thm_2Estring_2ESTRCAT__EQ__EMPTY (TMGuURK-wJCwtJx6cuh7mJyBEadKbkZuYjTM)

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Let $ty\_2Estring\_2Echar : \iota$ be given. Assume the following.

$$nonempty\ ty\_2Estring\_2Echar \tag{1}$$

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

$$\forall A0.nonempty\ A0 \Rightarrow nonempty\ (ty\_2Elist\_2Elist\ A0) \tag{2}$$

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

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow c\_2Elist\_2EAPPEND\ A\_27a \in (((ty\_2Elist\_2Elist\ A\_27a)^{(ty\_2Elist\_2Elist\ A\_27a)})^{(ty\_2Elist\_2Elist\ A\_27a)}) \tag{3}$$

Let $c\_2Elist\_2ENIL : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow c\_2Elist\_2ENIL\ A\_27a \in (ty\_2Elist\_2Elist\ A\_27a) \tag{4}$$

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_2ET *to be* $(ap\ (ap\ (\mathsf{c\_2Emin\_2E\_3D}\ (2^2))\ (\lambda V0x \in 2.V0x))\ (\lambda V1x \in 2.V$

Definition 3 *We define* c_2Ebool_2E_21 *to be* $\lambda A\_27a : \iota.(\lambda V0P \in (2^{A\_27a}).(ap\ (ap\ (\mathsf{c\_2Emin\_2E\_3D}\ (2^{A\_27}$

Definition 4 *We define* c_2Emin_2E_3D_3D_3E *to be* $\lambda P \in 2.\lambda Q \in 2.inj\_\_o\ (p\ P \Rightarrow p\ Q)$ *of type* ι.

Definition 5 *We define* c_2Ebool_2E_2F_5C *to be* $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap\ (\mathsf{c\_2Ebool\_2E\_21}\ 2)\ (\lambda V2t \in 2$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow ((\forall V0l1 \in (ty\_2Elist\_2Elist\ A\_27a).(\forall V1l2 \in (ty\_2Elist\_2Elist\ A\_27a).(((c\_2Elist\_2ENIL\ A\_27a) = (ap\ (ap\ (c\_2Elist\_2EAPPEND\ A\_27a)\ V0l1)\ V1l2)) \Leftrightarrow ((V0l1 = (c\_2Elist\_2ENIL\ A\_27a)) \wedge (V1l2 = (c\_2Elist\_2ENIL\ A\_27a)))))) \wedge (\forall V2l1 \in (ty\_2Elist\_2Elist\ A\_27a).(\forall V3l2 \in (ty\_2Elist\_2Elist\ A\_27a).(((ap\ (ap\ (c\_2Elist\_2EAPPEND\ A\_27a)\ V2l1)\ V3l2) = (c\_2Elist\_2ENIL\ A\_27a)) \Leftrightarrow ((V2l1 = (c\_2Elist\_2ENIL\ A\_27a)) \wedge (V3l2 = (c\_2Elist\_2ENIL\ A\_27a)))))))) \tag{5}$$

Theorem 1

$$(\forall V0l1 \in (ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar).(\forall V1l2 \in (ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar).(((ap\ (ap\ (c\_2Elist\_2EAPPEND\ ty\_2Estring\_2Echar)\ V0l1)\ V1l2) = (c\_2Elist\_2ENIL\ ty\_2Estring\_2Echar)) \Leftrightarrow ((V0l1 = (c\_2Elist\_2ENIL\ ty\_2Estring\_2Echar)) \wedge (V1l2 = (c\_2Elist\_2ENIL\ ty\_2Estring\_2Echar))))))$$