

## t16\_msafree3

(TMZnGR3UzvnpdANSfRbdUqvu657DdUyVnYf)

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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  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_funct\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k5\_msafree3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  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  $m3\_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u3\_msualg\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k11\_msafree : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k7\_msaterm : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r2\_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k4\_msafree3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned}
 & \forall X0. \forall X1. \forall X2. (((\neg v11\_struct\_0 X0) \wedge (v1\_instalg1 \\
 & X0) \wedge (l1\_msualg\_1 X0))) \wedge (((v1\_relat\_1 X1) \wedge (v2\_relat\_1 X1) \wedge \\
 & ((v4\_relat\_1 X1 (u1\_struct\_0 X0)) \wedge (v1\_funct\_1 X1) \wedge (v1\_partfun1 \\
 & X1 (u1\_struct\_0 X0)))))) \wedge ((v1\_relat\_1 X2) \wedge ((v4\_relat\_1 X2 (u1\_struct\_0 \\
 & X0)) \wedge ((v1\_funct\_1 X2) \wedge (v1\_partfun1 X2 (u1\_struct\_0 X0)))))) \Rightarrow \\
 & (m3\_pboole (k5\_msafree3 X0 X1 X2) (u1\_struct\_0 X0) (u3\_msualg\_1 \\
 & X0 (k11\_msafree X0 X1)))
 \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v11\_struct\_0 X0) \wedge ((v1\_instalg1 X0) \wedge (l1\_msualg\_1 \\
& X0))) \Rightarrow (\forall X1.((v1\_relat\_1 X1) \wedge ((v2\_relat\_1 X1) \wedge ((v4\_relat\_1 \\
& X1 (u1\_struct\_0 X0)) \wedge ((v1\_funct\_1 X1) \wedge (v1\_partfun1 X1 (u1\_struct\_0 \\
& X0)))))) \Rightarrow (\forall X2.((v1\_relat\_1 X2) \wedge ((v4\_relat\_1 X2 (u1\_struct\_0 \\
& X0)) \wedge ((v1\_funct\_1 X2) \wedge (v1\_partfun1 X2 (u1\_struct\_0 X0)))))) \Rightarrow \\
& (\forall X3.(m3\_pboole X3 (u1\_struct\_0 X0) (u3\_msualg\_1 X0 (k11\_msafree \\
& X0 X1))) \Rightarrow ((X3 = k5\_msafree3 X0 X1 X2) \Leftrightarrow (\forall X4.(m1\_subset\_1 \\
& X4 (u1\_struct\_0 X0)) \Rightarrow (k1\_funct\_1 X3 X4 = ReplSep (toset (\lambda X5 : \\
& \iota.m1\_dtconstr X5 (u1\_struct\_0 (k5\_msafree X0 X1)) (k5\_trees\_3 \\
& (u1\_struct\_0 (k5\_msafree X0 X1))) (k1\_msaterm X0 X1))) (\lambda X5 : \\
& \iota.(k7\_msaterm X0 X1 X5 = X4) \wedge (r2\_pboole (u1\_struct\_0 X0) (k4\_msafree3 \\
& X0 X1 X5) X2)) (\lambda X5 : \iota.X5))))))
\end{aligned} \tag{2}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0. \forall X1. ((\neg v11\_struct\_0 X1) \wedge ((v1\_instalg1 X1) \wedge \\
& (l1\_msualg\_1 X1))) \Rightarrow (\forall X2.((v1\_relat\_1 X2) \wedge ((v2\_relat\_1 \\
& X2) \wedge ((v4\_relat\_1 X2 (u1\_struct\_0 X1)) \wedge ((v1\_funct\_1 X2) \wedge (v1\_partfun1 \\
& X2 (u1\_struct\_0 X1)))))) \Rightarrow (\forall X3.((v1\_relat\_1 X3) \wedge ((v4\_relat\_1 \\
& X3 (u1\_struct\_0 X1)) \wedge ((v1\_funct\_1 X3) \wedge (v1\_partfun1 X3 (u1\_struct\_0 \\
& X1)))))) \Rightarrow (\forall X4.(m1\_subset\_1 X4 (u1\_struct\_0 X1)) \Rightarrow ((X0 \in \\
& k1\_funct\_1 (k5\_msafree3 X1 X2 X3) X4) \Rightarrow (m1\_dtconstr X0 (u1\_struct\_0 \\
& (k5\_msafree X1 X2)) (k5\_trees\_3 (u1\_struct\_0 (k5\_msafree X1 X2))) \\
& (k1\_msaterm X1 X2))))))
\end{aligned}$$