

t12_closure1

(TMGEX72Z8rnGHfSnTD4dawWVcpgdAab5wnn)

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Let $v1_relat_1 : \iota \Rightarrow o$ be given. Let $v4_relat_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v1_funct_1 : \iota \Rightarrow o$ be given. Let $v1_partfun1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v1_closure1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k2_msualg_3 : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k5_mssubfam : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $m2_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v2_relat_1 : \iota \Rightarrow o$ be given. Let $m1_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $r6_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k1_closure1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $r2_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k1_mboolean : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k2_closure1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k15_pralg_1 : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $v1_mssubfam : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v2_mssubfam : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v3_mssubfam : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v4_mssubfam : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v5_mssubfam : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v6_mssubfam : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $m3_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. ((v1_relat_1 X1) \wedge ((v2_relat_1 X1) \wedge ((v4_relat_1 \\ & X1 X0) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 X0)))))) \Rightarrow (\forall X2. \\ (m1_pboole X2 X0 X1) \Rightarrow (r6_pboole X0 X2 (k1_closure1 X0 X1 X1 (k2_msualg_3 \\ X0 X1) X2))) \end{aligned} \tag{1}$$

Assume the following.

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

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. (((v1_relat_1 X1) \wedge ((v4_relat_1 \\ & X1 X0) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 X0)))) \wedge ((v1_relat_1 \\ & X2) \wedge ((v4_relat_1 X2 X0) \wedge ((v1_funct_1 X2) \wedge (v1_partfun1 X2 X0)))))) \Rightarrow \\ & ((r6_pboole X0 X1 X2) \Leftrightarrow (X1 = X2)) \end{aligned} \tag{3}$$

Assume the following.

$$\forall X0.\forall X1.((v1_relat_1 X1)\wedge((v4_relat_1 X1 X0)\wedge(v1_funct_1 X1)\wedge(v1_partfun1 X1 X0)))\Rightarrow(k5_mssubfam X0 X1 = k1_mboolean X0 X1)$$
(4)

Assume the following.

$$\forall X0.\forall X1.\forall X2.\forall X3.(((v1_relat_1 X1)\wedge((v4_relat_1 X1 X0)\wedge(v1_funct_1 X1)\wedge(v1_partfun1 X1 X0))))\wedge((m2_pboole X2 X0 (k5_mssubfam X0 X1) (k5_mssubfam X0 X1))\wedge(m1_pboole X3 X0 (k5_mssubfam X0 X1)))\Rightarrow(k2_closure1 X0 X1 X2 X3 = k15_pralg_1 X2 X3)$$
(5)

Assume the following.

$$\forall X0.\forall X1.\forall X2.\forall X3.\forall X4.(((v1_relat_1 X1)\wedge((v2_relat_1 X1)\wedge((v4_relat_1 X1 X0)\wedge(v1_funct_1 X1)\wedge(v1_partfun1 X1 X0))))\wedge(((v1_relat_1 X2)\wedge((v2_relat_1 X2)\wedge(v4_relat_1 X2 X0)\wedge(v1_funct_1 X2)\wedge(v1_partfun1 X2 X0))))\wedge((m2_pboole X3 X0 X1 X2)\wedge(m1_pboole X4 X0 X1)))\Rightarrow(k1_closure1 X0 X1 X2 X3 X4 = k15_pralg_1 X3 X4)$$
(6)

Assume the following.

$$\forall X0.\forall X1.((v1_relat_1 X1)\wedge((v4_relat_1 X1 X0)\wedge(v1_funct_1 X1)\wedge(v1_partfun1 X1 X0)))\Rightarrow(\forall X2.(m1_pboole X2 X0 X1)\Rightarrow((v1_relat_1 X2)\wedge((v4_relat_1 X2 X0)\wedge(v1_funct_1 X2)\wedge(v1_partfun1 X2 X0))))$$
(7)

Assume the following.

$$\forall X0.\forall X1.((v1_relat_1 X1)\wedge((v4_relat_1 X1 X0)\wedge(v1_funct_1 X1)\wedge(v1_partfun1 X1 X0)))\Rightarrow(((v1_mssubfam (k5_mssubfam X0 X1) X0 X1)\wedge(v2_mssubfam (k5_mssubfam X0 X1) X0 X1)\wedge(v3_mssubfam (k5_mssubfam X0 X1) X0 X1)\wedge(v4_mssubfam (k5_mssubfam X0 X1) X0 X1)\wedge(v5_mssubfam (k5_mssubfam X0 X1) X0 X1)\wedge(v6_mssubfam (k5_mssubfam X0 X1) X0 X1)\wedge(m3_pboole (k5_mssubfam X0 X1) X0 (k1_mboolean X0 X1))))))$$
(8)

Assume the following.

$$\forall X0.\forall X1.((v1_relat_1 X1)\wedge((v4_relat_1 X1 X0)\wedge(v1_funct_1 X1)\wedge(v1_partfun1 X1 X0)))\Rightarrow(m2_pboole (k2_msualg_3 X0 X1) X0 X1 X1)$$
(9)

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. ((v1_relat_1 X1) \wedge ((v4_relat_1 X1 X0) \wedge \\ & (v1_funct_1 X1) \wedge (v1_partfun1 X1 X0))) \Rightarrow ((v1_relat_1 (k1_mboolean \\ & X0 X1)) \wedge ((v4_relat_1 (k1_mboolean X0 X1) X0) \wedge ((v1_funct_1 (k1_mboolean \\ & X0 X1)) \wedge (v1_partfun1 (k1_mboolean X0 X1) X0)))) \end{aligned} \quad (10)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. \forall X3. \forall X4. (((v1_relat_1 \\ & X1) \wedge ((v2_relat_1 X1) \wedge ((v4_relat_1 X1 X0) \wedge ((v1_funct_1 X1) \wedge \\ & v1_partfun1 X1 X0)))) \wedge (((v1_relat_1 X2) \wedge ((v2_relat_1 X2) \wedge \\ & (v4_relat_1 X2 X0) \wedge ((v1_funct_1 X2) \wedge (v1_partfun1 X2 X0)))))) \wedge \\ & ((m2_pboole X3 X0 X1 X2) \wedge (m1_pboole X4 X0 X1))) \Rightarrow (m1_pboole (k1_closure1 \\ & X0 X1 X2 X3 X4) X0 X2) \end{aligned} \quad (11)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. ((v1_relat_1 X1) \wedge ((v4_relat_1 X1 X0) \wedge \\ & (v1_funct_1 X1) \wedge (v1_partfun1 X1 X0))) \Rightarrow (\forall X2. (m2_pboole \\ & X2 X0 (k5_mssubfam X0 X1) (k5_mssubfam X0 X1)) \Rightarrow ((v1_closure1 X2 \\ & X0 X1) \Leftrightarrow (\forall X3. (m1_pboole X3 X0 (k5_mssubfam X0 X1)) \Rightarrow (r2_pboole \\ & X0 X3 (k2_closure1 X0 X1 X2 X3)))))) \end{aligned} \quad (12)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. ((v1_relat_1 X1) \wedge ((v4_relat_1 X1 X0) \wedge \\ & (v1_funct_1 X1) \wedge (v1_partfun1 X1 X0))) \Rightarrow (\forall X2. (m3_pboole \\ & X2 X0 (k1_mboolean X0 X1)) \Rightarrow ((v6_mssubfam X2 X0 X1) \Rightarrow (v2_relat_1 \\ & X2))) \end{aligned} \quad (13)$$

Theorem 1

$$\begin{aligned} & \forall X0. \forall X1. ((v1_relat_1 X1) \wedge ((v4_relat_1 X1 X0) \wedge \\ & (v1_funct_1 X1) \wedge (v1_partfun1 X1 X0))) \Rightarrow ((v1_closure1 (k2_msualg_3 \\ & X0 (k5_mssubfam X0 X1) X0 X1) \wedge (m2_pboole (k2_msualg_3 X0 (k5_mssubfam \\ & X0 X1) X0 (k5_mssubfam X0 X1) (k5_mssubfam X0 X1))) \end{aligned}$$