

t9_msualg_5 (TMN-
FRifCMM6Rh4UXqfDwn9qAHryZ2K5SiJ5)

October 27, 2020

Let $v1_xboole_0 : \iota \Rightarrow o$ be given. 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 $v1_msualg_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $m1_msualg_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $r8_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k3_pboole : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k4_msualg_5 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $r2_pboole : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k2_pboole : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $r6_pboole : \iota \Rightarrow \iota \Rightarrow o$ be given. Assume the following.

$$\begin{aligned} & \forall X0. (\neg v1_xboole_0 X0) \Rightarrow (\forall X1. ((v1_relat_1 X1) \wedge (\\ & (v4_relat_1 X1 X0) \wedge ((v1_funct_1 X1) \wedge (v1_partfun1 X1 X0)))) \Rightarrow (\\ & \forall X2. ((v1_msualg_4 X2 X0 X1) \wedge (m1_msualg_4 X2 X0 X1 X1)) \Rightarrow (\\ & \forall X3. ((v1_msualg_4 X3 X0 X1) \wedge (m1_msualg_4 X3 X0 X1 X1)) \Rightarrow (\\ & r2_pboole X0 (k2_pboole X0 X2 X3) (k4_msualg_5 X0 X1 X2 X3)))) \end{aligned} \quad (1)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. ((v1_relat_1 X1) \wedge ((v4_relat_1 X1 X0) \wedge (\\ & (v1_funct_1 X1) \wedge (v1_partfun1 X1 X0)))) \Rightarrow (\forall X2. ((v1_relat_1 \\ & X2) \wedge ((v4_relat_1 X2 X0) \wedge ((v1_funct_1 X2) \wedge (v1_partfun1 X2 X0)))) \Rightarrow \\ & ((r2_pboole X0 X1 X2) \Rightarrow (r6_pboole X0 (k3_pboole X0 X1 X2) X1))) \end{aligned} \quad (2)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. ((v1_relat_1 X1) \wedge ((v4_relat_1 X1 X0) \wedge (\\ & (v1_funct_1 X1) \wedge (v1_partfun1 X1 X0)))) \Rightarrow (\forall X2. ((v1_relat_1 \\ & X2) \wedge ((v4_relat_1 X2 X0) \wedge ((v1_funct_1 X2) \wedge (v1_partfun1 X2 X0)))) \Rightarrow \\ & (r2_pboole X0 X1 (k2_pboole X0 X1 X2))) \end{aligned} \quad (3)$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.((v1_relat_1 X1)\wedge((v4_relat_1 X1 X0)\wedge \\
& (v1_funct_1 X1)\wedge(v1_partfun1 X1 X0)))\Rightarrow(\forall X2.((v1_relat_1 \\
& X2)\wedge((v4_relat_1 X2 X0)\wedge((v1_funct_1 X2)\wedge(v1_partfun1 X2 X0))))\Rightarrow \\
& (\forall X3.((v1_relat_1 X3)\wedge((v4_relat_1 X3 X0)\wedge((v1_funct_1 \\
& X3)\wedge(v1_partfun1 X3 X0))))\Rightarrow((r2_pboole X0 X1 X2)\wedge(r2_pboole \\
& X0 X2 X3))\Rightarrow(r2_pboole X0 X1 X3)))
\end{aligned} \tag{4}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.((\neg v1_xboole_0 X0)\wedge(((v1_relat_1 \\
& X1)\wedge((v4_relat_1 X1 X0)\wedge((v1_funct_1 X1)\wedge(v1_partfun1 X1 X0))))\wedge \\
& ((v1_relat_1 X2)\wedge((v4_relat_1 X2 X0)\wedge((v1_funct_1 X2)\wedge(v1_partfun1 \\
& X2 X0))))))\Rightarrow((r8_pboole X0 X1 X2)\Leftrightarrow(X1 = X2))
\end{aligned} \tag{5}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.(((v1_relat_1 X1)\wedge((v4_relat_1 \\
& X1 X0)\wedge((v1_funct_1 X1)\wedge(v1_partfun1 X1 X0))))\wedge((v1_relat_1 \\
& X2)\wedge((v4_relat_1 X2 X0)\wedge((v1_funct_1 X2)\wedge(v1_partfun1 X2 X0))))\Rightarrow \\
& ((r6_pboole X0 X1 X2)\Leftrightarrow(X1 = X2))
\end{aligned} \tag{6}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.(((v1_relat_1 X1)\wedge((v4_relat_1 \\
& X1 X0)\wedge((v1_funct_1 X1)\wedge(v1_partfun1 X1 X0))))\wedge((v1_relat_1 \\
& X2)\wedge((v4_relat_1 X2 X0)\wedge((v1_funct_1 X2)\wedge(v1_partfun1 X2 X0))))\Rightarrow \\
& (\forall X3.(m1_msualg_4 X3 X0 X1 X2)\Rightarrow((v1_relat_1 X3)\wedge((v4_relat_1 \\
& X3 X0)\wedge((v1_funct_1 X3)\wedge(v1_partfun1 X3 X0))))))
\end{aligned} \tag{7}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.\forall X3.((\neg v1_xboole_0 X0)\wedge \\
& (((v1_relat_1 X1)\wedge((v4_relat_1 X1 X0)\wedge((v1_funct_1 X1)\wedge(v1_partfun1 \\
& X1 X0))))\wedge(((v1_msualg_4 X2 X0 X1)\wedge(m1_msualg_4 X2 X0 X1 X1))\wedge \\
& (v1_msualg_4 X3 X0 X1)\wedge(m1_msualg_4 X3 X0 X1 X1))))\Rightarrow((v1_msualg_4 \\
& (k4_msualg_5 X0 X1 X2 X3) X0 X1)\wedge(m1_msualg_4 (k4_msualg_5 X0 X1 \\
& X2 X3) X0 X1 X1))
\end{aligned} \tag{8}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.(((v1_relat_1 X1)\wedge((v4_relat_1 \\
& X1 X0)\wedge((v1_funct_1 X1)\wedge(v1_partfun1 X1 X0))))\wedge((v1_relat_1 \\
& X2)\wedge((v4_relat_1 X2 X0)\wedge((v1_funct_1 X2)\wedge(v1_partfun1 X2 X0))))\Rightarrow \\
& ((v1_relat_1 (k3_pboole X0 X1 X2))\wedge((v4_relat_1 (k3_pboole X0 \\
& X1 X2) X0)\wedge((v1_funct_1 (k3_pboole X0 X1 X2))\wedge(v1_partfun1 (k3_pboole \\
& X0 X1 X2) X0))))
\end{aligned} \tag{9}$$

Assume the following.

$$\begin{aligned}
& \forall X0.\forall X1.\forall X2.(((v1_relat_1 X1)\wedge((v4_relat_1 \\
& X1 X0)\wedge((v1_funct_1 X1)\wedge(v1_partfun1 X1 X0))))\wedge((v1_relat_1 \\
& X2)\wedge((v4_relat_1 X2 X0)\wedge((v1_funct_1 X2)\wedge(v1_partfun1 X2 X0))))\Rightarrow \\
& ((v1_relat_1 (k2_pboole X0 X1 X2))\wedge((v4_relat_1 (k2_pboole X0 \\
& X1 X2) X0)\wedge((v1_funct_1 (k2_pboole X0 X1 X2))\wedge(v1_partfun1 (k2_pboole \\
& X0 X1 X2) X0))))
\end{aligned} \tag{10}$$

Theorem 1

$$\begin{aligned}
& \forall X0.(\neg v1_xboole_0 X0)\Rightarrow(\forall X1.((v1_relat_1 X1)\wedge(\\
& (v4_relat_1 X1 X0)\wedge((v1_funct_1 X1)\wedge(v1_partfun1 X1 X0))))\Rightarrow(\\
& \forall X2.((v1_msualg_4 X2 X0 X1)\wedge(m1_msualg_4 X2 X0 X1 X1))\Rightarrow(\\
& \forall X3.((v1_msualg_4 X3 X0 X1)\wedge(m1_msualg_4 X3 X0 X1 X1))\Rightarrow(\\
& r8_pboole X0 (k3_pboole X0 X2 (k4_msualg_5 X0 X1 X2 X3) X2)))
\end{aligned}$$