0)))))) \Rightarrow \\ (m1\_subset\_1\ (k1\_msaterm\ X0\ X1)\ (k1\_zfmisc\_1\ (k5\_trees\_3\ (u1\_struct\_0\ \\ (k5\_msafree\ X0\ X1)))))\end{gathered} \tag{17}$$

Assume the following.

$$\begin{gathered}\forall X0.((\neg v11\_struct\_0\ X0) \wedge ((v1\_instalg1\ X0) \wedge (l1\_msualg\_1\ \\ X0))) \Rightarrow (\forall X1.((v1\_relat\_1\ X1) \wedge ((v2\_relat\_1\ X1) \wedge ((v4\_relat\_1\ \\ X1\ (u1\_struct\_0\ X0)) \wedge ((v1\_funct\_1\ X1) \wedge (v1\_partfun1\ X1\ (u1\_struct\_0\ \\ X0)))))) \Rightarrow (\forall X2.(m1\_dtconstr\ X2\ (u1\_struct\_0\ (k5\_msafree\ \\ X0\ X1))\ (k5\_trees\_3\ (u1\_struct\_0\ (k5\_msafree\ X0\ X1)))\ (k1\_msaterm\ \\ X0\ X1)) \Rightarrow (k4\_msafree3\ X0\ X1\ X2 = k2\_msafree3\ X0\ X2)))\end{gathered} \tag{18}$$

Assume the following.

$$\forall X0.(l1\_msualg\_1\ X0)\Rightarrow(\forall X1.((v1\_relat\_1\ X1)\wedge((v4\_relat\_1\ X1\ (u1\_struct\_0\ X0))\wedge((v1\_funct\_1\ X1)\wedge(v1\_partfun1\ X1\ (u1\_struct\_0\ X0)))))\Rightarrow(\forall X2.((\neg v1\_xboole\_0\ X2)\wedge(v1\_relat\_1\ X2))\Rightarrow(k3\_msafree3\ X0\ X1\ X2 = k3\_pboole\ (u1\_struct\_0\ X0)\ X1\ (k2\_msafree3\ X0\ X2))))) \tag{19}$$

Assume the following.

$$\forall X0.\forall X1.\forall X2.(((v1\_relat\_1\ X1)\wedge((v4\_relat\_1\ X1\ X0)\wedge((v1\_funct\_1\ X1)\wedge(v1\_partfun1\ X1\ X0))))\wedge((v1\_relat\_1\ X2)\wedge((v4\_relat\_1\ X2\ X0)\wedge((v1\_funct\_1\ X2)\wedge(v1\_partfun1\ X2\ X0)))))\Rightarrow(k3\_pboole\ X0\ X1\ X2 = k3\_pboole\ X0\ X2\ X1) \tag{20}$$

Assume the following.

$$\forall X0.((\neg v1\_xboole\_0\ X0)\wedge(v3\_trees\_3\ X0))\Rightarrow(\forall X1.(m1\_subset\_1\ X1\ X0)\Rightarrow(v3\_trees\_2\ X1)) \tag{21}$$

Assume the following.

$$\forall X0.(v3\_trees\_3\ X0)\Rightarrow(v4\_funct\_1\ X0) \tag{22}$$

Assume the following.

$$\forall X0.(v4\_funct\_1\ X0)\Rightarrow(\forall X1.(m1\_subset\_1\ X1\ X0)\Rightarrow((v1\_relat\_1\ X1)\wedge(v1\_funct\_1\ X1))) \tag{23}$$

Assume the following.

$$\forall X0.((v1\_relat\_1\ X0)\wedge((v1\_funct\_1\ X0)\wedge(v3\_trees\_2\ X0)))\Rightarrow((\neg v1\_xboole\_0\ X0)\wedge((v1\_relat\_1\ X0)\wedge((v1\_funct\_1\ X0)\wedge(v3\_trees\_2\ X0)))) \tag{24}$$

Assume the following.

$$\forall X0.(l1\_msualg\_1\ X0)\Rightarrow(((v2\_struct\_0\ X0)\wedge(v1\_instalg1\ X0))\Rightarrow(v11\_struct\_0\ X0)) \tag{25}$$

Assume the following.

$$\forall X0.(v1\_xboole\_0\ X0)\Rightarrow(\forall X1.(m1\_subset\_1\ X1\ (k1\_zfmisc\_1\ X0))\Rightarrow(v1\_xboole\_0\ X1)) \tag{26}$$

Assume the following.

$$\forall X0.(v1\_xboole\_0\ X0)\Rightarrow(v1\_relat\_1\ X0) \tag{27}$$

Assume the following.

$$\forall X0.(v1\_xboole\_0\ X0) \Rightarrow (v1\_funct\_1\ X0) \tag{28}$$

Assume the following.

$$\forall X0.(\neg v1\_xboole\_0\ X0) \Rightarrow (\forall X1.(m1\_trees\_3\ X1\ X0) \Rightarrow (v3\_trees\_3\ X1)) \tag{29}$$

Theorem 1

$$\forall X0.((\neg v11\_struct\_0\ X0) \wedge ((v1\_instalg1\ X0) \wedge (l1\_msualg\_1\ X0))) \Rightarrow (\forall X1.((v1\_relat\_1\ X1) \wedge ((v2\_relat\_1\ X1) \wedge ((v4\_relat\_1\ X1\ (u1\_struct\_0\ X0)) \wedge ((v1\_funct\_1\ X1) \wedge (v1\_partfun1\ X1\ (u1\_struct\_0\ X0))))))) \Rightarrow (\forall X2.(m1\_dtconstr\ X2\ (u1\_struct\_0\ (k5\_msafree\ X0\ X1))\ (k5\_trees\_3\ (u1\_struct\_0\ (k5\_msafree\ X0\ X1)))\ (k1\_msaterm\ X0\ X1)) \Rightarrow (r8\_pboole\ (u1\_struct\_0\ X0)\ (k4\_msafree3\ X0\ X1\ X2)\ (k3\_msafree3\ X0\ X1\ X2))))$$