

## t21\_bilinear

(TMccwZS8xP13agjK1AP8K395HsLH9Jm3AKx)

October 27, 2020

Let  $v2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v13\_algstr\_0 : \iota \Rightarrow o$  be given. Let  $v3\_rlvect\_1 : \iota \Rightarrow o$  be given. Let  $v4\_rlvect\_1 : \iota \Rightarrow o$  be given. Let  $v2\_vectsp\_1 : \iota \Rightarrow o$  be given. Let  $l6\_algstr\_0 : \iota \Rightarrow o$  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  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_zfmisc\_1 : \iota \Rightarrow \iota$  be given. Let  $k2\_zfmisc\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_binop\_1 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k9\_bilinear : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k7\_hahnban1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k4\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $k6\_algstr\_0 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $l2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $k3\_funct\_2 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $v1\_relat\_1 : \iota \Rightarrow o$  be given. Let  $v4\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v5\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v3\_funct\_1 : \iota \Rightarrow o$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $v1\_partfun1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $l2\_algstr\_0 : \iota \Rightarrow o$  be given. Let  $l5\_algstr\_0 : \iota \Rightarrow o$  be given. Let  $l4\_algstr\_0 : \iota \Rightarrow o$  be given. Let  $l4\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l3\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l3\_algstr\_0 : \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge (v13\_algstr\_0 X0) \wedge ((v3\_rlvect\_1 \\ & X0) \wedge ((v4\_rlvect\_1 X0) \wedge ((v2\_vectsp\_1 X0) \wedge (l6\_algstr\_0 X0)))))) \Rightarrow \\ & (\forall X1. (m1\_subset\_1 X1 (u1\_struct\_0 X0)) \Rightarrow (k6\_algstr\_0 X0 \\ & (k4\_struct\_0 X0) X1 = k4\_struct\_0 X0)) \end{aligned} \quad (1)$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge (l2\_struct\_0 X0)) \Rightarrow (\forall X1. \\ & ((\neg v2\_struct\_0 X1) \wedge (l1\_vectsp\_1 X1 X0)) \Rightarrow (\forall X2. (m1\_subset\_1 \\ & X2 (u1\_struct\_0 X1)) \Rightarrow (k3\_funct\_2 (u1\_struct\_0 X1) (u1\_struct\_0 \\ & X0) (k7\_hahnban1 X0 X1) X2 = k4\_struct\_0 X0))) \end{aligned} \quad (2)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge (l2\_struct\_0 X0)) \wedge \\ & ((\neg v2\_struct\_0 X1) \wedge (l1\_vectsp\_1 X1 X0))) \Rightarrow (\exists X2. (m1\_subset\_1 \\ & X2 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X0)))) \wedge \\ & ((v1\_relat\_1 X2) \wedge ((v4\_relat\_1 X2 (u1\_struct\_0 X1)) \wedge ((v5\_relat\_1 \\ & X2 (u1\_struct\_0 X0)) \wedge ((v1\_funct\_1 X2) \wedge ((v3\_funct\_1 X2) \wedge ((\neg v1\_xboole\_0 \\ & X2) \wedge ((v1\_partfun1 X2 (u1\_struct\_0 X1)) \wedge (v1\_funct\_2 X2 (u1\_struct\_0 \\ & X1) (u1\_struct\_0 X0)))))))))) \end{aligned} \quad (3)$$

Assume the following.

$$\forall X0. (l6\_algstr\_0 X0) \Rightarrow ((l2\_algstr\_0 X0) \wedge (l5\_algstr\_0 X0)) \quad (4)$$

Assume the following.

$$\forall X0. (l5\_algstr\_0 X0) \Rightarrow ((l4\_algstr\_0 X0) \wedge (l4\_struct\_0 X0)) \quad (5)$$

Assume the following.

$$\forall X0. (l4\_struct\_0 X0) \Rightarrow ((l2\_struct\_0 X0) \wedge (l3\_struct\_0 X0)) \quad (6)$$

Assume the following.

$$\forall X0. (l4\_algstr\_0 X0) \Rightarrow ((l3\_struct\_0 X0) \wedge (l3\_algstr\_0 X0)) \quad (7)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. \forall X3. \forall X4. (((\neg v2\_struct\_0 \\ & X0) \wedge (l3\_algstr\_0 X0)) \wedge (((\neg v2\_struct\_0 X1) \wedge (l1\_vectsp\_1 X1 X0)) \wedge \\ & (((\neg v2\_struct\_0 X2) \wedge (l1\_vectsp\_1 X2 X0)) \wedge ((v1\_funct\_1 X3) \wedge \\ & ((v1\_funct\_2 X3 (u1\_struct\_0 X1) (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 \\ & X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X0)))))) \wedge \\ & ((v1\_funct\_1 X4) \wedge ((v1\_funct\_2 X4 (u1\_struct\_0 X2) (u1\_struct\_0 \\ & X0)) \wedge (m1\_subset\_1 X4 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 \\ & X2) (u1\_struct\_0 X0)))))))))) \Rightarrow ((v1\_funct\_1 (k9\_bilinear X0 X1 \\ & X2 X3 X4)) \wedge ((v1\_funct\_2 (k9\_bilinear X0 X1 X2 X3 X4) (k2\_zfmisc\_1 \\ & (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 \\ & (k9\_bilinear X0 X1 X2 X3 X4) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 \\ & (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0)))))) \end{aligned} \quad (8)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. (((\neg v2\_struct\_0 X0) \wedge (l2\_struct\_0 X0)) \wedge \\ & (l1\_vectsp\_1 X1 X0)) \Rightarrow ((v1\_funct\_1 (k7\_hahnban1 X0 X1)) \wedge ((v1\_funct\_2 \\ & (k7\_hahnban1 X0 X1) (u1\_struct\_0 X1) (u1\_struct\_0 X0)) \wedge (m1\_subset\_1 \\ & (k7\_hahnban1 X0 X1) (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X1) \\ & (u1\_struct\_0 X0)))))) \end{aligned} \quad (9)$$

Assume the following.

$$\begin{aligned} & \forall X0.\forall X1.\forall X2.\forall X3.((\neg v1\_xboole\_0 X0)\wedge \\ & (((v1\_funct\_1 X2)\wedge((v1\_funct\_2 X2 X0 X1)\wedge(m1\_subset\_1 X2 (k1\_zfmisc\_1 \\ & (k2\_zfmisc\_1 X0 X1))))))\wedge(m1\_subset\_1 X3 X0))\Rightarrow(m1\_subset\_1 ( \\ & k3\_funct\_2 X0 X1 X2 X3) X1) \end{aligned} \quad (10)$$

Assume the following.

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0)\wedge(l3\_algstr\_0 X0))\Rightarrow(\forall X1. \\ & ((\neg v2\_struct\_0 X1)\wedge(l1\_vectsp\_1 X1 X0))\Rightarrow(\forall X2.((\neg v2\_struct\_0 \\ & X2)\wedge(l1\_vectsp\_1 X2 X0))\Rightarrow(\forall X3.((v1\_funct\_1 X3)\wedge((v1\_funct\_2 \\ & X3 (u1\_struct\_0 X1) (u1\_struct\_0 X0))\wedge(m1\_subset\_1 X3 (k1\_zfmisc\_1 \\ & (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X0))))))\Rightarrow(\forall X4. \\ & ((v1\_funct\_1 X4)\wedge((v1\_funct\_2 X4 (u1\_struct\_0 X2) (u1\_struct\_0 \\ & X0))\wedge(m1\_subset\_1 X4 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 \\ & X2) (u1\_struct\_0 X0))))))\Rightarrow(\forall X5.((v1\_funct\_1 X5)\wedge((v1\_funct\_2 \\ & X5 (k2\_zfmisc\_1 (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 \\ & X0))\wedge(m1\_subset\_1 X5 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (k2\_zfmisc\_1 \\ & (u1\_struct\_0 X1) (u1\_struct\_0 X2)) (u1\_struct\_0 X0))))))\Rightarrow((X5 = \\ & k9\_bilinear X0 X1 X2 X3 X4)\Leftrightarrow(\forall X6.(m1\_subset\_1 X6 (u1\_struct\_0 \\ & X1))\Rightarrow(\forall X7.(m1\_subset\_1 X7 (u1\_struct\_0 X2))\Rightarrow(k2\_binop\_1 \\ & (u1\_struct\_0 X1) (u1\_struct\_0 X2) (u1\_struct\_0 X0) X5 X6 X7 = k6\_algstr\_0 \\ & X0 (k3\_funct\_2 (u1\_struct\_0 X1) (u1\_struct\_0 X0) X3 X6) (k3\_funct\_2 \\ & (u1\_struct\_0 X2) (u1\_struct\_0 X0) X4 X7))))))))) \end{aligned} \quad (11)$$

Assume the following.

$$\begin{aligned} & \forall X0.(v1\_xboole\_0 X0)\Rightarrow(\forall X1.((v1\_relat\_1 X1)\wedge(v4\_relat\_1 \\ & X1 X0))\Rightarrow((v1\_xboole\_0 X1)\wedge((v1\_relat\_1 X1)\wedge(v4\_relat\_1 X1 X0)))) \end{aligned} \quad (12)$$

**Theorem 1**

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0)\wedge((v13\_algstr\_0 X0)\wedge((v3\_rlvect\_1 \\ & X0)\wedge((v4\_rlvect\_1 X0)\wedge((v2\_vectsp\_1 X0)\wedge(l6\_algstr\_0 X0))))))\Rightarrow \\ & ((\forall X1.((\neg v2\_struct\_0 X1)\wedge(l1\_vectsp\_1 X1 X0))\Rightarrow(\forall X2. \\ & ((\neg v2\_struct\_0 X2)\wedge(l1\_vectsp\_1 X2 X0))\Rightarrow(\forall X3.((v1\_funct\_1 \\ & X3)\wedge((v1\_funct\_2 X3 (u1\_struct\_0 X2) (u1\_struct\_0 X0))\wedge(m1\_subset\_1 \\ & X3 (k1\_zfmisc\_1 (k2\_zfmisc\_1 (u1\_struct\_0 X2) (u1\_struct\_0 X0))))))\Rightarrow \\ & (\forall X4.(m1\_subset\_1 X4 (u1\_struct\_0 X1))\Rightarrow(\forall X5.(m1\_subset\_1 \\ & X5 (u1\_struct\_0 X2))\Rightarrow(k2\_binop\_1 (u1\_struct\_0 X1) (u1\_struct\_0 \\ & X2) (u1\_struct\_0 X0) (k9\_bilinear X0 X1 X2 (k7\_hahnban1 X0 X1) X3 \\ & X4 X5 = k4\_struct\_0 X0))))))))) \end{aligned}$$