thm_2Ebinary__ieee_2Efloat__fn__updates (TMQxQgE36AzowR7ph95j2evkzRpT1niXQ7m)

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Definition 1 *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 2 *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 3 *We define* c_2Ebool_2ET *to be* $(ap\ (ap\ (\mathsf{c\_2Emin\_2E\_3D}\ (2^2))\ (\lambda V0x \in 2.V0x))\ (\lambda V1x \in 2.V1$

Definition 4 *We define* c_2Ebool_2E_21 *to be* $\lambda A\_27a : \iota.(\lambda V0P \in (2^{A\_27a}).(ap\ (ap\ (\mathsf{c\_2Emin\_2E\_3D}\ (2^{A\_27$

Definition 5 *We define* c_2Ebool_2E_2F_5C *to be* $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap\ (\mathsf{c\_2Ebool\_2E\_21}\ 2)\ (\lambda V2t \in 2$

Let $ty\_2Ebinary\_\_ieee\_2Efloat : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A0.nonempty\ A0 \Rightarrow \forall A1.nonempty\ A1 \Rightarrow nonempty\ (ty\_2Ebinary\_\_ieee\_2Efloat\ A0\ A1) \tag{1}$$

Let $ty\_2Eone\_2Eone : \iota$ be given. Assume the following.

$$nonempty\ ty\_2Eone\_2Eone \tag{2}$$

Let $ty\_2Efcp\_2Ecart : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A0.nonempty\ A0 \Rightarrow \forall A1.nonempty\ A1 \Rightarrow nonempty\ (ty\_2Efcp\_2Ecart\ A0\ A1) \tag{3}$$

Let $c\_2Ebinary\_\_ieee\_2Efloat\_\_Sign\_\_fupd : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27t.nonempty\ A\_27t \Rightarrow \forall A\_27w.nonempty\ A\_27w \Rightarrow c\_2Ebinary\_\_ieee\_$$
$$A\_27t\ A\_27w \in (((ty\_2Ebinary\_\_ieee\_2Efloat\ A\_27t\ A\_27w)^{(ty\_2Ebinary\_\_ieee\_2Efloat\ A\_27t\ A\_27w)})^{((ty\_2Efc} \tag{4}$$

Let $c\_2Ebinary\_\_ieee\_2Efloat\_\_Exponent\_\_fupd : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27t.nonempty\ A\_27t \Rightarrow \forall A\_27w.nonempty\ A\_27w \Rightarrow \forall A\_27x.$$
$$nonempty\ A\_27x \Rightarrow c\_2Ebinary\_\_ieee\_2Efloat\_\_Exponent\_\_fupd\ A\_2$$
$$A\_27w\ A\_27x \in (((ty\_2Ebinary\_\_ieee\_2Efloat\ A\_27t\ A\_27x)^{(ty\_2Ebinary\_\_ieee\_2Efloat\ A\_27t\ A\_27w)})^{((ty\_2Efc} \tag{5}$$

Let $c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27t.nonempty\ A\_27t \Rightarrow \forall A\_27w.nonempty\ A\_27w \Rightarrow c\_2Ebinary\_\_ieee\_2Erecord$$
$$A\_27t\ A\_27w \in ((((ty\_2Ebinary\_\_ieee\_2Efloat\ A\_27t\ A\_27w)^{(ty\_2Efcp\_2Ecart\ 2\ A\_27t)})^{(ty\_2Efcp\_2Ecart\ 2\ A\_2} \tag{6}$$

Let $c\_2Ebinary\_\_ieee\_2Efloat\_\_Significand\_\_fupd : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27t.nonempty\ A\_27t \Rightarrow \forall A\_27u.nonempty\ A\_27u \Rightarrow \forall A\_27$$
$$nonempty\ A\_27w \Rightarrow c\_2Ebinary\_\_ieee\_2Efloat\_\_Significand\_\_f$$
$$A\_27t\ A\_27u\ A\_27w \in (((ty\_2Ebinary\_\_ieee\_2Efloat\ A\_27u\ A\_27w)^{(ty\_2Ebinary\_\_ieee\_2Efloat\ A\_27t\ A\_27w)})^{(} \tag{7}$$

Assume the following.

$$\forall A\_27t.nonempty\ A\_27t \Rightarrow \forall A\_27w.nonempty\ A\_27w \Rightarrow (\forall V0f \in ((ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone)^{(ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone)}).(\forall V1c \in (ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone).(\forall V2c0 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27w).(\forall V3c1 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27t).((ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Efloat\_\_Sign\_\_fupd\ A\_27t\ A\_27w)\ V0f)\ (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27w)\ V1c)\ V2c0)\ V3c1)) = (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27w)\ (ap\ V0f\ V1c))\ V2c0)\ V3c1)))))) \tag{8}$$

Assume the following.

$$\forall A\_27t.nonempty\ A\_27t \Rightarrow \forall A\_27w.nonempty\ A\_27w \Rightarrow \forall A\_27x.$$
$$nonempty\ A\_27x \Rightarrow (\forall V0f \in ((ty\_2Efcp\_2Ecart\ 2\ A\_27x)^{(ty\_2Efcp\_2Ecart\ 2\ A\_27w)}).(\forall V1c \in (ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone).(\forall V2c0 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27w).(\forall V3c1 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27t).((ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Efloat\_\_Exponent\_\_fupd\ A\_27t\ A\_27w\ A\_27x)\ V0f)\ (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27w)\ V1c)\ V2c0)\ V3c1)) = (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27x)\ V1c)\ (ap\ V0f\ V2c0))\ V3c1)))))) \tag{9}$$

Assume the following.

$$\forall A\_27t.nonempty\ A\_27t \Rightarrow \forall A\_27u.nonempty\ A\_27u \Rightarrow \forall A\_27w.\ nonempty\ A\_27w \Rightarrow (\forall V0f \in ((ty\_2Efcp\_2Ecart\ 2\ A\_27u)^{(ty\_2Efcp\_2Ecart\ 2\ A\_27t)}).\ (\forall V1c \in (ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone).(\forall V2c0 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27w).(\forall V3c1 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27t).((ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Efloat\_\_Significand\_\_fupd\ A\_27t\ A\_27u\ A\_27w)\ V0f)\ (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27w)\ V1c)\ V2c0)\ V3c1)) = (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27u\ A\_27w)\ V1c)\ V2c0)\ (ap\ V0f\ V3c1)))))))) \tag{10}$$

Theorem 1

$$\forall A\_27t.nonempty\ A\_27t \Rightarrow \forall A\_27u.nonempty\ A\_27u \Rightarrow \forall A\_27w.\ nonempty\ A\_27w \Rightarrow \forall A\_27x.nonempty\ A\_27x \Rightarrow ((\forall V0f \in ((ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone)^{(ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone)}).\ (\forall V1c \in (ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone).(\forall V2c0 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27w).(\forall V3c1 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27t).((ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Efloat\_\_Sign\_\_fupd\ A\_27t\ A\_27w)\ V0f)\ (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27w)\ V1c)\ V2c0)\ V3c1)) = (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27w)\ (ap\ V0f\ V1c))\ V2c0)\ V3c1))))))\wedge((\forall V4f \in ((ty\_2Efcp\_2Ecart\ 2\ A\_27x)^{(ty\_2Efcp\_2Ecart\ 2\ A\_27w)}).(\forall V5c \in (ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone).(\forall V6c0 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27w).(\forall V7c1 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27t).((ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Efloat\_\_Exponent\_\_fupd\ A\_27t\ A\_27w\ A\_27x)\ V4f)\ (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27w)\ V5c)\ V6c0)\ V7c1)) = (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27x)\ V5c)\ (ap\ V4f\ V6c0))\ V7c1))))))\wedge(\forall V8f \in ((ty\_2Efcp\_2Ecart\ 2\ A\_27u)^{(ty\_2Efcp\_2Ecart\ 2\ A\_27t)}).(\forall V9c \in (ty\_2Efcp\_2Ecart\ 2\ ty\_2Eone\_2Eone).(\forall V10c0 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27w).(\forall V11c1 \in (ty\_2Efcp\_2Ecart\ 2\ A\_27t).((ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Efloat\_\_Significand\_\_fupd\ A\_27t\ A\_27u\ A\_27w)\ V8f)\ (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27t\ A\_27w)\ V9c)\ V10c0)\ V11c1)) = (ap\ (ap\ (ap\ (c\_2Ebinary\_\_ieee\_2Erecordtype\_2Efloat\ A\_27u\ A\_27w)\ V9c)\ V10c0)\ (ap\ V8f\ V11c1)))))))))$$