

## t12\_bilinear

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Let  $v2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l2\_algstr\_0 : \iota \Rightarrow o$  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  $k2\_zfmisc\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_zfmisc\_1 : \iota \Rightarrow \iota$  be given. Let  $r2\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k8\_bilinear : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_bilinear : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_hahnban1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $l1\_struct\_0 : \iota \Rightarrow o$  be given. Let  $k1\_relset\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r1\_tarski : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k2\_relset\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k3\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_binop\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $l2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l1\_algstr\_0 : \iota \Rightarrow o$  be given. Let  $k1\_algstr\_0 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Assume the following.

$$\begin{aligned}
 & \forall X0.((\neg v2\_struct\_0 X0) \wedge (l1\_struct\_0 X0)) \Rightarrow (\forall X1. \\
 & ((\neg v2\_struct\_0 X1) \wedge (l1\_vectsp\_1 X1 X0)) \Rightarrow (\forall X2.((\neg v2\_struct\_0 \\
 & X2) \wedge (l1\_vectsp\_1 X2 X0)) \Rightarrow (\forall X3.((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 \\
 & X3 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 \\
 & X0)) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 \\
 & (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0)))))) \Rightarrow (\forall X4. \\
 & (m1\_subset\_1 X4 (u1\_struct\_0 X2)) \Rightarrow ((k1\_relset\_1 (u1\_struct\_0 \\
 & X1) (k8\_bilinear X0 X1 X2 X3 X4) = u1\_struct\_0 X1) \wedge ((r1\_tarski (k2\_relset\_1 \\
 & (u1\_struct\_0 X0) (k8\_bilinear X0 X1 X2 X3 X4)) (u1\_struct\_0 X0)) \wedge \\
 & (\forall X5.(m1\_subset\_1 X5 (u1\_struct\_0 X1)) \Rightarrow (k3\_funct\_2 (u1\_struct\_0 \\
 & X1) (u1\_struct\_0 X0) (k8\_bilinear X0 X1 X2 X3 X4) X5 = k2\_binop\_1 ( \\
 & u1\_struct\_0 X1) (u1\_struct\_0 X2) (u1\_struct\_0 X0) X3 X5 X4)))))) \\
 & \tag{1}
 \end{aligned}$$

Assume the following.

$$\begin{aligned}
 & \forall X0. \forall X1. \forall X2. \forall X3. (((v1\_funct\_1 X2) \wedge \\
 & ((v1\_funct\_2 X2 X0 X1) \wedge (m1\_subset\_1 X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\
 & X0 X1)))))) \wedge ((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 X3 X0 X1) \wedge (m1\_subset\_1 \\
 & X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 X0 X1)))))) \Rightarrow ((r2\_funct\_2 X0 X1 X2 \\
 & X3) \Leftrightarrow (X2 = X3)) \\
 & \tag{2}
 \end{aligned}$$

Assume the following.

$$\forall X0.(l2\_algstr\_0 X0)\Rightarrow((l2\_struct\_0 X0)\wedge(l1\_algstr\_0 X0)) \quad (3)$$

Assume the following.

$$\forall X0.(l1\_algstr\_0 X0)\Rightarrow(l1\_struct\_0 X0) \quad (4)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.\forall X4.(((\neg v2\_struct\_0 \\ & X0)\wedge(l1\_struct\_0 X0))\wedge(((\neg v2\_struct\_0 X1)\wedge(l1\_vectsp\_1 X1 X0))\wedge \\ & (((\neg v2\_struct\_0 X2)\wedge(l1\_vectsp\_1 X2 X0))\wedge((v1\_funct\_1 X3)\wedge \\ & (v1\_funct\_2 X3 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) \\ & (u1\_struct\_0 X0))\wedge(m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 \\ & X0))))))\wedge(m1\_subset\_1 X4 (u1\_struct\_0 X2))))))\Rightarrow((v1\_funct\_1 \\ & (k8\_bilinear X0 X1 X2 X3 X4))\wedge((v1\_funct\_2 (k8\_bilinear X0 X1 X2 \\ & X3 X4) (u1\_struct\_0 X1) (u1\_struct\_0 X0))\wedge(m1\_subset\_1 (k8\_bilinear \\ & X0 X1 X2 X3 X4) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 \\ & X0)))))) \end{aligned} \quad (5)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.\forall X4.(((\neg v2\_struct\_0 \\ & X0)\wedge(l2\_algstr\_0 X0))\wedge(((\neg v2\_struct\_0 X1)\wedge(l1\_vectsp\_1 X1 X0))\wedge \\ & (((\neg v2\_struct\_0 X2)\wedge(l1\_vectsp\_1 X2 X0))\wedge((v1\_funct\_1 X3)\wedge \\ & ((v1\_funct\_2 X3 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) \\ & (u1\_struct\_0 X0))\wedge(m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\ & (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 \\ & X0))))))\wedge((v1\_funct\_1 X4)\wedge((v1\_funct\_2 X4 (k2\_zfmisc\_1 (u1\_struct\_0 \\ & X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0))\wedge(m1\_subset\_1 X4 (k1\_zfmisc\_1 \\ & (k2\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) \\ & (u1\_struct\_0 X0)))))))))\Rightarrow((v1\_funct\_1 (k2\_bilinear X0 X1 X2 \\ & X3 X4))\wedge((v1\_funct\_2 (k2\_bilinear X0 X1 X2 X3 X4) (k2\_zfmisc\_1 ( \\ & u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0))\wedge(m1\_subset\_1 \\ & (k2\_bilinear X0 X1 X2 X3 X4) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 \\ & (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0)))))) \end{aligned} \quad (6)$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge (l2\_algstr\_0 X0)) \Rightarrow (\forall X1. \\
& ((\neg v2\_struct\_0 X1) \wedge (l1\_vectsp\_1 X1 X0)) \Rightarrow (\forall X2.((v1\_funct\_1 \\
& X2) \wedge ((v1\_funct\_2 X2 (u1\_struct\_0 X1) (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 \\
& X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X0)))))) \Rightarrow \\
& (\forall X3.((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 X3 (u1\_struct\_0 X1) \\
& (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 \\
& (u1\_struct\_0 X1) (u1\_struct\_0 X0)))))) \Rightarrow (\forall X4.((v1\_funct\_1 \\
& X4) \wedge ((v1\_funct\_2 X4 (u1\_struct\_0 X1) (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 \\
& X4 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X0)))))) \Rightarrow \\
& ((X4 = k3\_hahnban1 X0 X1 X2 X3) \Leftrightarrow (\forall X5.(m1\_subset\_1 X5 (u1\_struct\_0 \\
& X1)) \Rightarrow (k3\_funct\_2 (u1\_struct\_0 X1) (u1\_struct\_0 X0) X4 X5 = k1\_algstr\_0 \\
& X0 (k3\_funct\_2 (u1\_struct\_0 X1) (u1\_struct\_0 X0) X2 X5) (k3\_funct\_2 \\
& (u1\_struct\_0 X1) (u1\_struct\_0 X0) X3 X5)))))))))
\end{aligned} \tag{7}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge (l2\_algstr\_0 X0)) \Rightarrow (\forall X1. \\
& ((\neg v2\_struct\_0 X1) \wedge (l1\_vectsp\_1 X1 X0)) \Rightarrow (\forall X2.((\neg v2\_struct\_0 \\
& X2) \wedge (l1\_vectsp\_1 X2 X0)) \Rightarrow (\forall X3.((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 \\
& X3 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 \\
& X0)) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 \\
& (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0)))))) \Rightarrow (\forall X4. \\
& ((v1\_funct\_1 X4) \wedge ((v1\_funct\_2 X4 (k2\_zfmisc\_1 (u1\_struct\_0 X1) \\
& (u1\_struct\_0 X2)) (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 X4 (k1\_zfmisc\_1 \\
& (k2\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) \\
& (u1\_struct\_0 X0)))))) \Rightarrow (\forall X5.((v1\_funct\_1 X5) \wedge ((v1\_funct\_2 \\
& X5 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 \\
& X0)) \wedge (m1\_subset\_1 X5 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 \\
& (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0)))))) \Rightarrow ((X5 = \\
& k2\_bilinear X0 X1 X2 X3 X4) \Leftrightarrow (\forall X6.(m1\_subset\_1 X6 (u1\_struct\_0 \\
& X1)) \Rightarrow (\forall X7.(m1\_subset\_1 X7 (u1\_struct\_0 X2)) \Rightarrow (k2\_binop\_1 \\
& (u1\_struct\_0 X1) (u1\_struct\_0 X2) (u1\_struct\_0 X0) X5 X6 X7 = k1\_algstr\_0 \\
& X0 (k2\_binop\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2) (u1\_struct\_0 \\
& X0) X3 X6 X7) (k2\_binop\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2) (u1\_struct\_0 \\
& X0) X4 X6 X7)))))))))
\end{aligned} \tag{8}$$

**Theorem 1**

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge (l2\_algstr\_0 X0)) \Rightarrow (\forall X1. \\ & ((\neg v2\_struct\_0 X1) \wedge (l1\_vectsp\_1 X1 X0)) \Rightarrow (\forall X2.((\neg v2\_struct\_0 \\ & X2) \wedge (l1\_vectsp\_1 X2 X0)) \Rightarrow (\forall X3.((v1\_funct\_1 X3) \wedge ((v1\_funct\_2 \\ & X3 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 \\ & X0)) \wedge (m1\_subset\_1 X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 \\ & (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0)))))) \Rightarrow (\forall X4. \\ & ((v1\_funct\_1 X4) \wedge ((v1\_funct\_2 X4 (k2\_zfmisc\_1 (u1\_struct\_0 X1) \\ & (u1\_struct\_0 X2)) (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 X4 (k1\_zfmisc\_1 \\ & (k2\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) \\ & (u1\_struct\_0 X0)))))) \Rightarrow (\forall X5.(m1\_subset\_1 X5 (u1\_struct\_0 \\ & X2)) \Rightarrow (r2\_funct\_2 (u1\_struct\_0 X1) (u1\_struct\_0 X0) (k8\_bilinear \\ & X0 X1 X2 (k2\_bilinear X0 X1 X2 X3 X4) X5) (k3\_hahnban1 X0 X1 (k8\_bilinear \\ & X0 X1 X2 X3 X5) (k8\_bilinear X0 X1 X2 X4 X5)))))) \end{aligned}$$