

thm_2Epatricia__casts_2EREVERSE__11
(TMJ9LNQYWnSNSfcfP5mUZAXRdYq2LHb8wwa)

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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 $c_2Ebool_2E_2F$ 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 $c_2Ebool_2E_2F_5C$ to be $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap (c_2Ebool_2E_21 2) (\lambda V2t \in 2.V2t))$

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.

$$\forall A_27a.nonempty A_27a \Rightarrow c_2Elist_2ECONS A_27a \in (((ty_2Elist_2Elist A_27a)(ty_2Elist_2Elist A_27a))A_27a) \quad (2)$$

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

$$\forall A_27a.nonempty A_27a \Rightarrow c_2Elist_2ENIL A_27a \in (ty_2Elist_2Elist A_27a) \quad (3)$$

Definition 7 We define $c_2Ebool_2E_2E$ to be $(\lambda V0t \in 2.(ap (ap c_2Emin_2E_3D_3D_3E V0t) c_2Ebool_2E_2F$

Let $c_2Elist_2EREVERSE : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow c_2Elist_2EREVERSE A_27a \in ((ty_2Elist_2Elist A_27a)(ty_2Elist_2Elist A_27a)) \quad (4)$$

Assume the following.

$$True \quad (5)$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(((p \ V0t1) \Rightarrow (p \ V1t2)) \Rightarrow (((p \ V1t2) \Rightarrow (p \ V0t1)) \Rightarrow ((p \ V0t1) \Leftrightarrow (p \ V1t2)))))) \quad (6)$$

Assume the following.

$$(\forall V0t \in 2.(False \Rightarrow (p \ V0t))) \quad (7)$$

Assume the following.

$$((\forall V0t \in 2.((\neg(\neg(p \ V0t))) \Leftrightarrow (p \ V0t))) \wedge (((\neg True) \Leftrightarrow False) \wedge ((\neg False) \Leftrightarrow True))) \quad (8)$$

Assume the following.

$$\forall A_27a.nonempty \ A_27a \Rightarrow (\forall V0x \in A_27a.((V0x = V0x) \Leftrightarrow True)) \quad (9)$$

Assume the following.

$$\forall A_27a.nonempty \ A_27a \Rightarrow (\forall V0x \in A_27a.(\forall V1y \in A_27a.((V0x = V1y) \Leftrightarrow (V1y = V0x)))) \quad (10)$$

Assume the following.

$$(\forall V0t \in 2.(((True \Leftrightarrow (p \ V0t)) \Leftrightarrow (p \ V0t)) \wedge (((p \ V0t) \Leftrightarrow True) \Leftrightarrow (p \ V0t)) \wedge (((False \Leftrightarrow (p \ V0t)) \Leftrightarrow (\neg(p \ V0t))) \wedge (((p \ V0t) \Leftrightarrow False) \Leftrightarrow (\neg(p \ V0t)))))) \quad (11)$$

Assume the following.

$$\forall A_27a.nonempty \ A_27a \Rightarrow (\forall V0P \in (2^{(ty_2Elist_2Elist \ A_27a)}).(((p \ (ap \ V0P \ (c_2Elist_2ENIL \ A_27a))) \wedge (\forall V1t \in (ty_2Elist_2Elist \ A_27a).((p \ (ap \ V0P \ V1t)) \Rightarrow (\forall V2h \in A_27a.(p \ (ap \ V0P \ (ap \ (c_2Elist_2ECONS \ A_27a \ V2h) \ V1t)))))) \Rightarrow (\forall V3l \in (ty_2Elist_2Elist \ A_27a).(p \ (ap \ V0P \ V3l)))))) \quad (12)$$

Assume the following.

$$\forall A_27a.nonempty \ A_27a \Rightarrow (\forall V0a0 \in A_27a.(\forall V1a1 \in (ty_2Elist_2Elist \ A_27a).(\forall V2a0_27 \in A_27a.(\forall V3a1_27 \in (ty_2Elist_2Elist \ A_27a).(((ap \ (ap \ (c_2Elist_2ECONS \ A_27a) \ V0a0) \ V1a1) = (ap \ (ap \ (c_2Elist_2ECONS \ A_27a) \ V2a0_27) \ V3a1_27)) \Leftrightarrow ((V0a0 = V2a0_27) \wedge (V1a1 = V3a1_27)))))) \quad (13)$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0a1 \in (ty_2Elist_2Elist \\ & A_27a).(\forall V1a0 \in A_27a.(\neg((c_2Elist_2ENIL\ A_27a) = (ap\ (\\ & ap\ (c_2Elist_2ECONS\ A_27a)\ V1a0)\ V0a1)))))) \end{aligned} \quad (14)$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0l1 \in (ty_2Elist_2Elist \\ & A_27a).(\forall V1l2 \in (ty_2Elist_2Elist\ A_27a).(((ap\ (c_2Elist_2EREVERSE \\ & A_27a)\ V0l1) = (ap\ (c_2Elist_2EREVERSE\ A_27a)\ V1l2)) \Leftrightarrow (V0l1 = V1l2)))) \end{aligned} \quad (15)$$

Theorem 1

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0l1 \in (ty_2Elist_2Elist \\ & A_27a).(\forall V1l2 \in (ty_2Elist_2Elist\ A_27a).(((ap\ (c_2Elist_2EREVERSE \\ & A_27a)\ V0l1) = (ap\ (c_2Elist_2EREVERSE\ A_27a)\ V1l2)) \Leftrightarrow (V0l1 = V1l2)))) \end{aligned}$$