

thm_2EreaderMonad_2EJOIN__BIND (TMRsdn1gS2ox8v4Pfocb6BKoTvbMSHtHw4v)

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

Definition 3 We define `c_2Ecombin_2EK` to be $\lambda A_27a : \iota. \lambda A_27b : \iota. (\lambda V0x \in A_27a. (\lambda V1y \in A_27b. V0x))$

Definition 4 We define `c_2Ecombin_2ES` to be $\lambda A_27a : \iota. \lambda A_27b : \iota. \lambda A_27c : \iota. (\lambda V0f \in ((A_27c^{A_27b})^{A_27a}))$

Definition 5 We define `c_2Ecombin_2EI` to be $\lambda A_27a : \iota. (ap (ap (c_2Ecombin_2ES A_27a (A_27a^{A_27a})) A_27a))$

Definition 6 We define `c_2Ebool_2E_21` to be $\lambda A_27a : \iota. (\lambda V0P \in (2^{A_27a}). (ap (ap (c_2Emin_2E_3D (2^{A_27a})) P)))$

Definition 7 We define `c_2EreaderMonad_2EBIND` to be $\lambda A_27a : \iota. \lambda A_27b : \iota. \lambda A_27s : \iota. \lambda V0M \in (A_27a^{A_27b})$

Definition 8 We define `c_2EreaderMonad_2EJOIN` to be $\lambda A_27a : \iota. \lambda A_27s : \iota. \lambda V0MM \in ((A_27a^{A_27s})^{A_27a})$

Assume the following.

$$True \tag{1}$$

Assume the following.

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

Assume the following.

$$\forall A_27a. nonempty A_27a \Rightarrow (\forall V0x \in A_27a. ((V0x = V0x) \Leftrightarrow True)) \tag{3}$$

Assume the following.

$$\forall A_27a. nonempty A_27a \Rightarrow \forall A_27b. nonempty A_27b \Rightarrow (\forall V0f \in (A_27b^{A_27a}). (\forall V1g \in (A_27b^{A_27a}). ((V0f = V1g) \Leftrightarrow (\forall V2x \in A_27a. ((ap V0f V2x) = (ap V1g V2x)))))) \tag{4}$$

Assume the following.

$$\forall A_27a. nonempty A_27a \Rightarrow (\forall V0x \in A_27a. ((ap (c_2Ecombin_2EI A_27a) V0x) = V0x)) \tag{5}$$

Theorem 1

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow \forall A_27b.nonempty\ A_27b \Rightarrow (\\ & \forall VOM \in ((A_27b^{A_27a})^{A_27a}).((ap\ (c_2EreaderMonad_2EJOIN \\ & A_27b\ A_27a)\ VOM) = (ap\ (ap\ (c_2EreaderMonad_2EBIND\ (A_27b^{A_27a}) \\ & A_27b\ A_27a)\ VOM)\ (c_2Ecombin_2EI\ (A_27b^{A_27a})))))) \end{aligned}$$