thm_2Estring_2EEXPLODE__EQ__THM (TMNHfT8rzVySJdGzdESyGz7RKQcHYa7v6pf)

October 26, 2020

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* $(ap\ (ap\ (\text{c\_2Emin\_2E\_3D}\ (2^2))\ (\lambda V0x \in 2.V0x))\ (\lambda V1x \in 2.V1$

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

Definition 4 *We define* c_2Ebool_2EF *to be* $(ap\ (\text{c\_2Ebool\_2E\_21}\ 2)\ (\lambda V0t \in 2.V0t))$.

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_2Emin_2E_40 *to be* $\lambda A.\lambda P \in 2^A.$**if** $(\exists x \in A.p\ (ap\ P\ x))$ **then** $(the\ (\lambda x.x \in A \wedge p$ *of type* $\iota \Rightarrow \iota$.

Definition 7 *We define* c_2Ebool_2E_3F *to be* $\lambda A\_27a : \iota.(\lambda V0P \in (2^{A\_27a}).(ap\ V0P\ (ap\ (\text{c\_2Emin\_2E\_40}\ A$

Definition 8 *We define* c_2Ebool_2E_5C_2F *to be* $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap\ (\text{c\_2Ebool\_2E\_21}\ 2)\ (\lambda V2t \in 2$

Definition 9 *We define* c_2Ebool_2E_7E *to be* $(\lambda V0t \in 2.(ap\ (ap\ \text{c\_2Emin\_2E\_3D\_3D\_3E}\ V0t)\ \text{c\_2Ebool\_2EF}$

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

$$\forall A0.nonempty\ A0 \Rightarrow nonempty\ (ty\_2Elist\_2Elist\ A0) \tag{1}$$

Let $c\_2Elist\_2ECONS : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow c\_2Elist\_2ECONS\ A\_27a \in (((ty\_2Elist\_2Elist\ A\_27a)^{(ty\_2Elist\_2Elist\ A\_27a)})^{A\_27a}) \tag{2}$$

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

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow c\_2Elist\_2ENIL\ A\_27a \in (ty\_2Elist\_2Elist\ A\_27a) \tag{3}$$

Definition 10 *We define* c_2Ebool_2E_2F_5C *to be* $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap$ (c_2Ebool_2E_21 2) $(\lambda V2t \in$

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

$$nonempty\ ty\_2Estring\_2Echar \tag{4}$$

Let $c\_2Estring\_2EIMPLODE : \iota$ be given. Assume the following.

$$c\_2Estring\_2EIMPLODE \in ((ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar)^{(ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar)}) \tag{5}$$

Let $c\_2Estring\_2EEXPLODE : \iota$ be given. Assume the following.

$$c\_2Estring\_2EEXPLODE \in ((ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar)^{(ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar)}) \tag{6}$$

Assume the following.

$$True \tag{7}$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(((p\ V0t1) \Rightarrow (p\ V1t2)) \Rightarrow (((p\ V1t2) \Rightarrow (p\ V0t1)) \Rightarrow ((p\ V0t1) \Leftrightarrow (p\ V1t2)))))) \tag{8}$$

Assume the following.

$$(\forall V0t \in 2.(False \Rightarrow (p\ V0t))) \tag{9}$$

Assume the following.

$$(\forall V0t \in 2.(((True \wedge (p\ V0t)) \Leftrightarrow (p\ V0t)) \wedge ((((p\ V0t) \wedge True) \Leftrightarrow (p\ V0t)) \wedge (((False \wedge (p\ V0t)) \Leftrightarrow False) \wedge ((((p\ V0t) \wedge False) \Leftrightarrow False) \wedge (((p\ V0t) \wedge (p\ V0t)) \Leftrightarrow (p\ V0t))))))) \tag{10}$$

Assume the following.

$$(\forall V0t \in 2.(((True \Rightarrow (p\ V0t)) \Leftrightarrow (p\ V0t)) \wedge ((((p\ V0t) \Rightarrow True) \Leftrightarrow True) \wedge (((False \Rightarrow (p\ V0t)) \Leftrightarrow True) \wedge ((((p\ V0t) \Rightarrow (p\ V0t)) \Leftrightarrow True) \wedge (((p\ V0t) \Rightarrow False) \Leftrightarrow (\neg (p\ V0t)))))))) \tag{11}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow (\forall V0x \in A\_27a.((V0x = V0x) \Leftrightarrow True)) \tag{12}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow (\forall V0x \in A\_27a.(\forall V1y \in A\_27a.((V0x = V1y) \Leftrightarrow (V1y = V0x)))) \tag{13}$$

Assume the following.

$$(\forall V0t \in 2.(((True \Leftrightarrow (p\ V0t)) \Leftrightarrow (p\ V0t)) \wedge ((((p\ V0t) \Leftrightarrow True) \Leftrightarrow (p\ V0t)) \wedge (((False \Leftrightarrow (p\ V0t)) \Leftrightarrow (\neg (p\ V0t))) \wedge (((p\ V0t) \Leftrightarrow False) \Leftrightarrow (\neg (p\ V0t))))))) \tag{14}$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(\forall V2t3 \in 2.(((p\ V0t1)\Rightarrow ((p\ V1t2)\Rightarrow(p\ V2t3)))\Leftrightarrow(((p\ V0t1)\wedge(p\ V1t2))\Rightarrow(p\ V2t3)))))) \tag{15}$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(((p\ V0t1)\Leftrightarrow(p\ V1t2))\Leftrightarrow(((p\ V0t1)\Rightarrow(p\ V1t2))\wedge((p\ V1t2)\Rightarrow(p\ V0t1)))))) \tag{16}$$

Assume the following.

$$(\forall V0x \in 2.(\forall V1x\_27 \in 2.(\forall V2y \in 2.(\forall V3y\_27 \in 2.((((p\ V0x)\Leftrightarrow(p\ V1x\_27))\wedge((p\ V1x\_27)\Rightarrow((p\ V2y)\Leftrightarrow(p\ V3y\_27))))\Rightarrow (((p\ V0x)\Rightarrow(p\ V2y))\Leftrightarrow((p\ V1x\_27)\Rightarrow(p\ V3y\_27)))))))) \tag{17}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a\Rightarrow(\forall V0l \in (ty\_2Elist\_2Elist\ A\_27a).((V0l = (c\_2Elist\_2ENIL\ A\_27a))\vee(\exists V1h \in A\_27a.(\exists V2t \in (ty\_2Elist\_2Elist\ A\_27a).(V0l = (ap\ (ap\ (c\_2Elist\_2ECONS\ A\_27a)\ V1h)\ V2t)))))) \tag{18}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a\Rightarrow(\forall V0a0 \in A\_27a.(\forall V1a1 \in (ty\_2Elist\_2Elist\ A\_27a).(\forall V2a0\_27 \in A\_27a.(\forall V3a1\_27 \in (ty\_2Elist\_2Elist\ A\_27a).(((ap\ (ap\ (c\_2Elist\_2ECONS\ A\_27a)\ V0a0)\ V1a1) = (ap\ (ap\ (c\_2Elist\_2ECONS\ A\_27a)\ V2a0\_27)\ V3a1\_27))\Leftrightarrow((V0a0 = V2a0\_27)\wedge(V1a1 = V3a1\_27))))))) \tag{19}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a\Rightarrow(\forall V0a1 \in (ty\_2Elist\_2Elist\ A\_27a).(\forall V1a0 \in A\_27a.(\neg((c\_2Elist\_2ENIL\ A\_27a) = (ap\ (ap\ (c\_2Elist\_2ECONS\ A\_27a)\ V1a0)\ V0a1))))) \tag{20}$$

Assume the following.

$$(((ap\ c\_2Estring\_2EEXPLODE\ (c\_2Elist\_2ENIL\ ty\_2Estring\_2Echar)) = (c\_2Elist\_2ENIL\ ty\_2Estring\_2Echar))\wedge(\forall V0c \in ty\_2Estring\_2Echar. (\forall V1s \in (ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar).((ap\ c\_2Estring\_2EEXPLODE\ (ap\ (ap\ (c\_2Elist\_2ECONS\ ty\_2Estring\_2Echar)\ V0c)\ V1s)) = (ap\ (ap\ (c\_2Elist\_2ECONS\ ty\_2Estring\_2Echar)\ V0c)\ (ap\ c\_2Estring\_2EEXPLODE\ V1s)))))) \tag{21}$$

Assume the following.

$$(\forall V0s \in (ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar).((ap\ c\_2Estring\_2EIMPLODE\ (ap\ c\_2Estring\_2EEXPLODE\ V0s)) = V0s)) \tag{22}$$

Assume the following.

$$(\forall V0cs \in (ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar).((ap\ c\_2Estring\_2EEXPLODE\ (ap\ c\_2Estring\_2EIMPLODE\ V0cs)) = V0cs)) \tag{23}$$

Theorem 1

$$(\forall V0s \in (ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar).(\forall V1h \in ty\_2Estring\_2Echar.(\forall V2t \in (ty\_2Elist\_2Elist\ ty\_2Estring\_2Echar).((((ap\ (ap\ (c\_2Elist\_2ECONS\ ty\_2Estring\_2Echar)\ V1h)\ V2t) = (ap\ c\_2Estring\_2EEXPLODE\ V0s)) \Leftrightarrow (V0s = (ap\ (ap\ (c\_2Elist\_2ECONS\ ty\_2Estring\_2Echar)\ V1h)\ (ap\ c\_2Estring\_2EIMPLODE\ V2t)))) \wedge (((ap\ c\_2Estring\_2EEXPLODE\ V0s) = (ap\ (ap\ (c\_2Elist\_2ECONS\ ty\_2Estring\_2Echar)\ V1h)\ V2t)) \Leftrightarrow (V0s = (ap\ (ap\ (c\_2Elist\_2ECONS\ ty\_2Estring\_2Echar)\ V1h)\ (ap\ c\_2Estring\_2EIMPLODE\ V2t))))))))$$