

thm\_2Erich\_\_list\_2EASSOC\_\_APPEND  
(TMSSqgsZX7e6zChHrwq2BoAjs3g9us8NskD)

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**Definition 1** We define  $c\_2Emin\_2E\_3D$  to be  $\lambda A.\lambda x \in A.\lambda y \in A.inj\_o (x = y)$  of type  $\iota \Rightarrow \iota$ .

**Definition 2** We define  $c\_2Ebool\_2E\_2T$  to be  $(ap (ap (c\_2Emin\_2E\_3D (2^2)) (\lambda V0x \in 2.V0x)) (\lambda V1x \in 2.V1x))$

**Definition 3** We define  $c\_2Ebool\_2E\_21$  to be  $\lambda A\_27a : \iota.(\lambda V0P \in (2^{A\_27a}).(ap (ap (c\_2Emin\_2E\_3D (2^{A\_27a})$

**Definition 4** We define  $c\_2Ecombin\_2EASSOC$  to be  $\lambda A\_27a : \iota.\lambda V0f \in ((A\_27a^{A\_27a})^{A\_27a}).(ap (c\_2Ebool$

Let  $ty\_2Elist\_2Elist : \iota \Rightarrow \iota$  be given. Assume the following.

$$\forall A0.nonempty A0 \Rightarrow nonempty (ty\_2Elist\_2Elist A0) \quad (1)$$

Let  $c\_2Elist\_2EAPPEND : \iota \Rightarrow \iota$  be given. Assume the following.

$$\forall A\_27a.nonempty A\_27a \Rightarrow c\_2Elist\_2EAPPEND A\_27a \in (((ty\_2Elist\_2Elist A\_27a)^{(ty\_2Elist\_2Elist A\_27a)})^{(ty\_2Elist\_2Elist A\_27a)}) \quad (2)$$

Assume the following.

$$True \quad (3)$$

Assume the following.

$$\forall A\_27a.nonempty A\_27a \Rightarrow (\forall V0t \in 2.((\forall V1x \in A\_27a.(p V0t)) \Leftrightarrow (p V0t))) \quad (4)$$

Assume the following.

$$\forall A\_27a.nonempty A\_27a \Rightarrow (\forall V0x \in A\_27a.((V0x = V0x) \Leftrightarrow True)) \quad (5)$$

Assume the following.

$$\begin{aligned} & \forall A\_27a.nonempty A\_27a \Rightarrow (\forall V0l1 \in (ty\_2Elist\_2Elist A\_27a).(\forall V1l2 \in (ty\_2Elist\_2Elist A\_27a).(\forall V2l3 \in (ty\_2Elist\_2Elist A\_27a).((ap (ap (c\_2Elist\_2EAPPEND A\_27a) V0l1) (ap (ap (c\_2Elist\_2EAPPEND A\_27a) V1l2) V2l3))) = (ap (ap (c\_2Elist\_2EAPPEND A\_27a) (ap (ap (c\_2Elist\_2EAPPEND A\_27a) V0l1) V1l2)) V2l3)))))) \end{aligned} \quad (6)$$

**Theorem 1**

$\forall A\_27a.nonempty\ A\_27a \Rightarrow (p\ (ap\ (c\_2Ecombin\_2EASSOC\ (ty\_2Elist\_2Elist\ A\_27a))\ (c\_2Elist\_2EAPPEND\ A\_27a)))$