

t27_msaterm
(TMLZ5Y4hzig7qvDs4iYb3BUqB8LnjJKnKgff)

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Let $v2_struct_0 : \iota \Rightarrow o$ be given. Let $v11_struct_0 : \iota \Rightarrow o$ be given. Let $l1_msualg_1 : \iota \Rightarrow o$ be given. Let $l3_msualg_1 : \iota \Rightarrow \iota \Rightarrow o$ 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 $m1_dtconstr : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ 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 $k2_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $u3_msualg_1 : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $r2_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $l1_struct_0 : \iota \Rightarrow o$ be given. Let $l2_msualg_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $l5_struct_0 : \iota \Rightarrow o$ be given. Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge (l1_msualg_1 \\
& X0))) \Rightarrow (\forall X1.((v1_relat_1 X1) \wedge ((v2_relat_1 X1) \wedge ((v4_relat_1 \\
& X1 (u1_struct_0 X0)) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 (u1_struct_0 \\
& X0)))))) \Rightarrow (\forall X2.((v1_relat_1 X2) \wedge ((v2_relat_1 X2) \wedge ((v4_relat_1 \\
& X2 (u1_struct_0 X0)) \wedge ((v1_funct_1 X2) \wedge (v1_partfun1 X2 (u1_struct_0 \\
& X0)))))) \Rightarrow ((r2_pboole (u1_struct_0 X0) X1 X2) \Rightarrow (\forall X3.(m1_dtconstr \\
& X3 (u1_struct_0 (k5_msafree X0 X1)) (k5_trees_3 (u1_struct_0 (\\
& k5_msafree X0 X1))) (k1_msaterm X0 X1)) \Rightarrow (m1_dtconstr X3 (u1_struct_0 \\
& (k5_msafree X0 X2)) (k5_trees_3 (u1_struct_0 (k5_msafree X0 X2))) \\
& (k1_msaterm X0 X2))))))
\end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. ((v1_relat_1 X1) \wedge ((v4_relat_1 X1 X0) \wedge \\
& (v1_funct_1 X1) \wedge (v1_partfun1 X1 X0))) \Rightarrow (\forall X2. ((v1_relat_1 \\
& X2) \wedge ((v4_relat_1 X2 X0) \wedge ((v1_funct_1 X2) \wedge (v1_partfun1 X2 X0)))) \Rightarrow \\
& (r2_pboole X0 X1 (k2_pboole X0 X1 X2))
\end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (((v1_relat_1 X1) \wedge ((v4_relat_1 \\ & X1 X0) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 X0)))) \wedge ((v1_relat_1 \\ & X2) \wedge ((v2_relat_1 X2) \wedge ((v4_relat_1 X2 X0) \wedge ((v1_funct_1 X2) \wedge (\\ & v1_partfun1 X2 X0)))))) \Rightarrow ((v1_relat_1 (k2_pboole X0 X2 X1)) \wedge ((\\ & v2_relat_1 (k2_pboole X0 X2 X1)) \wedge ((v4_relat_1 (k2_pboole X0 X2 \\ & X1) X0) \wedge ((v1_funct_1 (k2_pboole X0 X2 X1)) \wedge (v1_partfun1 (k2_pboole \\ & X0 X2 X1) X0)))))) \end{aligned} \quad (3)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. ((l1_struct_0 X0) \wedge (l2_msualg_1 X1 X0)) \Rightarrow \\ & ((v1_relat_1 (u3_msualg_1 X0 X1)) \wedge ((v4_relat_1 (u3_msualg_1 \\ & X0 X1) (u1_struct_0 X0)) \wedge ((v1_funct_1 (u3_msualg_1 X0 X1)) \wedge (v1_partfun1 \\ & (u3_msualg_1 X0 X1) (u1_struct_0 X0)))))) \end{aligned} \quad (4)$$

Assume the following.

$$\forall X0. (l5_struct_0 X0) \Rightarrow (l1_struct_0 X0) \quad (5)$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2_struct_0 X0) \wedge (l1_msualg_1 X0)) \Rightarrow (\forall X1. \\ & (l3_msualg_1 X1 X0) \Rightarrow (l2_msualg_1 X1 X0)) \end{aligned} \quad (6)$$

Assume the following.

$$\forall X0. (l1_msualg_1 X0) \Rightarrow (l5_struct_0 X0) \quad (7)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (((v1_relat_1 X1) \wedge ((v4_relat_1 \\ & X1 X0) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 X0)))) \wedge ((v1_relat_1 \\ & X2) \wedge ((v4_relat_1 X2 X0) \wedge ((v1_funct_1 X2) \wedge (v1_partfun1 X2 X0)))))) \Rightarrow \\ & ((v1_relat_1 (k2_pboole X0 X1 X2)) \wedge ((v4_relat_1 (k2_pboole X0 \\ & X1 X2) X0) \wedge ((v1_funct_1 (k2_pboole X0 X1 X2)) \wedge (v1_partfun1 (k2_pboole \\ & X0 X1 X2) X0)))))) \end{aligned} \quad (8)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (((v1_relat_1 X1) \wedge ((v4_relat_1 \\ & X1 X0) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 X0)))) \wedge ((v1_relat_1 \\ & X2) \wedge ((v4_relat_1 X2 X0) \wedge ((v1_funct_1 X2) \wedge (v1_partfun1 X2 X0)))))) \Rightarrow \\ & (k2_pboole X0 X1 X2 = k2_pboole X0 X2 X1) \end{aligned} \quad (9)$$

Theorem 1

$$\begin{aligned} & \forall X0.((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge (l1_msualg_1 \\ & \quad X0))) \Rightarrow (\forall X1.(l3_msualg_1 X1 X0) \Rightarrow (\forall X2.((v1_relat_1 \\ & X2) \wedge ((v2_relat_1 X2) \wedge ((v4_relat_1 X2 (u1_struct_0 X0)) \wedge ((v1_funct_1 \\ & X2) \wedge (v1_partfun1 X2 (u1_struct_0 X0)))))) \Rightarrow (\forall X3.(m1_dtconstr \\ & X3 (u1_struct_0 (k5_msafree X0 X2)) (k5_trees_3 (u1_struct_0 (\\ & k5_msafree X0 X2))) (k1_msaterm X0 X2)) \Rightarrow (m1_dtconstr X3 (u1_struct_0 \\ & (k5_msafree X0 (k2_pboole (u1_struct_0 X0) (u3_msualg_1 X0 X1) \\ & X2))) (k5_trees_3 (u1_struct_0 (k5_msafree X0 (k2_pboole (u1_struct_0 \\ & X0) (u3_msualg_1 X0 X1) X2)))) (k1_msaterm X0 (k2_pboole (u1_struct_0 \\ & X0) (u3_msualg_1 X0 X1) X2)))))) \end{aligned}$$