

thm_2Elist_2ETL
(TMdJBFB26jmZK5AeXdPyzEitbgTfn2sWW8c)

October 26, 2020

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

$$\forall A.27a.nonempty\ A.27a \Rightarrow c_2Elist_2ECONS\ A.27a \in (((ty_2Elist_2Elist\ A.27a)^{(ty_2Elist_2Elist\ A.27a)})^{A.27a}) \quad (2)$$

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 $(ap\ (ap\ (c_2Emin_2E_3D\ (2^2))\ (\lambda V0x \in 2.V0x))\ (\lambda V1x \in 2.V1x))$

Definition 3 We define $c_2Ebool_2E_21$ to be $\lambda A.27a : \iota.(\lambda V0P \in (2^{A.27a}).(ap\ (ap\ (c_2Emin_2E_3D\ (2^{A.27a}))\ (\lambda V1Q \in 2.V1Q))\ (\lambda V2R \in 2.V2R)))$

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

$$\forall A.27a.nonempty\ A.27a \Rightarrow c_2Elist_2ENIL\ A.27a \in (ty_2Elist_2Elist\ A.27a) \quad (3)$$

Let $c_2Elist_2ETL : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A.27a.nonempty\ A.27a \Rightarrow c_2Elist_2ETL\ A.27a \in ((ty_2Elist_2Elist\ A.27a)^{(ty_2Elist_2Elist\ A.27a)}) \quad (4)$$

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 $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap\ (c_2Ebool_2E_21\ 2)\ (\lambda V2t \in 2.V2t)))$

Assume the following.

$$\forall A.27a.nonempty\ A.27a \Rightarrow (((ap\ (c_2Elist_2ETL\ A.27a)\ (c_2Elist_2ENIL\ A.27a)) = (c_2Elist_2ENIL\ A.27a)) \wedge (\forall V0h \in A.27a.(\forall V1t \in (ty_2Elist_2Elist\ A.27a).((ap\ (c_2Elist_2ETL\ A.27a)\ (ap\ (ap\ (c_2Elist_2ECONS\ A.27a)\ V0h)\ V1t)) = V1t)))) \quad (5)$$

Theorem 1

$$\forall A_{27a}. \text{nonempty } A_{27a} \Rightarrow (\forall V_0 h \in A_{27a}. (\forall V_1 t \in (ty_2Elist_2Elist\ A_{27a}). ((ap\ (c_2Elist_2ETL\ A_{27a})\ (ap\ (ap\ (c_2Elist_2ECONS\ A_{27a})\ V_0 h)\ V_1 t)) = V_1 t)))$$