

t46_osafree (TMN-
HVcvYt653S969gHWYHiMpnP1g8FvWN7U)

October 27, 2020

Let $v2_struct_0 : \iota \Rightarrow o$ be given. Let $v11_struct_0 : \iota \Rightarrow o$ be given. Let $v4_osalg_1 : \iota \Rightarrow o$ be given. Let $v5_osalg_1 : \iota \Rightarrow o$ be given. Let $v8_osalg_1 : \iota \Rightarrow o$ be given. Let $v10_osalg_1 : \iota \Rightarrow o$ be given. Let $v2_osalg_4 : \iota \Rightarrow o$ be given. Let $l3_osalg_1 : \iota \Rightarrow o$ 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 $r8_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k15_osafree : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k20_osafree : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $v2_msualg_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k8_osafree : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $v3_osalg_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $m1_osalg_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $r2_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v1_xboole_0 : \iota \Rightarrow o$ be given. Let $v3_msualg_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v4_msualg_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v12_osalg_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $l1_struct_0 : \iota \Rightarrow o$ be given. Let $l2_msualg_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $u3_msualg_1 : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $l3_msualg_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $m1_msualg_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $l1_osalg_1 : \iota \Rightarrow o$ be given. Let $l2_osalg_1 : \iota \Rightarrow o$ be given. Let $l1_msualg_1 : \iota \Rightarrow o$ be given. Let $l1_orders_2 : \iota \Rightarrow o$ be given. Let $v3_msualg_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge ((v4_osalg_1 \\ & X0) \wedge ((v5_osalg_1 X0) \wedge ((v8_osalg_1 X0) \wedge ((v10_osalg_1 X0) \wedge ((\\ & v2_osalg_4 X0) \wedge (l3_osalg_1 X0)))))))) \Rightarrow (\forall X1.((v1_relat_1 \\ & X1) \wedge ((v2_relat_1 X1) \wedge ((v4_relat_1 X1 (u1_struct_0 X0)) \wedge ((v1_funct_1 \\ & X1) \wedge (v1_partfun1 X1 (u1_struct_0 X0)))))) \Rightarrow (\forall X2.((v2_msualg_4 \\ & X2 X0 (k8_osafree X0 X1)) \wedge ((v3_osalg_4 X2 X0 (k8_osafree X0 X1)) \wedge \\ & (m1_osalg_4 X2 X0 (k8_osafree X0 X1)))) \Rightarrow (r2_pboole (u1_struct_0 \\ & X0) (k20_osafree X0 X1) X2))) \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. ((\neg v1_xboole_0 X0) \wedge (((v1_relat_1 \\ & X1) \wedge ((v4_relat_1 X1 X0) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 X0)))) \wedge \\ & ((v1_relat_1 X2) \wedge ((v4_relat_1 X2 X0) \wedge ((v1_funct_1 X2) \wedge (v1_partfun1 \\ & X2 X0)))))) \Rightarrow ((r8_pboole X0 X1 X2) \Leftrightarrow (X1 = X2)) \end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.(((\neg v2_struct_0 X0)\wedge(\neg v11_struct_0 X0)\wedge \\ & ((v4_osalg_1 X0)\wedge(v5_osalg_1 X0)\wedge(v2_osalg_4 X0)\wedge(l3_osalg_1 \\ & X0))))\wedge((v1_relat_1 X1)\wedge((v2_relat_1 X1)\wedge((v4_relat_1 X1 \\ & (u1_struct_0 X0))\wedge((v1_funct_1 X1)\wedge(v1_partfun1 X1 (u1_struct_0 \\ & X0))))))\Rightarrow((v2_msualg_4 (k20_osafree X0 X1) X0 (k8_osafree X0 \\ & X1))\wedge(v3_osalg_4 (k20_osafree X0 X1) X0 (k8_osafree X0 X1))) \end{aligned} \quad (3)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.(((\neg v2_struct_0 X0)\wedge(\neg v11_struct_0 X0)\wedge \\ & ((v4_osalg_1 X0)\wedge(v5_osalg_1 X0)\wedge(l3_osalg_1 X0))))\wedge((v1_relat_1 \\ & X1)\wedge((v2_relat_1 X1)\wedge((v4_relat_1 X1 (u1_struct_0 X0))\wedge((v1_funct_1 \\ & X1)\wedge(v1_partfun1 X1 (u1_struct_0 X0))))))\Rightarrow((v3_msualg_1 (k8_osafree \\ & X0 X1) X0)\wedge((v4_msualg_1 (k8_osafree X0 X1) X0)\wedge(v12_osalg_1 (\\ & k8_osafree X0 X1) X0))) \end{aligned} \quad (4)$$

Assume the following.

$$\forall X0.((\neg v2_struct_0 X0)\wedge(l1_struct_0 X0))\Rightarrow(\neg v1_xboole_0 (u1_struct_0 X0)) \quad (5)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.((l1_struct_0 X0)\wedge(l2_msualg_1 X1 X0))\Rightarrow \\ & ((v1_relat_1 (u3_msualg_1 X0 X1))\wedge((v4_relat_1 (u3_msualg_1 \\ & X0 X1) (u1_struct_0 X0))\wedge((v1_funct_1 (u3_msualg_1 X0 X1))\wedge(v1_partfun1 \\ & (u3_msualg_1 X0 X1) (u1_struct_0 X0)))))) \end{aligned} \quad (6)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.(((\neg v2_struct_0 X0)\wedge(\neg v11_struct_0 X0)\wedge \\ & ((v4_osalg_1 X0)\wedge(v5_osalg_1 X0)\wedge(l3_osalg_1 X0))))\wedge((v12_osalg_1 \\ & X1 X0)\wedge(l3_msualg_1 X1 X0))\Rightarrow(\forall X2.(m1_osalg_4 X2 X0 X1)\Rightarrow \\ & (m1_msualg_4 X2 (u1_struct_0 X0) (u3_msualg_1 X0 X1) (u3_msualg_1 \\ & X0 X1))) \end{aligned} \quad (7)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.(((v1_relat_1 X1)\wedge((v4_relat_1 \\ & X1 X0)\wedge((v1_funct_1 X1)\wedge(v1_partfun1 X1 X0))))\wedge((v1_relat_1 \\ & X2)\wedge((v4_relat_1 X2 X0)\wedge((v1_funct_1 X2)\wedge(v1_partfun1 X2 X0))))\Rightarrow \\ & (\forall X3.(m1_msualg_4 X3 X0 X1 X2)\Rightarrow((v1_relat_1 X3)\wedge((v4_relat_1 \\ & X3 X0)\wedge((v1_funct_1 X3)\wedge(v1_partfun1 X3 X0)))))) \end{aligned} \quad (8)$$

Assume the following.

$$\forall X0.(l3_osalg_1 X0)\Rightarrow((l1_osalg_1 X0)\wedge(l2_osalg_1 X0)) \quad (9)$$

Assume the following.

$$\forall X0.((\neg v2_struct_0 X0) \wedge (l1_msualg_1 X0)) \Rightarrow (\forall X1. (l3_msualg_1 X1 X0) \Rightarrow (l2_msualg_1 X1 X0)) \quad (10)$$

Assume the following.

$$\forall X0.(l2_osalg_1 X0) \Rightarrow ((l1_msualg_1 X0) \wedge (l1_orders_2 X0)) \quad (11)$$

Assume the following.

$$\forall X0.(l1_orders_2 X0) \Rightarrow (l1_struct_0 X0) \quad (12)$$

Assume the following.

$$\begin{aligned} \forall X0. \forall X1. & (((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge \\ & ((v4_osalg_1 X0) \wedge ((v5_osalg_1 X0) \wedge (l3_osalg_1 X0)))))) \wedge ((v1_relat_1 \\ & X1) \wedge (v2_relat_1 X1) \wedge ((v4_relat_1 X1 (u1_struct_0 X0)) \wedge ((v1_funct_1 \\ & X1) \wedge (v1_partfun1 X1 (u1_struct_0 X0)))))) \Rightarrow ((v12_osalg_1 (k8_osafree \\ & X0 X1) X0) \wedge (l3_msualg_1 (k8_osafree X0 X1) X0)) \end{aligned} \quad (13)$$

Assume the following.

$$\begin{aligned} \forall X0. \forall X1. & (((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge \\ & ((v4_osalg_1 X0) \wedge ((v5_osalg_1 X0) \wedge ((v2_osalg_4 X0) \wedge (l3_osalg_1 \\ & X0)))))) \wedge ((v1_relat_1 X1) \wedge ((v2_relat_1 X1) \wedge ((v4_relat_1 X1 \\ & (u1_struct_0 X0)) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 (u1_struct_0 \\ & X0)))))) \Rightarrow ((v2_msualg_4 (k20_osafree X0 X1) X0 (k8_osafree X0 \\ & X1)) \wedge (m1_osalg_4 (k20_osafree X0 X1) X0 (k8_osafree X0 X1))) \end{aligned} \quad (14)$$

Assume the following.

$$\begin{aligned} \forall X0. \forall X1. & (((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge \\ & ((v4_osalg_1 X0) \wedge ((v5_osalg_1 X0) \wedge ((v2_osalg_4 X0) \wedge (l3_osalg_1 \\ & X0)))))) \wedge ((v1_relat_1 X1) \wedge ((v2_relat_1 X1) \wedge ((v4_relat_1 X1 \\ & (u1_struct_0 X0)) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 (u1_struct_0 \\ & X0)))))) \Rightarrow ((v2_msualg_4 (k15_osafree X0 X1) X0 (k8_osafree X0 \\ & X1)) \wedge ((v3_msualg_4 (k15_osafree X0 X1) X0 (k8_osafree X0 X1)) \wedge \\ & ((v3_osalg_4 (k15_osafree X0 X1) X0 (k8_osafree X0 X1)) \wedge (m1_osalg_4 \\ & (k15_osafree X0 X1) X0 (k8_osafree X0 X1)))) \end{aligned} \quad (15)$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge ((v4_osalg_1 \\
& X0) \wedge ((v5_osalg_1 X0) \wedge ((v2_osalg_4 X0) \wedge (l3_osalg_1 X0)))))) \Rightarrow \\
& (\forall X1.((v1_relat_1 X1) \wedge ((v2_relat_1 X1) \wedge ((v4_relat_1 \\
& X1 (u1_struct_0 X0)) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 (u1_struct_0 \\
& X0)))))) \Rightarrow (\forall X2.((v2_msualg_4 X2 X0 (k8_osafree X0 X1)) \wedge \\
& ((v3_msualg_4 X2 X0 (k8_osafree X0 X1)) \wedge ((v3_osalg_4 X2 X0 (k8_osafree \\
& X0 X1)) \wedge (m1_osalg_4 X2 X0 (k8_osafree X0 X1)))))) \Rightarrow ((X2 = k15_osafree \\
& X0 X1) \Leftrightarrow (\forall X3.((v2_msualg_4 X3 X0 (k8_osafree X0 X1)) \wedge ((v3_msualg_4 \\
& X3 X0 (k8_osafree X0 X1)) \wedge ((v3_osalg_4 X3 X0 (k8_osafree X0 X1)) \wedge \\
& (m1_osalg_4 X3 X0 (k8_osafree X0 X1)))))) \Rightarrow (r2_pboole (u1_struct_0 \\
& X0) X2 X3))))
\end{aligned} \tag{16}$$

Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. (((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge \\
& ((v4_osalg_1 X0) \wedge ((v5_osalg_1 X0) \wedge (l3_osalg_1 X0)))))) \wedge ((v4_msualg_1 \\
& X1 X0) \wedge ((v12_osalg_1 X1 X0) \wedge (l3_msualg_1 X1 X0))) \Rightarrow (\forall X2. \\
& (m1_osalg_4 X2 X0 X1) \Rightarrow (((v2_msualg_4 X2 X0 X1) \wedge (v3_osalg_4 X2 X0 \\
& X1)) \Rightarrow ((v2_msualg_4 X2 X0 X1) \wedge (v3_msualg_4 X2 X0 X1)))
\end{aligned} \tag{17}$$

Theorem 1

$$\begin{aligned}
& \forall X0.((\neg v2_struct_0 X0) \wedge ((\neg v11_struct_0 X0) \wedge ((v4_osalg_1 \\
& X0) \wedge ((v5_osalg_1 X0) \wedge ((v8_osalg_1 X0) \wedge ((v10_osalg_1 X0) \wedge ((\\
& v2_osalg_4 X0) \wedge (l3_osalg_1 X0)))))))) \Rightarrow (\forall X1.((v1_relat_1 \\
& X1) \wedge ((v2_relat_1 X1) \wedge ((v4_relat_1 X1 (u1_struct_0 X0)) \wedge ((v1_funct_1 \\
& X1) \wedge (v1_partfun1 X1 (u1_struct_0 X0)))))) \Rightarrow (r8_pboole (u1_struct_0 \\
& X0) (k15_osafree X0 X1) (k20_osafree X0 X1)))
\end{aligned}$$