

thm_2Equotient__list_2ELIST__MAP__I
(TMKM7oZ7Woap4bZfgUbgaViMpdqRzqBqAzQ)

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Definition 1 We define `c_2Emin_2E_3D` to be $\lambda A. \lambda x \in A. \lambda y \in A. \text{inj_o } (x = y)$ of type $\iota \Rightarrow \iota$.

Definition 2 We define `c_2Ebool_2ET` to be $(\text{ap } (\text{ap } (\text{c_2Emin_2E_3D } (2^2))) (\lambda V 0x \in 2. V 0x)) (\lambda V 1x \in 2. V 1x)$

Definition 3 We define `c_2Ecombin_2EK` to be $\lambda A. \lambda 27a : \iota. \lambda A. \lambda 27b : \iota. (\lambda V 0x \in A. 27a. (\lambda V 1y \in A. 27b. V 0x))$

Definition 4 We define `c_2Ecombin_2ES` to be $\lambda A. \lambda 27a : \iota. \lambda A. \lambda 27b : \iota. \lambda A. \lambda 27c : \iota. (\lambda V 0f \in ((A. 27c^{A. 27b})^{A. 27a}))$

Definition 5 We define `c_2Ecombin_2EI` to be $\lambda A. \lambda 27a : \iota. (\text{ap } (\text{ap } (\text{c_2Ecombin_2ES } A. 27a (A. 27a^{A. 27a}))) A. 27a)$

Let `ty_2Elist_2Elist` : $\iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A 0. \text{nonempty } A 0 \Rightarrow \text{nonempty } (\text{ty_2Elist_2Elist } A 0) \quad (1)$$

Let `c_2Elist_2EMAP` : $\iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A. 27a. \text{nonempty } A. 27a \Rightarrow \forall A. 27b. \text{nonempty } A. 27b \Rightarrow \text{c_2Elist_2EMAP } A. 27a A. 27b \in (((\text{ty_2Elist_2Elist } A. 27b)^{(\text{ty_2Elist_2Elist } A. 27a)})^{(A. 27b^{A. 27a})}) \quad (2)$$

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

$$\forall A. 27a. \text{nonempty } A. 27a \Rightarrow \text{c_2Elist_2ECONS } A. 27a \in (((\text{ty_2Elist_2Elist } A. 27a)^{(\text{ty_2Elist_2Elist } A. 27a)})^{A. 27a}) \quad (3)$$

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

$$\forall A. 27a. \text{nonempty } A. 27a \Rightarrow \text{c_2Elist_2ENIL } A. 27a \in (\text{ty_2Elist_2Elist } A. 27a) \quad (4)$$

Definition 6 We define `c_2Emin_2E_3D_3D_3E` to be $\lambda P \in 2. \lambda Q \in 2. \text{inj_o } (p P \Rightarrow p Q)$ of type ι .

Definition 7 We define `c_2Ebool_2E_21` to be $\lambda A. \lambda 27a : \iota. (\lambda V 0P \in (2^{A. 27a}). (\text{ap } (\text{ap } (\text{c_2Emin_2E_3D } (2^{A. 27a}))))$

Definition 8 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.

$$True \tag{5}$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow (\forall V0t \in 2.((\forall V1x \in A_27a.(p V0t) \Leftrightarrow (p V0t))) \tag{6}$$

Assume the following.

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

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow \forall A_27b.nonempty A_27b \Rightarrow (\forall V0f \in (A_27b^{A_27a}).(\forall V1g \in (A_27b^{A_27a}).((V0f = V1g) \Leftrightarrow (\forall V2x \in A_27a.((ap V0f V2x) = (ap V1g V2x)))))) \tag{8}$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow (\forall V0x \in A_27a.((ap (c_2Ecombin_2EI A_27a) V0x) = V0x)) \tag{9}$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty A_27a \Rightarrow \forall A_27b.nonempty A_27b \Rightarrow (\\ & (\forall V0f \in (A_27b^{A_27a}).((ap (ap (c_2Elist_2EMAP A_27a A_27b) V0f) (c_2Elist_2ENIL A_27a)) = (c_2Elist_2ENIL A_27b))) \wedge (\forall V1f \in \\ & (A_27b^{A_27a}).(\forall V2h \in A_27a.(\forall V3t \in (ty_2Elist_2Elist A_27a).((ap (ap (c_2Elist_2EMAP A_27a A_27b) V1f) (ap (ap (c_2Elist_2ECONS A_27a) V2h) V3t)) = (ap (ap (c_2Elist_2ECONS A_27b) (ap V1f V2h)) (ap (ap (c_2Elist_2EMAP A_27a A_27b) V1f) V3t)))))) \tag{10} \end{aligned}$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty A_27a \Rightarrow (\forall V0P \in (2^{(ty_2Elist_2Elist A_27a)}). \\ & (((p (ap V0P (c_2Elist_2ENIL A_27a))) \wedge (\forall V1t \in (ty_2Elist_2Elist A_27a).((p (ap V0P V1t) \Rightarrow (\forall V2h \in A_27a.(p (ap V0P (ap (ap (c_2Elist_2ECONS A_27a) V2h) V1t)))))) \Rightarrow (\forall V3l \in (ty_2Elist_2Elist A_27a).(p (ap V0P V3l)))))) \tag{11} \end{aligned}$$

Theorem 1

$$\forall A_27a.nonempty A_27a \Rightarrow ((ap (c_2Elist_2EMAP A_27a A_27a) (c_2Ecombin_2EI A_27a)) = (c_2Ecombin_2EI (ty_2Elist_2Elist A_27a)))$$