thm_2Ecardinal_2EINFINITE__cardleq__INSERT (TMdPKB98ikmmKdmVAR9zWBTmMdHLZY6o1Gb)

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* $(ap \ (ap \ (\mathsf{c\_2Emin\_2E\_3D} \ (2^2)) \ (\lambda V0x \in 2.V0x)) \ (\lambda V1x \in 2.V1$

Definition 3 *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 4 *We define* c_2Ebool_2EF *to be* $(ap \ (\mathsf{c\_2Ebool\_2E\_21} \ 2) \ (\lambda V0t \in 2.V0t))$.

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* $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap \ (\mathsf{c\_2Ebool\_2E\_21} \ 2) \ (\lambda V2t \in 2$

Definition 7 *We define* c_2Emin_2E_40 *to be* $\lambda A.\lambda P \in 2^A.\mathbf{if} \ (\exists x \in A.p \ (ap \ P \ x)) \ \mathbf{then} \ (the \ (\lambda x.x \in A \wedge p$
of type $\iota \Rightarrow \iota$.

Definition 8 *We define* c_2Ebool_2ECOND *to be* $\lambda A\_27a : \iota.(\lambda V0t \in 2.(\lambda V1t1 \in A\_27a.(\lambda V2t2 \in A\_27a.(ap$

Definition 9 *We define* c_2Ebool_2EIN *to be* $\lambda A\_27a : \iota.(\lambda V0x \in A\_27a.(\lambda V1f \in (2^{A\_27a}).(ap \ V1f \ V0x)))$

Definition 10 *We define* c_2Epred__set_2EINJ *to be* $\lambda A\_27a : \iota.\lambda A\_27b : \iota.\lambda V0f \in (A\_27b^{A\_27a}).\lambda V1s \in (2^A$

Definition 11 *We define* c_2Ebool_2E_3F *to be* $\lambda A\_27a : \iota.(\lambda V0P \in (2^{A\_27a}).(ap \ V0P \ (ap \ (\mathsf{c\_2Emin\_2E\_40}$

Definition 12 *We define* c_2Ecardinal_2Ecardleq *to be* $\lambda A\_27a : \iota.\lambda A\_27b : \iota.\lambda V0s1 \in (2^{A\_27a}).\lambda V1s2 \in (2^A$

Definition 13 *We define* c_2Ebool_2E_5C_2F *to be* $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap \ (\mathsf{c\_2Ebool\_2E\_21} \ 2) \ (\lambda V2t \in 2$

Let $ty\_2Epair\_2Eprod : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A0.nonempty \ A0 \Rightarrow \forall A1.nonempty \ A1 \Rightarrow nonempty \ (ty\_2Epair\_2Eprod \\ A0 \ A1)$$

$$(1)$$

Let $c\_2Epair\_2EABS\_\_prod : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27a.nonempty \ A\_27a \Rightarrow \forall A\_27b.nonempty \ A\_27b \Rightarrow c\_2Epair\_2EABS\_\_prod \\ A\_27a \ A\_27b \in ((ty\_2Epair\_2Eprod \ A\_27a \ A\_27b)^{((2^{A\_27b})^{A\_27a})})$$

$$(2)$$

1

Definition 14 *We define* c_2Epair_2E_2C *to be* $\lambda A\_27a : \iota.\lambda A\_27b : \iota.\lambda V0x \in A\_27a.\lambda V1y \in A\_27b.(ap\ (c\_2...$

Let $c\_2Epred\_\_set\_2EGSPEC : \iota{\Rightarrow}\iota{\Rightarrow}\iota$ be given. Assume the following.

$$\forall A\_27a.nonempty\ A\_27a{\Rightarrow}\forall A\_27b.nonempty\ A\_27b{\Rightarrow}c\_2Epred\_\_set\_2EGSPEC$$
$$A\_27a\ A\_27b \in ((2^{A\_27a})^{((ty\_2Epair\_2Eprod\ A\_27a\ 2)^{A\_27b})}) \tag{3}$$

Definition 15 *We define* c_2Epred__set_2EINSERT *to be* $\lambda A\_27a : \iota.\lambda V0x \in A\_27a.\lambda V1s \in (2^{A\_27a}).(ap\ (c\_...$

Definition 16 *We define* c_2Epred__set_2EEMPTY *to be* $\lambda A\_27a : \iota.(\lambda V0x \in A\_27a.c_2Ebool_2EF).$

Definition 17 *We define* c_2Epred__set_2EFINITE *to be* $\lambda A\_27a : \iota.\lambda V0s \in (2^{A\_27a}).(ap\ ($c_2Ebool_2E_21$\ (2...$

Let $ty\_2Enum\_2Enum : \iota$ be given. Assume the following.

$$nonempty\ ty\_2Enum\_2Enum \tag{4}$$

Let $c\_2Earithmetic\_2EEVEN : \iota$ be given. Assume the following.

$$c\_2Earithmetic\_2EEVEN \in (2^{ty\_2Enum\_2Enum}) \tag{5}$$

Let $c\_2Earithmetic\_2EODD : \iota$ be given. Assume the following.

$$c\_2Earithmetic\_2EODD \in (2^{ty\_2Enum\_2Enum}) \tag{6}$$

Definition 18 *We define* c_2Ebool_2E_7E *to be* $(\lambda V0t \in 2.(ap\ (ap\ $c_2Emin_2E_3D_3D_3E$\ V0t)\ $c_2Ebool_2E...

Let $c\_2Enum\_2EREP\_\_num : \iota$ be given. Assume the following.

$$c\_2Enum\_2EREP\_\_num \in (omega^{ty\_2Enum\_2Enum}) \tag{7}$$

Let $c\_2Enum\_2ESUC\_\_REP : \iota$ be given. Assume the following.

$$c\_2Enum\_2ESUC\_\_REP \in (omega^{omega}) \tag{8}$$

Let $c\_2Enum\_2EABS\_\_num : \iota$ be given. Assume the following.

$$c\_2Enum\_2EABS\_\_num \in (ty\_2Enum\_2Enum^{omega}) \tag{9}$$

Definition 19 *We define* c_2Enum_2ESUC *to be* $\lambda V0m \in ty\_2Enum\_2Enum.(ap\ c\_2Enum\_2EABS\_\_num...$

Definition 20 *We define* c_2Eprim__rec_2E_3C *to be* $\lambda V0m \in ty\_2Enum\_2Enum.\lambda V1n \in ty\_2Enum\_2Enu...$

Definition 21 *We define* c_2Earithmetic_2E_3E *to be* $\lambda V0m \in ty\_2Enum\_2Enum.\lambda V1n \in ty\_2Enum\_2En...$

Definition 22 *We define* c_2Earithmetic_2E_3E_3D *to be* $\lambda V0m \in ty\_2Enum\_2Enum.\lambda V1n \in ty\_2Enum\_2...$

Let $c\_2Enum\_2EZERO\_\_REP : \iota$ be given. Assume the following.

$$c\_2Enum\_2EZERO\_\_REP \in omega \tag{10}$$

2

Definition 23 *We define* c_2Enum_2E0 *to be* $(ap\ c\_2Enum\_2EABS\_\_num\ c\_2Enum\_2EZERO\_\_REP)$.

Definition 24 *We define* c_2Eprim__rec_2EPRE *to be* $\lambda V0m \in ty\_2Enum\_2Enum.(ap\ (ap\ (ap\ (\text{c\_2Ebool\_2}$

Let $c\_2Earithmetic\_2EEXP : \iota$ be given. Assume the following.

$$c\_2Earithmetic\_2EEXP \in ((ty\_2Enum\_2Enum^{ty\_2Enum\_2Enum})^{ty\_2Enum\_2Enum})$$

(11)

Let $c\_2Earithmetic\_2E\_2D : \iota$ be given. Assume the following.

$$c\_2Earithmetic\_2E\_2D \in ((ty\_2Enum\_2Enum^{ty\_2Enum\_2Enum})^{ty\_2Enum\_2Enum})$$

(12)

Let $c\_2Earithmetic\_2E\_2A : \iota$ be given. Assume the following.

$$c\_2Earithmetic\_2E\_2A \in ((ty\_2Enum\_2Enum^{ty\_2Enum\_2Enum})^{ty\_2Enum\_2Enum})$$

(13)

Definition 25 *We define* c_2Earithmetic_2ENUMERAL *to be* $\lambda V0x \in ty\_2Enum\_2Enum.V0x.$

Definition 26 *We define* c_2Enumeral_2EiiSUC *to be* $\lambda V0n \in ty\_2Enum\_2Enum.(ap\ \text{c\_2Enum\_2ESUC}\ (ap$

Let $c\_2Earithmetic\_2E\_2B : \iota$ be given. Assume the following.

$$c\_2Earithmetic\_2E\_2B \in ((ty\_2Enum\_2Enum^{ty\_2Enum\_2Enum})^{ty\_2Enum\_2Enum})$$

(14)

Definition 27 *We define* c_2Enumeral_2EiZ *to be* $\lambda V0x \in ty\_2Enum\_2Enum.V0x.$

Definition 28 *We define* c_2Earithmetic_2EBIT2 *to be* $\lambda V0n \in ty\_2Enum\_2Enum.(ap\ (ap\ c\_2Earithmetic$

Definition 29 *We define* c_2Earithmetic_2EBIT1 *to be* $\lambda V0n \in ty\_2Enum\_2Enum.(ap\ (ap\ c\_2Earithmetic$

Definition 30 *We define* c_2Earithmetic_2EZERO *to be* c_2Enum_2E0.

Definition 31 *We define* c_2Earithmetic_2E_3C_3D *to be* $\lambda V0m \in ty\_2Enum\_2Enum.\lambda V1n \in ty\_2Enum\_2$

Let $ty\_2Eoption\_2Eoption : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A0.nonempty\ A0 \Rightarrow nonempty\ (ty\_2Eoption\_2Eoption\ A0) \qquad (15)$$

Let $c\_2Eoption\_2Eoption\_\_CASE : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow \forall A\_27b.nonempty\ A\_27b \Rightarrow c\_2Eoption\_2Eoption\_\_CASE$$
$$A\_27a\ A\_27b \in (((A\_27b^{(A\_27b^{A\_27a})})^{A\_27b})^{(ty\_2Eoption\_2Eoption\ A\_27a)})$$

(16)

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

$$nonempty\ ty\_2Eone\_2Eone \qquad (17)$$

Let $ty\_2Esum\_2Esum : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A0.nonempty \ A0 \Rightarrow \forall A1.nonempty \ A1 \Rightarrow nonempty \ (ty\_2Esum\_2Esum$$
$$A0 \ A1)$$

(18)

Let $c\_2Esum\_2EABS\_\_sum : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27a.nonempty \ A\_27a \Rightarrow \forall A\_27b.nonempty \ A\_27b \Rightarrow c\_2Esum\_2EABS\_\_sum$$
$$A\_27a \ A\_27b \in ((ty\_2Esum\_2Esum \ A\_27a \ A\_27b)^{(((2^{A\_27b})^{A\_27a})^2)})$$

(19)

Definition 32 *We define* c_2Esum_2EINL *to be* $\lambda A\_27a : \iota.\lambda A\_27b : \iota.\lambda V0e \in A\_27a.(ap \ (c\_2Esum\_2EABS$

Let $c\_2Eoption\_2Eoption\_\_ABS : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A\_27a.nonempty \ A\_27a \Rightarrow c\_2Eoption\_2Eoption\_\_ABS \ A\_27a \in$$
$$((ty\_2Eoption\_2Eoption \ A\_27a)^{(ty\_2Esum\_2Esum \ A\_27a \ ty\_2Eone\_2Eone)})$$

(20)

Definition 33 *We define* c_2Eoption_2ESOME *to be* $\lambda A\_27a : \iota.\lambda V0x \in A\_27a.(ap \ (c\_2Eoption\_2Eoption\_$

Definition 34 *We define* c_2Eone_2Eone *to be* $(ap \ ($c_2Emin_2E_40 \ ty_2Eone_2Eone$) \ (\lambda V0x \in ty\_2Eone\_2$

Definition 35 *We define* c_2Esum_2EINR *to be* $\lambda A\_27a : \iota.\lambda A\_27b : \iota.\lambda V0e \in A\_27b.(ap \ (c\_2Esum\_2EABS$

Definition 36 *We define* c_2Eoption_2ENONE *to be* $\lambda A\_27a : \iota.(ap \ (c\_2Eoption\_2Eoption\_\_ABS \ A\_27a) \ ($

Definition 37 *We define* c_2Eoption_2Esome *to be* $\lambda A\_27a : \iota.\lambda V0P \in (2^{A\_27a}).(ap \ (ap \ (ap \ ($c_2Ebool_2EC

Definition 38 *We define* c_2Epred__set_2EUNIV *to be* $\lambda A\_27a : \iota.(\lambda V0x \in A\_27a.c_2Ebool_2ET)$.

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$((ap \ (ap \ c\_2Earithmetic\_2E\_2B \ \textsf{c\_2Enum\_2E0}) \ V0m) = V0m) \wedge (((ap \ ($$
$$ap \ c\_2Earithmetic\_2E\_2B \ V0m) \ \textsf{c\_2Enum\_2E0}) = V0m) \wedge (((ap \ (ap \ c\_2Earithmetic\_2E\_2B$$
$$(ap \ \textsf{c\_2Enum\_2ESUC} \ V0m)) \ V1n) = (ap \ \textsf{c\_2Enum\_2ESUC} \ (ap \ (ap \ c\_2Earithmetic\_2E\_2B$$
$$V0m) \ V1n))) \wedge ((ap \ (ap \ c\_2Earithmetic\_2E\_2B \ V0m) \ (ap \ \textsf{c\_2Enum\_2ESUC}$$
$$V1n)) = (ap \ \textsf{c\_2Enum\_2ESUC} \ (ap \ (ap \ c\_2Earithmetic\_2E\_2B \ V0m) \ V1n)))))))))$$

(21)

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$(ap \ (ap \ c\_2Earithmetic\_2E\_2B \ V0m) \ V1n) = (ap \ (ap \ c\_2Earithmetic\_2E\_2B$$
$$V1n) \ V0m))))$$

(22)

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$\forall V2p \in ty\_2Enum\_2Enum.((ap \ (ap \ c\_2Earithmetic\_2E\_2B \ V0m)$$
$$(ap \ (ap \ c\_2Earithmetic\_2E\_2B \ V1n) \ V2p)) = (ap \ (ap \ c\_2Earithmetic\_2E\_2B$$
$$(ap \ (ap \ c\_2Earithmetic\_2E\_2B \ V0m) \ V1n)) \ V2p)))))$$

(23)

4

Assume the following.

$$(\forall V0n \in ty\_2Enum\_2Enum.(p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$\mathsf{c\_2Enum\_2E0})\ V0n))) \tag{24}$$

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$((ap\ (ap\ c\_2Earithmetic\_2E\_2A\ \mathsf{c\_2Enum\_2E0})\ V0m) = \mathsf{c\_2Enum\_2E0}) \wedge$$
$$(((ap\ (ap\ c\_2Earithmetic\_2E\_2A\ V0m)\ \mathsf{c\_2Enum\_2E0}) = \mathsf{c\_2Enum\_2E0}) \wedge$$
$$(((ap\ (ap\ c\_2Earithmetic\_2E\_2A\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$$
$$(ap\ \mathsf{c\_2Earithmetic\_2EBIT1}\ \mathsf{c\_2Earithmetic\_2EZERO})))\ V0m) = V0m) \wedge$$
$$(((ap\ (ap\ c\_2Earithmetic\_2E\_2A\ V0m)\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$$
$$(ap\ \mathsf{c\_2Earithmetic\_2EBIT1}\ \mathsf{c\_2Earithmetic\_2EZERO}))) = V0m) \wedge ($$
$$((ap\ (ap\ c\_2Earithmetic\_2E\_2A\ (ap\ \mathsf{c\_2Enum\_2ESUC}\ V0m))\ V1n) = (ap$$
$$(ap\ c\_2Earithmetic\_2E\_2B\ (ap\ (ap\ c\_2Earithmetic\_2E\_2A\ V0m)\ V1n))$$
$$V1n)) \wedge ((ap\ (ap\ c\_2Earithmetic\_2E\_2A\ V0m)\ (ap\ \mathsf{c\_2Enum\_2ESUC}\ V1n)) =$$
$$(ap\ (ap\ c\_2Earithmetic\_2E\_2B\ V0m)\ (ap\ (ap\ c\_2Earithmetic\_2E\_2A$$
$$V0m)\ V1n)))))))))) \tag{25}$$

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$\forall V2p \in ty\_2Enum\_2Enum.(((p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$V0m)\ V1n)) \wedge (p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}\ V1n)\ V2p))) \Rightarrow (p\ ($$
$$ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}\ V0m)\ V2p)))))) \tag{26}$$

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$(V0m = V1n) \Leftrightarrow ((p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}\ V0m)\ V1n)) \wedge (p\ ($$
$$ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}\ V1n)\ V0m)))))) \tag{27}$$

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$\forall V2p \in ty\_2Enum\_2Enum.((p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$(ap\ (ap\ c\_2Earithmetic\_2E\_2B\ V0m)\ V1n))\ (ap\ (ap\ c\_2Earithmetic\_2E\_2B$$
$$V0m)\ V2p))) \Leftrightarrow (p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}\ V1n)\ V2p)))))) \tag{28}$$

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$(\neg(V0m = V1n)) \Leftrightarrow ((p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}\ (ap\ \mathsf{c\_2Enum\_2ESUC}$$
$$V0m))\ V1n)) \vee (p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}\ (ap\ \mathsf{c\_2Enum\_2ESUC}$$
$$V1n))\ V0m)))))) \tag{29}$$

Assume the following.

$$(\forall V0n \in ty\_2Enum\_2Enum.((ap\ \mathsf{c\_2Enum\_2ESUC}\ V0n) = (ap\ (ap$$
$$c\_2Earithmetic\_2E\_2B\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}$$
$$\mathsf{c\_2Earithmetic\_2EZERO})))\ V0n)))$$

(30)

Assume the following.

$$True \tag{31}$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(((p\ V0t1){\Rightarrow}(p\ V1t2)){\Rightarrow}(((p\ $$
$$V1t2){\Rightarrow}(p\ V0t1)){\Rightarrow}((p\ V0t1){\Leftrightarrow}(p\ V1t2)))))) \tag{32}$$

Assume the following.

$$(\forall V0t \in 2.(False{\Rightarrow}(p\ V0t))) \tag{33}$$

Assume the following.

$$(\forall V0t \in 2.((p\ V0t){\vee}({\neg}(p\ V0t)))) \tag{34}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a{\Rightarrow}(\forall V0t \in 2.((\forall V1x \in $$
$$A\_27a.(p\ V0t)){\Leftrightarrow}(p\ V0t))) \tag{35}$$

Assume the following.

$$(\forall V0t \in 2.(((True{\wedge}(p\ V0t)){\Leftrightarrow}(p\ V0t)){\wedge}((((p\ V0t){\wedge}True){\Leftrightarrow}$$
$$(p\ V0t)){\wedge}(((False{\wedge}(p\ V0t)){\Leftrightarrow}False){\wedge}((((p\ V0t){\wedge}False){\Leftrightarrow}False){\wedge}$$
$$(((p\ V0t){\wedge}(p\ V0t)){\Leftrightarrow}(p\ V0t))))))) \tag{36}$$

Assume the following.

$$(\forall V0t \in 2.(((True{\vee}(p\ V0t)){\Leftrightarrow}True){\wedge}((((p\ V0t){\vee}True){\Leftrightarrow}True){\wedge}$$
$$(((False{\vee}(p\ V0t)){\Leftrightarrow}(p\ V0t)){\wedge}((((p\ V0t){\vee}False){\Leftrightarrow}(p\ V0t)){\wedge}(((p\ V0t){\vee}$$
$$(p\ V0t)){\Leftrightarrow}(p\ V0t)))))))$$

(37)

Assume the following.

$$(\forall V0t \in 2.(((True{\Rightarrow}(p\ V0t)){\Leftrightarrow}(p\ V0t)){\wedge}((((p\ V0t){\Rightarrow}True){\Leftrightarrow}$$
$$True){\wedge}(((False{\Rightarrow}(p\ V0t)){\Leftrightarrow}True){\wedge}((((p\ V0t){\Rightarrow}(p\ V0t)){\Leftrightarrow}True){\wedge}(($$
$$(p\ V0t){\Rightarrow}False){\Leftrightarrow}({\neg}(p\ V0t)))))))) \tag{38}$$

Assume the following.

$$((\forall V0t \in 2.(({\neg}({\neg}(p\ V0t))){\Leftrightarrow}(p\ V0t))){\wedge}((({\neg}True){\Leftrightarrow}False){\wedge}$$
$$(({\neg}False){\Leftrightarrow}True))) \tag{39}$$

6

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow (\forall V0x \in A\_27a.(V0x = V0x)) \tag{40}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow (\forall V0x \in A\_27a.((V0x = V0x) \Leftrightarrow True)) \tag{41}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow (\forall V0x \in A\_27a.(\forall V1y \in A\_27a.((V0x = V1y) \Leftrightarrow (V1y = V0x)))) \tag{42}$$

Assume the following.

$$(\forall V0t \in 2.(((True \Leftrightarrow (p\ V0t)) \Leftrightarrow (p\ V0t)) \wedge ((((p\ V0t) \Leftrightarrow True) \Leftrightarrow (p\ V0t)) \wedge (((False \Leftrightarrow (p\ V0t)) \Leftrightarrow (\neg (p\ V0t))) \wedge (((p\ V0t) \Leftrightarrow False) \Leftrightarrow (\neg (p\ V0t)))))))) \tag{43}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow (\forall V0t1 \in A\_27a.(\forall V1t2 \in A\_27a.(((ap\ (ap\ (ap\ \mathsf{c\_2Ebool\_2ECOND}\ A\_27a)\ \mathsf{c\_2Ebool\_2ET})\ V0t1)\ V1t2) = V0t1) \wedge ((ap\ (ap\ (ap\ \mathsf{c\_2Ebool\_2ECOND}\ A\_27a)\ \mathsf{c\_2Ebool\_2EF})\ V0t1)\ V1t2) = V1t2)))) \tag{44}$$

Assume the following.

$$(\forall V0A \in 2.(\forall V1B \in 2.(\forall V2C \in 2.(((p\ V0A) \vee ((p\ V1B) \vee (p\ V2C))) \Leftrightarrow (((p\ V0A) \vee (p\ V1B)) \vee (p\ V2C)))))) \tag{45}$$

Assume the following.

$$(\forall V0A \in 2.(\forall V1B \in 2.(((\neg ((p\ V0A) \wedge (p\ V1B))) \Leftrightarrow ((\neg (p\ V0A)) \vee (\neg (p\ V1B)))) \wedge ((\neg ((p\ V0A) \vee (p\ V1B))) \Leftrightarrow ((\neg (p\ V0A)) \wedge (\neg (p\ V1B))))))) \tag{46}$$

Assume the following.

$$(\forall V0t \in 2.(((p\ V0t) \Rightarrow False) \Leftrightarrow ((p\ V0t) \Leftrightarrow False))) \tag{47}$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(\forall V2t3 \in 2.(((p\ V0t1) \Rightarrow ((p\ V1t2) \Rightarrow (p\ V2t3))) \Leftrightarrow (((p\ V0t1) \wedge (p\ V1t2)) \Rightarrow (p\ V2t3)))))) \tag{48}$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(((p\ V0t1) \Leftrightarrow (p\ V1t2)) \Leftrightarrow (((p\ V0t1) \Rightarrow (p\ V1t2)) \wedge ((p\ V1t2) \Rightarrow (p\ V0t1)))))) \tag{49}$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(((p\ V0t1) \Leftrightarrow (p\ V1t2)) \Leftrightarrow (((p\ V0t1) \wedge (p\ V1t2)) \vee ((\neg (p\ V0t1)) \wedge (\neg (p\ V1t2))))))) \tag{50}$$

Assume the following.

$$(\forall V0x \in 2.(\forall V1x\_27 \in 2.(\forall V2y \in 2.(\forall V3y\_27 \in 2.((((p\ V0x) \Leftrightarrow (p\ V1x\_27)) \wedge ((p\ V1x\_27) \Rightarrow ((p\ V2y) \Leftrightarrow (p\ V3y\_27)))) \Rightarrow (((p\ V0x) \Rightarrow (p\ V2y)) \Leftrightarrow ((p\ V1x\_27) \Rightarrow (p\ V3y\_27)))))))) \tag{51}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow (\forall V0P \in 2.(\forall V1Q \in 2. \\ (\forall V2x \in A\_27a.(\forall V3x\_27 \in A\_27a.(\forall V4y \in A\_27a. \\ (\forall V5y\_27 \in A\_27a.((((p\ V0P) \Leftrightarrow (p\ V1Q)) \wedge (((p\ V1Q) \Rightarrow (V2x = V3x\_27)) \wedge \\ ((\neg (p\ V1Q)) \Rightarrow (V4y = V5y\_27)))) \Rightarrow ((ap\ (ap\ (ap\ (\mathsf{c\_2Ebool\_2ECOND}\ A\_27a) \\ V0P)\ V2x)\ V4y) = (ap\ (ap\ (ap\ (\mathsf{c\_2Ebool\_2ECOND}\ A\_27a)\ V1Q)\ V3x\_27) \\ V5y\_27)))))))))) \tag{52}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow ((\forall V0t1 \in A\_27a.(\forall V1t2 \in \\ A\_27a.((ap\ (ap\ (ap\ (\mathsf{c\_2Ebool\_2ECOND}\ A\_27a)\ \mathsf{c\_2Ebool\_2ET})\ V0t1) \\ V1t2) = V0t1))) \wedge (\forall V2t1 \in A\_27a.(\forall V3t2 \in A\_27a.((ap \\ (ap\ (ap\ (\mathsf{c\_2Ebool\_2ECOND}\ A\_27a)\ \mathsf{c\_2Ebool\_2EF})\ V2t1)\ V3t2) = V3t2)))) \tag{53}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow (\forall V0A \in (2^{A\_27a}).((\neg (p\ (\\ ap\ (\mathsf{c\_2Epred\_\_set\_2EFINITE}\ A\_27a)\ V0A))) \Leftrightarrow (p\ (ap\ (ap\ (\mathsf{c\_2Ecardinal\_2Ecardleq} \\ ty\_2Enum\_2Enum\ A\_27a)\ (\mathsf{c\_2Epred\_\_set\_2EUNIV}\ ty\_2Enum\_2Enum)) \\ V0A)))) \tag{54}$$

8

Assume the following.

$((\forall V0n \in ty\_2Enum\_2Enum.((ap\ (ap\ c\_2Earithmetic\_2E\_2B$
$\mathsf{c\_2Enum\_2E0})\ V0n) = V0n)) \wedge ((\forall V1n \in ty\_2Enum\_2Enum.((ap$
$(ap\ c\_2Earithmetic\_2E\_2B\ V1n)\ \mathsf{c\_2Enum\_2E0}) = V1n)) \wedge ((\forall V2n \in$
$ty\_2Enum\_2Enum.(\forall V3m \in ty\_2Enum\_2Enum.((ap\ (ap\ c\_2Earithmetic\_2E\_2B$
$(ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V2n))\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$V3m)) = (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Enumeral\_2EiZ}\ (ap$
$(ap\ c\_2Earithmetic\_2E\_2B\ V2n)\ V3m))))))) \wedge ((\forall V4n \in ty\_2Enum\_2Enum.$
$((ap\ (ap\ c\_2Earithmetic\_2E\_2A\ \mathsf{c\_2Enum\_2E0})\ V4n) = \mathsf{c\_2Enum\_2E0})) \wedge$
$((\forall V5n \in ty\_2Enum\_2Enum.((ap\ (ap\ c\_2Earithmetic\_2E\_2A$
$V5n)\ \mathsf{c\_2Enum\_2E0}) = \mathsf{c\_2Enum\_2E0})) \wedge ((\forall V6n \in ty\_2Enum\_2Enum.$
$(\forall V7m \in ty\_2Enum\_2Enum.((ap\ (ap\ c\_2Earithmetic\_2E\_2A\ ($
$ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V6n))\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$V7m)) = (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ (ap\ c\_2Earithmetic\_2E\_2A$
$V6n)\ V7m))))) \wedge ((\forall V8n \in ty\_2Enum\_2Enum.((ap\ (ap\ c\_2Earithmetic\_2E\_2D$
$\mathsf{c\_2Enum\_2E0})\ V8n) = \mathsf{c\_2Enum\_2E0})) \wedge ((\forall V9n \in ty\_2Enum\_2Enum.$
$((ap\ (ap\ c\_2Earithmetic\_2E\_2D\ V9n)\ \mathsf{c\_2Enum\_2E0}) = V9n)) \wedge ((\forall V10n \in$
$ty\_2Enum\_2Enum.(\forall V11m \in ty\_2Enum\_2Enum.((ap\ (ap\ c\_2Earithmetic\_2E\_2D$
$(ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V10n))\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$V11m)) = (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ (ap\ c\_2Earithmetic\_2E\_2D$
$V10n)\ V11m))))) \wedge ((\forall V12n \in ty\_2Enum\_2Enum.((ap\ (ap\ c\_2Earithmetic\_2EEXP$
$\mathsf{c\_2Enum\_2E0})\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}$
$V12n))) = \mathsf{c\_2Enum\_2E0})) \wedge ((\forall V13n \in ty\_2Enum\_2Enum.((ap$
$(ap\ c\_2Earithmetic\_2EEXP\ \mathsf{c\_2Enum\_2E0})\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$(ap\ \mathsf{c\_2Earithmetic\_2EBIT2}\ V13n))) = \mathsf{c\_2Enum\_2E0})) \wedge ((\forall V14n \in$
$ty\_2Enum\_2Enum.((ap\ (ap\ c\_2Earithmetic\_2EEXP\ V14n)\ \mathsf{c\_2Enum\_2E0}) =$
$(ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}\ \mathsf{c\_2Earithmetic\_2EZERO})))) \wedge$
$((\forall V15n \in ty\_2Enum\_2Enum.(\forall V16m \in ty\_2Enum\_2Enum.$
$((ap\ (ap\ c\_2Earithmetic\_2EEXP\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V15n))$
$(ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V16m)) = (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$(ap\ (ap\ c\_2Earithmetic\_2EEXP\ V15n)\ V16m)))))) \wedge (((ap\ \mathsf{c\_2Enum\_2ESUC}$
$\mathsf{c\_2Enum\_2E0}) = (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}$
$\mathsf{c\_2Earithmetic\_2EZERO}))) \wedge ((\forall V17n \in ty\_2Enum\_2Enum.($
$(ap\ \mathsf{c\_2Enum\_2ESUC}\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V17n)) = (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$(ap\ \mathsf{c\_2Enum\_2ESUC}\ V17n)))) \wedge (((ap\ \mathsf{c\_2Eprim\_\_rec\_2EPRE}\ \mathsf{c\_2Enum\_2E0}) =$
$\mathsf{c\_2Enum\_2E0}) \wedge ((\forall V18n \in ty\_2Enum\_2Enum.((ap\ \mathsf{c\_2Eprim\_\_rec\_2EPRE}$
$(ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V18n)) = (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$(ap\ \mathsf{c\_2Eprim\_\_rec\_2EPRE}\ V18n)))) \wedge ((\forall V19n \in ty\_2Enum\_2Enum.$
$(((ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V19n) = \mathsf{c\_2Enum\_2E0}) \Leftrightarrow (V19n = \mathsf{c\_2Earithmetic\_2EZERO}))) \wedge$
$((\forall V20n \in ty\_2Enum\_2Enum.((\mathsf{c\_2Enum\_2E0} = (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$V20n)) \Leftrightarrow (V20n = \mathsf{c\_2Earithmetic\_2EZERO}))) \wedge ((\forall V21n \in ty\_2Enum\_2Enum.$
$(\forall V22m \in ty\_2Enum\_2Enum.(((ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$V21n) = (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V22m)) \Leftrightarrow (V21n = V22m))))) \wedge$
$((\forall V23n \in ty\_2Enum\_2Enum.((p\ (ap\ (ap\ \mathsf{c\_2Eprim\_\_rec\_2E\_3C}$
$V23n)\ \mathsf{c\_2Enum\_2E0})) \Leftrightarrow False)) \wedge ((\forall V24n \in ty\_2Enum\_2Enum.$
$((p\ (ap\ (ap\ \mathsf{c\_2Eprim\_\_rec\_2E\_3C}\ \mathsf{c\_2Enum\_2E0})\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$V24n))) \Leftrightarrow (p\ (ap\ (ap\ \mathsf{c\_2Eprim\_\_rec\_2E\_3C}\ \mathsf{c\_2Earithmetic\_2EZERO})$
$V24n)))) \wedge ((\forall V25n \in ty\_2Enum\_2Enum.(\forall V26m \in ty\_2Enum\_2Enum.$
$((p\ (ap\ (ap\ \mathsf{c\_2Eprim\_\_rec\_2E\_3C}\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$V25n))\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V26m))) \Leftrightarrow (p\ (ap\ (ap\ \mathsf{c\_2Eprim\_\_rec\_2E\_3C}$
$V25n)\ V26m))))) \wedge ((\forall V27n \in ty\_2Enum\_2Enum.((p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3E}$
$\mathsf{c\_2Enum\_2E0})\ V27n)) \Leftrightarrow False)) \wedge ((\forall V28n \in ty\_2Enum\_2Enum.$
$((p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3E}\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$V28n))\ \mathsf{c\_2Enum\_2E0})) \Leftrightarrow (p\ (ap\ (ap\ \mathsf{c\_2Eprim\_\_rec\_2E\_3C}\ \mathsf{c\_2Earithmetic\_2EZERO})$
$V28n)))) \wedge ((\forall V29n \in ty\_2Enum\_2Enum.(\forall V30m \in ty\_2Enum\_2Enum.$
$((p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3E}\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$
$V29n))\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ V30m))) \Leftrightarrow (p\ (ap\ (ap\ \mathsf{c\_2Eprim\_\_rec\_2E\_3C}$
$V30m)\ V29n))))) \wedge ((\forall V31n \in ty\_2Enum\_2Enum.((p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$
$\mathsf{c\_2Enum\_2E0})\ V31n)) \Leftrightarrow True)) \wedge ((\forall V32n \in ty\_2Enum\_2Enum.$
$((p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$

Assume the following.

$$(\forall V0n \in ty\_2Enum\_2Enum.(\forall V1m \in ty\_2Enum\_2Enum.($$
$$((ap \text{ c\_2Enumeral\_2EiZ } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ c\_2Earithmetic\_2EZERO})$$
$$V0n)) = V0n) \wedge (((ap \text{ c\_2Enumeral\_2EiZ } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B$$
$$V0n) \text{ c\_2Earithmetic\_2EZERO})) = V0n) \wedge (((ap \text{ c\_2Enumeral\_2EiZ } ($$
$$ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1 } V0n)) ($$
$$ap \text{ c\_2Earithmetic\_2EBIT1 } V1m))) = (ap \text{ c\_2Earithmetic\_2EBIT2 } ($$
$$ap \text{ c\_2Enumeral\_2EiZ } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } V0n) \text{ } V1m)))) \wedge$$
$$(((ap \text{ c\_2Enumeral\_2EiZ } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1}$$
$$V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2 } V1m))) = (ap \text{ c\_2Earithmetic\_2EBIT1}$$
$$(ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } V0n) \text{ } V1m)))) \wedge ($$
$$((ap \text{ c\_2Enumeral\_2EiZ } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2}$$
$$V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1 } V1m))) = (ap \text{ c\_2Earithmetic\_2EBIT1}$$
$$(ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } V0n) \text{ } V1m)))) \wedge ($$
$$((ap \text{ c\_2Enumeral\_2EiZ } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2}$$
$$V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2 } V1m))) = (ap \text{ c\_2Earithmetic\_2EBIT2}$$
$$(ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } V0n) \text{ } V1m)))) \wedge ($$
$$((ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ c\_2Earithmetic\_2EZERO})$$
$$V0n)) = (ap \text{ c\_2Enum\_2ESUC } V0n)) \wedge (((ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B$$
$$V0n) \text{ c\_2Earithmetic\_2EZERO})) = (ap \text{ c\_2Enum\_2ESUC } V0n)) \wedge (((ap$$
$$\text{c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1}$$
$$V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1 } V1m))) = (ap \text{ c\_2Earithmetic\_2EBIT1}$$
$$(ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } V0n) \text{ } V1m)))) \wedge ($$
$$((ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1}$$
$$V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2 } V1m))) = (ap \text{ c\_2Earithmetic\_2EBIT2}$$
$$(ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } V0n) \text{ } V1m)))) \wedge ($$
$$((ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2}$$
$$V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1 } V1m))) = (ap \text{ c\_2Earithmetic\_2EBIT2}$$
$$(ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } V0n) \text{ } V1m)))) \wedge ($$
$$((ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2}$$
$$V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2 } V1m))) = (ap \text{ c\_2Earithmetic\_2EBIT1}$$
$$(ap \text{ c\_2Enumeral\_2EiiSUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } V0n) \text{ } V1m)))) \wedge$$
$$(((ap \text{ c\_2Enumeral\_2EiiSUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ c\_2Earithmetic\_2EZERO})$$
$$V0n)) = (ap \text{ c\_2Enumeral\_2EiiSUC } V0n)) \wedge (((ap \text{ c\_2Enumeral\_2EiiSUC}$$
$$(ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } V0n) \text{ c\_2Earithmetic\_2EZERO})) = ($$
$$ap \text{ c\_2Enumeral\_2EiiSUC } V0n)) \wedge (((ap \text{ c\_2Enumeral\_2EiiSUC } (ap \text{ } ($$
$$ap \text{ } c\_2Earithmetic\_2E\_2B \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1 } V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1}$$
$$V1m))) = (ap \text{ c\_2Earithmetic\_2EBIT2 } (ap \text{ c\_2Enum\_2ESUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B$$
$$V0n) \text{ } V1m)))) \wedge (((ap \text{ c\_2Enumeral\_2EiiSUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B$$
$$(ap \text{ c\_2Earithmetic\_2EBIT1 } V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2 } V1m))) =$$
$$(ap \text{ c\_2Earithmetic\_2EBIT1 } (ap \text{ c\_2Enumeral\_2EiiSUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B$$
$$V0n) \text{ } V1m)))) \wedge (((ap \text{ c\_2Enumeral\_2EiiSUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B$$
$$(ap \text{ c\_2Earithmetic\_2EBIT2 } V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT1 } V1m))) =$$
$$(ap \text{ c\_2Earithmetic\_2EBIT1 } (ap \text{ c\_2Enumeral\_2EiiSUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B$$
$$V0n) \text{ } V1m)))) \wedge ((ap \text{ c\_2Enumeral\_2EiiSUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B$$
$$(ap \text{ c\_2Earithmetic\_2EBIT2 } V0n)) \text{ } (ap \text{ c\_2Earithmetic\_2EBIT2 } V1m))) =$$
$$(ap \text{ c\_2Earithmetic\_2EBIT2 } (ap \text{ c\_2Enumeral\_2EiiSUC } (ap \text{ } (ap \text{ } c\_2Earithmetic\_2E\_2B$$
$$V0n) \text{ } V1m)))))))))))))))))))))))))$$

$$(56)$$

Assume the following.

$$(\forall V0n \in ty\_2Enum\_2Enum.(\forall V1m \in ty\_2Enum\_2Enum.($$
$$((p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D} \ \mathsf{c\_2Earithmetic\_2EZERO}) \ V0n))\Leftrightarrow$$
$$True)\wedge(((p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D} \ (ap \ \mathsf{c\_2Earithmetic\_2EBIT1}$$
$$V0n)) \ \mathsf{c\_2Earithmetic\_2EZERO}))\Leftrightarrow False)\wedge(((p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$(ap \ \mathsf{c\_2Earithmetic\_2EBIT2} \ V0n)) \ \mathsf{c\_2Earithmetic\_2EZERO}))\Leftrightarrow False)\wedge$$
$$(((p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D} \ (ap \ \mathsf{c\_2Earithmetic\_2EBIT1}$$
$$V0n)) \ (ap \ \mathsf{c\_2Earithmetic\_2EBIT1} \ V1m)))\Leftrightarrow(p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$V0n) \ V1m)))\wedge(((p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D} \ (ap \ \mathsf{c\_2Earithmetic\_2EBIT1}$$
$$V0n)) \ (ap \ \mathsf{c\_2Earithmetic\_2EBIT2} \ V1m)))\Leftrightarrow(p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$V0n) \ V1m)))\wedge(((p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D} \ (ap \ \mathsf{c\_2Earithmetic\_2EBIT2}$$
$$V0n)) \ (ap \ \mathsf{c\_2Earithmetic\_2EBIT1} \ V1m)))\Leftrightarrow(\neg(p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$V1m) \ V0n))))\wedge((p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D} \ (ap \ \mathsf{c\_2Earithmetic\_2EBIT2}$$
$$V0n)) \ (ap \ \mathsf{c\_2Earithmetic\_2EBIT2} \ V1m)))\Leftrightarrow(p \ (ap \ (ap \ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$V0n) \ V1m)))))))))))$$

$$(57)$$

Assume the following.

$$\forall A\_27a.nonempty \ A\_27a\Rightarrow(\forall V0opt \in (ty\_2Eoption\_2Eoption$$
$$A\_27a).((V0opt = (\mathsf{c\_2Eoption\_2ENONE} \ A\_27a))\vee(\exists V1x \in A\_27a.$$
$$(V0opt = (ap \ (\mathsf{c\_2Eoption\_2ESOME} \ A\_27a) \ V1x)))))$$

$$(58)$$

Assume the following.

$$\forall A\_27a.nonempty \ A\_27a\Rightarrow\forall A\_27b.nonempty \ A\_27b\Rightarrow($$
$$(\forall V0v \in A\_27b.(\forall V1f \in (A\_27b^{A\_27a}).((ap \ (ap \ (ap \ (c\_2Eoption\_2Eoption\_CASE$$
$$A\_27a \ A\_27b) \ (\mathsf{c\_2Eoption\_2ENONE} \ A\_27a)) \ V0v) \ V1f) = V0v)))\wedge(\forall V2x \in$$
$$A\_27a.(\forall V3v \in A\_27b.(\forall V4f \in (A\_27b^{A\_27a}).((ap \ (ap$$
$$(ap \ (c\_2Eoption\_2Eoption\_CASE \ A\_27a \ A\_27b) \ (ap \ (\mathsf{c\_2Eoption\_2ESOME}$$
$$A\_27a) \ V2x)) \ V3v) \ V4f) = (ap \ V4f \ V2x))))))$$

$$(59)$$

Assume the following.

$$\forall A\_27a.nonempty \ A\_27a\Rightarrow(\forall V0P \in (2^{A\_27a}).(\forall V1Q \in$$
$$(2^{(ty\_2Eoption\_2Eoption \ A\_27a)}).(((\forall V2x \in A\_27a.((p$$
$$(ap \ V0P \ V2x))\Rightarrow(p \ (ap \ V1Q \ (ap \ (\mathsf{c\_2Eoption\_2ESOME} \ A\_27a) \ V2x)))))\wedge$$
$$((\forall V3x \in A\_27a.(\neg(p \ (ap \ V0P \ V3x))))\Rightarrow(p \ (ap \ V1Q \ (\mathsf{c\_2Eoption\_2ENONE}$$
$$A\_27a)))))\Rightarrow(p \ (ap \ V1Q \ (ap \ (\mathsf{c\_2Eoption\_2Esome} \ A\_27a) \ V0P))))))$$

$$(60)$$

Assume the following.

$$\forall A\_27a.nonempty \ A\_27a\Rightarrow((ap \ (\mathsf{c\_2Eoption\_2Esome} \ A\_27a)$$
$$(\lambda V0x \in A\_27a.\mathsf{c\_2Ebool\_2EF})) = (\mathsf{c\_2Eoption\_2ENONE} \ A\_27a))$$

$$(61)$$

Assume the following.

$$\forall A\_27a.nonempty \ A\_27a\Rightarrow(\forall V0x \in A\_27a.(p \ (ap \ (ap \ (\mathsf{c\_2Ebool\_2EIN}$$
$$A\_27a) \ V0x) \ (\mathsf{c\_2Epred\_set\_2EUNIV} \ A\_27a))))$$

$$(62)$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow \forall A\_27b.nonempty\ A\_27b \Rightarrow ($$
$$\forall V0f \in (A\_27b^{A\_27a}).(\forall V1x \in A\_27a.(\forall V2s \in ($$
$$2^{A\_27a}).(\forall V3t \in (2^{A\_27b}).((p\ (ap\ (ap\ (ap\ (\mathsf{c\_2Epred\_set\_2EINJ}$$
$$A\_27a\ A\_27b)\ V0f)\ (ap\ (ap\ (\mathsf{c\_2Epred\_set\_2EINSERT}\ A\_27a)\ V1x)\ V2s))$$
$$V3t)) \Leftrightarrow ((p\ (ap\ (ap\ (ap\ (\mathsf{c\_2Epred\_set\_2EINJ}\ A\_27a\ A\_27b)\ V0f)\ V2s)$$
$$V3t)) \wedge ((p\ (ap\ (ap\ (\mathsf{c\_2Ebool\_2EIN}\ A\_27b)\ (ap\ V0f\ V1x))\ V3t)) \wedge (\forall V4y \in$$
$$A\_27a.(((p\ (ap\ (ap\ (\mathsf{c\_2Ebool\_2EIN}\ A\_27a)\ V4y)\ V2s)) \wedge ((ap\ V0f\ V1x) =$$
$$(ap\ V0f\ V4y))) \Rightarrow (V1x = V4y))))))))))$$

(63)

Assume the following.

$$(\forall V0t \in 2.((\neg(\neg(p\ V0t))) \Leftrightarrow (p\ V0t)))$$

(64)

Assume the following.

$$(\forall V0A \in 2.((p\ V0A) \Rightarrow ((\neg(p\ V0A)) \Rightarrow False)))$$

(65)

Assume the following.

$$(\forall V0A \in 2.(\forall V1B \in 2.(((\neg((p\ V0A) \vee (p\ V1B))) \Rightarrow False) \Leftrightarrow$$
$$(((p\ V0A) \Rightarrow False) \Rightarrow ((\neg(p\ V1B)) \Rightarrow False)))))$$

(66)

Assume the following.

$$(\forall V0A \in 2.(\forall V1B \in 2.(((\neg((\neg(p\ V0A)) \vee (p\ V1B))) \Rightarrow False) \Leftrightarrow$$
$$((p\ V0A) \Rightarrow ((\neg(p\ V1B)) \Rightarrow False)))))$$

(67)

Assume the following.

$$(\forall V0A \in 2.(((\neg(p\ V0A)) \Rightarrow False) \Rightarrow (((p\ V0A) \Rightarrow False) \Rightarrow False)))$$

(68)

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p\ V0p) \Leftrightarrow ($$
$$(p\ V1q) \Leftrightarrow (p\ V2r))) \Leftrightarrow (((p\ V0p) \vee ((p\ V1q) \vee (p\ V2r))) \wedge (((p\ V0p) \vee ((\neg($$
$$p\ V2r)) \vee (\neg(p\ V1q)))) \wedge (((p\ V1q) \vee ((\neg(p\ V2r)) \vee (\neg(p\ V0p)))) \wedge ((p\ V2r) \vee$$
$$((\neg(p\ V1q)) \vee (\neg(p\ V0p)))))))))))$$

(69)

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p\ V0p) \Leftrightarrow ($$
$$(p\ V1q) \wedge (p\ V2r))) \Leftrightarrow (((p\ V0p) \vee ((\neg(p\ V1q)) \vee (\neg(p\ V2r)))) \wedge (((p\ V1q) \vee$$
$$(\neg(p\ V0p))) \wedge ((p\ V2r) \vee (\neg(p\ V0p))))))))))$$

(70)

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p\ V0p) \Leftrightarrow ($$
$$(p\ V1q) \vee (p\ V2r))) \Leftrightarrow (((p\ V0p) \vee (\neg(p\ V1q))) \wedge (((p\ V0p) \vee (\neg(p\ V2r))) \wedge$$
$$((p\ V1q) \vee ((p\ V2r) \vee (\neg(p\ V0p))))))))))$$

(71)

12

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p \ V0p)\Leftrightarrow($$
$$(p \ V1q)\Rightarrow(p \ V2r)))\Leftrightarrow(((p \ V0p)\lor(p \ V1q))\land(((p \ V0p)\lor(\neg(p \ V2r)))\land((\quad (72)$$
$$\neg(p \ V1q))\lor((p \ V2r)\lor(\neg(p \ V0p)))))))))))$$

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.(((p \ V0p)\Leftrightarrow(\neg(p \ V1q)))\Leftrightarrow(((p \ V0p)\lor$$
$$(p \ V1q))\land((\neg(p \ V1q))\lor(\neg(p \ V0p)))))))) \quad (73)$$

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.((\neg((p \ V0p)\Rightarrow(p \ V1q)))\Rightarrow(p \ V0p)))) \quad (74)$$

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.((\neg((p \ V0p)\Rightarrow(p \ V1q)))\Rightarrow(\neg(p \ V1q))))) \quad (75)$$

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.((\neg((p \ V0p)\lor(p \ V1q)))\Rightarrow(\neg(p \ V0p))))) \quad (76)$$

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.((\neg((p \ V0p)\lor(p \ V1q)))\Rightarrow(\neg(p \ V1q))))) \quad (77)$$

Assume the following.

$$(\forall V0p \in 2.((\neg(\neg(p \ V0p)))\Rightarrow(p \ V0p))) \quad (78)$$

Theorem 1

$$\forall A\_27a.nonempty \ A\_27a\Rightarrow\forall A\_27b.nonempty \ A\_27b\Rightarrow($$
$$\forall V0A \in (2^{A\_27a}).(\forall V1x \in A\_27b.(\forall V2s \in (2^{A\_27b}).$$
$$((\neg(p \ (ap \ (\mathsf{c\_2Epred\_\_set\_2EFINITE} \ A\_27a) \ V0A)))\Rightarrow((p \ (ap \ (ap \ (\mathsf{c\_2Ecardinal\_2Ecardleq}$$
$$A\_27b \ A\_27a) \ (ap \ (ap \ (\mathsf{c\_2Epred\_\_set\_2EINSERT} \ A\_27b) \ V1x) \ V2s))$$
$$V0A))\Leftrightarrow(p \ (ap \ (ap \ (\mathsf{c\_2Ecardinal\_2Ecardleq} \ A\_27b \ A\_27a) \ V2s) \ V0A)))))))$$