

t10_ranknull (TMYgtxvT54Sn5YHCNSrJry2937dJbg8pVX2)

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Let $v2_struct_0 : \iota \Rightarrow o$ be given. Let $v6_struct_0 : \iota \Rightarrow o$ be given. Let $v13_algstr_0 : \iota \Rightarrow o$ be given. Let $v33_algstr_0 : \iota \Rightarrow o$ be given. Let $v2_rlvect_1 : \iota \Rightarrow o$ be given. Let $v3_rlvect_1 : \iota \Rightarrow o$ be given. Let $v4_rlvect_1 : \iota \Rightarrow o$ be given. Let $v3_group_1 : \iota \Rightarrow o$ be given. Let $v5_group_1 : \iota \Rightarrow o$ be given. Let $v4_vectsp_1 : \iota \Rightarrow o$ be given. Let $v5_vectsp_1 : \iota \Rightarrow o$ be given. Let $l6_algstr_0 : \iota \Rightarrow o$ be given. Let $v8_vectsp_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v9_vectsp_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v10_vectsp_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v11_vectsp_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $l1_vectsp_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v1_funct_1 : \iota \Rightarrow o$ be given. Let $v1_funct_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $u1_struct_0 : \iota \Rightarrow \iota$ be given. Let $v13_vectsp_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $v1_mod_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $m1_subset_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k1_zfmisc_1 : \iota \Rightarrow \iota$ be given. Let $k2_zfmisc_1 : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $r1_struct_0 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k1_ranknull : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k3_funct_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Let $k4_struct_0 : \iota \Rightarrow \iota$ be given. Let $m1_vectsp_4 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$ be given. Let $l2_algstr_0 : \iota \Rightarrow o$ be given. Let $l5_algstr_0 : \iota \Rightarrow o$ be given. Let $l2_struct_0 : \iota \Rightarrow o$ be given. Let $l1_struct_0 : \iota \Rightarrow o$ be given. Let $l1_algstr_0 : \iota \Rightarrow o$ be given. Let $v7_vectsp_1 : \iota \Rightarrow \iota \Rightarrow o$ be given. Let $k2_struct_0 : \iota \Rightarrow \iota$ be given. Assume the following.

$$\begin{aligned}
& \forall X0. \forall X1. (((\neg(v2_struct_0 X0) \wedge ((v13_algstr_0 X0) \wedge \\
& ((v3_group_1 X0) \wedge ((v4_vectsp_1 X0) \wedge ((v5_vectsp_1 X0) \wedge ((v2_rlvect_1 \\
& X0) \wedge ((v3_rlvect_1 X0) \wedge ((v4_rlvect_1 X0) \wedge (l6_algstr_0 X0)))))))))) \wedge \\
& ((\neg(v2_struct_0 X1) \wedge ((v13_algstr_0 X1) \wedge ((v8_vectsp_1 X1 X0) \wedge \\
& ((v9_vectsp_1 X1 X0) \wedge ((v10_vectsp_1 X1 X0) \wedge ((v11_vectsp_1 X1 \\
& X0) \wedge ((v2_rlvect_1 X1) \wedge ((v3_rlvect_1 X1) \wedge ((v4_rlvect_1 X1) \wedge \\
& (l1_vectsp_1 X1 X0)))))))))) \Rightarrow (\forall X2. (m1_vectsp_4 X2 X0 \\
& X1) \Rightarrow ((\neg(v2_struct_0 X2) \wedge ((v13_algstr_0 X2) \wedge ((v8_vectsp_1 X2 \\
& X0) \wedge ((v9_vectsp_1 X2 X0) \wedge ((v10_vectsp_1 X2 X0) \wedge ((v11_vectsp_1 \\
& X2 X0) \wedge ((v2_rlvect_1 X2) \wedge ((v3_rlvect_1 X2) \wedge ((v4_rlvect_1 X2) \wedge \\
& (l1_vectsp_1 X2 X0)))))))))))))
\end{aligned} \tag{1}$$

Assume the following.

$$\forall X0. (l6_algstr_0 X0) \Rightarrow ((l2_algstr_0 X0) \wedge (l5_algstr_0 X0)) \tag{2}$$

Assume the following.

$$\forall X0.(l2_struct_0 X0) \Rightarrow (l1_struct_0 X0) \quad (3)$$

Assume the following.

$$\forall X0.(l2_algstr_0 X0) \Rightarrow ((l2_struct_0 X0) \wedge (l1_algstr_0 X0)) \quad (4)$$

Assume the following.

$$\forall X0.(l1_struct_0 X0) \Rightarrow (\forall X1.(l1_vectsp_1 X1 X0) \Rightarrow (l2_algstr_0 X1)) \quad (5)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.(((\neg v2_struct_0 \\ & X0) \wedge ((\neg v6_struct_0 X0) \wedge ((v13_algstr_0 X0) \wedge ((v33_algstr_0 X0) \wedge \\ & ((v2_rlvect_1 X0) \wedge ((v3_rlvect_1 X0) \wedge ((v4_rlvect_1 X0) \wedge ((v3_group_1 \\ & X0) \wedge ((v5_group_1 X0) \wedge ((v4_vectsp_1 X0) \wedge ((v5_vectsp_1 X0) \wedge (\\ & l6_algstr_0 X0)))))))))) \wedge (((\neg v2_struct_0 X1) \wedge ((v13_algstr_0 \\ & X1) \wedge ((v2_rlvect_1 X1) \wedge ((v3_rlvect_1 X1) \wedge ((v4_rlvect_1 X1) \wedge \\ & ((v8_vectsp_1 X1 X0) \wedge ((v9_vectsp_1 X1 X0) \wedge ((v10_vectsp_1 X1 X0) \wedge \\ & ((v11_vectsp_1 X1 X0) \wedge (l1_vectsp_1 X1 X0)))))))))) \wedge (((\neg v2_struct_0 \\ & X2) \wedge ((v13_algstr_0 X2) \wedge ((v2_rlvect_1 X2) \wedge ((v3_rlvect_1 X2) \wedge \\ & ((v4_rlvect_1 X2) \wedge ((v8_vectsp_1 X2 X0) \wedge ((v9_vectsp_1 X2 X0) \wedge \\ & ((v10_vectsp_1 X2 X0) \wedge ((v11_vectsp_1 X2 X0) \wedge (l1_vectsp_1 X2 X0)))))))))) \wedge \\ & ((v1_funct_1 X3) \wedge ((v1_funct_2 X3 (u1_struct_0 X1) (u1_struct_0 \\ & X2)) \wedge ((v13_vectsp_1 X3 X1 X2) \wedge ((v1_mod_2 X3 X0 X1 X2) \wedge (m1_subset_1 \\ & X3 (k1_zfmisc_1 (k2_zfmisc_1 (u1_struct_0 X1) (u1_struct_0 X2)))))))))) \Rightarrow \\ & ((v7_vectsp_1 (k1_ranknull X0 X1 X2 X3) X0) \wedge (m1_vectsp_4 (k1_ranknull \\ & X0 X1 X2 X3) X0 X1)) \end{aligned} \quad (6)$$

Assume the following.

$$\forall X0.(l1_struct_0 X0) \Rightarrow (\forall X1.(r1_struct_0 X0 X1) \Leftrightarrow (X1 \in u1_struct_0 X0)) \quad (7)$$

Assume the following.

$$\forall X0.(l1_struct_0 X0) \Rightarrow (k2_struct_0 X0 = u1_struct_0 X0) \quad (8)$$

Assume the following.

$$\begin{aligned}
& \forall X0. ((\neg v2_struct_0 X0) \wedge ((\neg v6_struct_0 X0) \wedge ((v13_algstr_0 \\
& X0) \wedge ((v33_algstr_0 X0) \wedge ((v2_rlvect_1 X0) \wedge ((v3_rlvect_1 X0) \wedge \\
& ((v4_rlvect_1 X0) \wedge ((v3_group_1 X0) \wedge ((v5_group_1 X0) \wedge ((v4_vectsp_1 \\
& X0) \wedge ((v5_vectsp_1 X0) \wedge (l6_algstr_0 X0)))))))))) \Rightarrow (\forall X1. \\
& ((\neg v2_struct_0 X1) \wedge ((v13_algstr_0 X1) \wedge ((v2_rlvect_1 X1) \wedge ((\\
& v3_rlvect_1 X1) \wedge ((v4_rlvect_1 X1) \wedge ((v8_vectsp_1 X1 X0) \wedge ((v9_vectsp_1 \\
& X1 X0) \wedge ((v10_vectsp_1 X1 X0) \wedge ((v11_vectsp_1 X1 X0) \wedge (l1_vectsp_1 \\
& X1 X0)))))))))) \Rightarrow (\forall X2. ((\neg v2_struct_0 X2) \wedge ((v13_algstr_0 \\
& X2) \wedge ((v2_rlvect_1 X2) \wedge ((v3_rlvect_1 X2) \wedge ((v4_rlvect_1 X2) \wedge \\
& ((v8_vectsp_1 X2 X0) \wedge ((v9_vectsp_1 X2 X0) \wedge ((v10_vectsp_1 X2 X0) \wedge \\
& ((v11_vectsp_1 X2 X0) \wedge (l1_vectsp_1 X2 X0)))))))))) \Rightarrow (\forall X3. \\
& ((v1_funct_1 X3) \wedge ((v1_funct_2 X3 (u1_struct_0 X1) (u1_struct_0 \\
& X2)) \wedge ((v13_vectsp_1 X3 X1 X2) \wedge ((v1_mod_2 X3 X0 X1 X2) \wedge (m1_subset_1 \\
& X3 (k1_zfmisc_1 (k2_zfmisc_1 (u1_struct_0 X1) (u1_struct_0 X2))))))) \Rightarrow \\
& (\forall X4. ((v7_vectsp_1 X4 X0) \wedge (m1_vectsp_4 X4 X0 X1)) \Rightarrow ((X4 = \\
& k1_ranknull X0 X1 X2 X3) \Leftrightarrow (k2_struct_0 X4 = ReplSep (toset (\lambda X5 : \\
& \iota.m1_subset_1 X5 (u1_struct_0 X1))) (\lambda X5 : \iota.k3_funct_2 \\
& (u1_struct_0 X1) (u1_struct_0 X2) X3 X5 = k4_struct_0 X2) (\lambda X5 : \\
& \iota.X5))))))
\end{aligned} \tag{9}$$

Theorem 1

$$\begin{aligned}
& \forall X0. ((\neg v2_struct_0 X0) \wedge ((\neg v6_struct_0 X0) \wedge ((v13_algstr_0 \\
& X0) \wedge ((v33_algstr_0 X0) \wedge ((v2_rlvect_1 X0) \wedge ((v3_rlvect_1 X0) \wedge \\
& ((v4_rlvect_1 X0) \wedge ((v3_group_1 X0) \wedge ((v5_group_1 X0) \wedge ((v4_vectsp_1 \\
& X0) \wedge ((v5_vectsp_1 X0) \wedge (l6_algstr_0 X0)))))))))) \Rightarrow (\forall X1. \\
& ((\neg v2_struct_0 X1) \wedge ((v13_algstr_0 X1) \wedge ((v2_rlvect_1 X1) \wedge ((\\
& v3_rlvect_1 X1) \wedge ((v4_rlvect_1 X1) \wedge ((v8_vectsp_1 X1 X0) \wedge ((v9_vectsp_1 \\
& X1 X0) \wedge ((v10_vectsp_1 X1 X0) \wedge ((v11_vectsp_1 X1 X0) \wedge (l1_vectsp_1 \\
& X1 X0)))))))))) \Rightarrow (\forall X2. ((\neg v2_struct_0 X2) \wedge ((v13_algstr_0 \\
& X2) \wedge ((v2_rlvect_1 X2) \wedge ((v3_rlvect_1 X2) \wedge ((v4_rlvect_1 X2) \wedge \\
& ((v8_vectsp_1 X2 X0) \wedge ((v9_vectsp_1 X2 X0) \wedge ((v10_vectsp_1 X2 X0) \wedge \\
& ((v11_vectsp_1 X2 X0) \wedge (l1_vectsp_1 X2 X0)))))))))) \Rightarrow (\forall X3. \\
& ((v1_funct_1 X3) \wedge ((v1_funct_2 X3 (u1_struct_0 X1) (u1_struct_0 \\
& X2)) \wedge ((v13_vectsp_1 X3 X1 X2) \wedge ((v1_mod_2 X3 X0 X1 X2) \wedge (m1_subset_1 \\
& X3 (k1_zfmisc_1 (k2_zfmisc_1 (u1_struct_0 X1) (u1_struct_0 X2))))))) \Rightarrow \\
& (\forall X4. (m1_subset_1 X4 (u1_struct_0 X1)) \Rightarrow ((r1_struct_0 \\
& (k1_ranknull X0 X1 X2 X3) X4) \Leftrightarrow (k3_funct_2 (u1_struct_0 X1) (u1_struct_0 \\
& X2) X3 X4 = k4_struct_0 X2))))))
\end{aligned}$$