

thm_2Estring_2ESTRCAT_EQNS (TMQ1YUtu9jcLU4hVdgLzUUsttFHLTh7xRng)

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Let $ty_2Estring_2Echar : \iota$ be given. Assume the following.

$$nonempty\ ty_2Estring_2Echar \tag{1}$$

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 $c_2Ebool_2E_2F$ to be $(ap (c_2Ebool_2E_21 2) (\lambda V0t \in 2.V0t))$.

Definition 5 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 6 We define $c_2Ebool_2E_27E$ to be $(\lambda V0t \in 2.(ap (ap c_2Emin_2E_3D_3D_3E V0t) c_2Ebool_2E_2F$

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 $c_2Elist_2ECONS : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A_27a.nonempty\ A_27a \Rightarrow c_2Elist_2ECONS\ A_27a \in (((ty_2Elist_2Elist\ A_27a)^{(ty_2Elist_2Elist\ A_27a)})^{A_27a}) \tag{3}$$

Let $c_2Elist_2ENIL : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A_27a.nonempty\ A_27a \Rightarrow c_2Elist_2ENIL\ A_27a \in (ty_2Elist_2Elist\ A_27a) \tag{4}$$

Let $c_2Elist_2EAPPEND : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A_27a.nonempty\ A_27a \Rightarrow c_2Elist_2EAPPEND\ A_27a \in (((ty_2Elist_2Elist\ A_27a)^{(ty_2Elist_2Elist\ A_27a)})^{(ty_2Elist_2Elist\ A_27a)}) \tag{5}$$

Definition 7 We define $c_2Ebool_2E_2F_5C$ to be $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap (c_2Ebool_2E_21 2) (\lambda V2t \in 2$

Assume the following.

$$True \tag{6}$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow (\forall V0x \in A_27a.((V0x = V0x) \Leftrightarrow True)) \tag{7}$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow (\forall V0x \in A_27a.(\forall V1y \in A_27a.((V0x = V1y) \Leftrightarrow (V1y = V0x)))) \tag{8}$$

Assume the following.

$$(\forall V0t \in 2.(((True \Leftrightarrow (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \Leftrightarrow True) \Leftrightarrow (p V0t)) \wedge (((False \Leftrightarrow (p V0t)) \Leftrightarrow (\neg (p V0t))) \wedge (((p V0t) \Leftrightarrow False) \Leftrightarrow (\neg (p V0t)))))) \tag{9}$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow ((\forall V0l \in (ty_2Elist_2Elist A_27a).((ap (ap (c_2Elist_2EAPPEND A_27a) (c_2Elist_2ENIL A_27a)) V0l) = V0l)) \wedge (\forall V1l1 \in (ty_2Elist_2Elist A_27a).(\forall V2l2 \in (ty_2Elist_2Elist A_27a).(\forall V3h \in A_27a.((ap (ap (c_2Elist_2EAPPEND A_27a) (ap (ap (c_2Elist_2ECONS A_27a) V3h) V1l1)) V2l2) = (ap (ap (c_2Elist_2ECONS A_27a) V3h) (ap (ap (c_2Elist_2EAPPEND A_27a) V1l1) V2l2)))))))))) \tag{10}$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow (\forall V0l \in (ty_2Elist_2Elist A_27a).((ap (ap (c_2Elist_2EAPPEND A_27a) V0l) (c_2Elist_2ENIL A_27a)) = V0l)) \tag{11}$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow (\forall V0l1 \in (ty_2Elist_2Elist A_27a).(\forall V1l2 \in (ty_2Elist_2Elist A_27a).(\forall V2l3 \in (ty_2Elist_2Elist A_27a).((ap (ap (c_2Elist_2EAPPEND A_27a) V0l1) (ap (ap (c_2Elist_2EAPPEND A_27a) V1l2) V2l3)) = (ap (ap (c_2Elist_2EAPPEND A_27a) (ap (ap (c_2Elist_2EAPPEND A_27a) V0l1) V1l2)) V2l3)))))) \tag{12}$$

Assume the following.

$$\begin{aligned}
& \forall A.27a.nonempty\ A.27a \Rightarrow ((\forall V0l1 \in (ty_2Elist_2Elist \\
& \quad A.27a).(\forall V1l2 \in (ty_2Elist_2Elist\ A.27a).(\forall V2l3 \in \\
& \quad (ty_2Elist_2Elist\ A.27a).(((ap\ (ap\ (c.2Elist_2EAPPEND\ A.27a) \\
V0l1)\ V1l2) = (ap\ (ap\ (c.2Elist_2EAPPEND\ A.27a)\ V0l1)\ V2l3)) \Leftrightarrow (V1l2 = \\
& \quad V2l3)))))) \wedge (\forall V3l1 \in (ty_2Elist_2Elist\ A.27a).(\forall V4l2 \in \\
& \quad (ty_2Elist_2Elist\ A.27a).(\forall V5l3 \in (ty_2Elist_2Elist\ A.27a). \\
& \quad (((ap\ (ap\ (c.2Elist_2EAPPEND\ A.27a)\ V4l2)\ V3l1) = (ap\ (ap\ (c.2Elist_2EAPPEND \\
& \quad A.27a)\ V5l3)\ V3l1)) \Leftrightarrow (V4l2 = V5l3))))))
\end{aligned} \tag{13}$$

Theorem 1

$$\begin{aligned}
& (\forall V0s \in (ty_2Elist_2Elist\ ty_2Estring_2Echar).(\forall V1c \in \\
& \quad ty_2Estring_2Echar.(\forall V2s1 \in (ty_2Elist_2Elist\ ty_2Estring_2Echar). \\
& \quad (\forall V3s2 \in (ty_2Elist_2Elist\ ty_2Estring_2Echar).(((ap \\
& \quad (ap\ (c.2Elist_2EAPPEND\ ty_2Estring_2Echar)\ (c.2Elist_2ENIL \\
& \quad ty_2Estring_2Echar))\ V0s) = V0s) \wedge (((ap\ (ap\ (c.2Elist_2EAPPEND \\
& \quad ty_2Estring_2Echar)\ V0s)\ (c.2Elist_2ENIL\ ty_2Estring_2Echar)) = \\
& \quad V0s) \wedge ((ap\ (ap\ (c.2Elist_2EAPPEND\ ty_2Estring_2Echar)\ (ap\ (ap \\
& \quad (c.2Elist_2ECONS\ ty_2Estring_2Echar)\ V1c)\ V2s1))\ V3s2) = (ap\ (\\
& \quad ap\ (c.2Elist_2ECONS\ ty_2Estring_2Echar)\ V1c)\ (ap\ (ap\ (c.2Elist_2EAPPEND \\
& \quad ty_2Estring_2Echar)\ V2s1)\ V3s2))))))))))
\end{aligned}$$