# thm_2EOmega__Automata_2EAUTOMATON__TEMP__CLOSURE (TMTxCpor-jhs1ep9xM5U4ZUf4gXeW64UEGWS)

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_2Emin_2E_3D_3D_3E *to be* $\lambda P \in 2.\lambda Q \in 2.inj\_\_o\ (p\ P \Rightarrow p\ Q)$
*of type* $\iota$.

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

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

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

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.

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

$$(2)$$

**Definition 6** *We define* c_2Epair_2E_2C *to be* $\lambda A\_27a : \iota.\lambda A\_27b : \iota.\lambda V0x \in A\_27a.\lambda V1y \in A\_27b.(ap\ (c\_2E$

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

**Definition 8** *We define* c_2Ebool_2E_3F *to be* $\lambda A\_27a : \iota.(\lambda V0P \in (2^{A\_27a}).(ap\ V0P\ (ap\ (\text{c\_2Emin\_2E\_40}\ A$

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

$$nonempty\ ty\_2Enum\_2Enum \tag{3}$$

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

$$c\_2Enum\_2EREP\_\_num \in (omega^{ty\_2Enum\_2Enum}) \tag{4}$$

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

$$c\_2Enum\_2ESUC\_\_REP \in (omega^{omega}) \tag{5}$$

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

$$c\_2Enum\_2EABS\_\_num \in (ty\_2Enum\_2Enum^{omega}) \tag{6}$$

**Definition 9** *We define* c_2Enum_2ESUC *to be* $\lambda V0m \in ty\_2Enum\_2Enum.(ap\ c\_2Enum\_2EABS\_\_num$ (

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

$$c\_2Enum\_2EZERO\_\_REP \in omega \tag{7}$$

**Definition 10** *We define* c_2Enum_2E0 *to be* $(ap\ c\_2Enum\_2EABS\_\_num\ c\_2Enum\_2EZERO\_\_REP).$

**Definition 11** *We define* c_2Ebool_2EF *to be* $(ap\ (c\_2Ebool\_2E\_21\ 2)\ (\lambda V0t \in 2.V0t)).$

**Definition 12** *We define* c_2Ebool_2ECOND *to be* $\lambda A\_27a : \iota.(\lambda V0t \in 2.(\lambda V1t1 \in A\_27a.(\lambda V2t2 \in A\_27a.($

**Definition 13** *We define* c_2Eprim__rec_2EPRE *to be* $\lambda V0m \in ty\_2Enum\_2Enum.(ap\ (ap\ (ap\ (c\_2Ebool\_2E$

**Definition 14** *We define* c_2Ebool_2E_7E *to be* $(\lambda V0t \in 2.(ap\ (ap\ c\_2Emin\_2E\_3D\_3D\_3E\ V0t)\ c\_2Ebool\_2E$

**Definition 15** *We define* c_2Eprim__rec_2E_3C *to be* $\lambda V0m \in ty\_2Enum\_2Enum.\lambda V1n \in ty\_2Enum\_2Enu$

**Definition 16** *We define* c_2EPast__Temporal__Logic_2EPSNEXT *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1t0 \in$

**Definition 17** *We define* c_2Ebool_2E_5C_2F *to be* $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap\ (c\_2Ebool\_2E\_21\ 2)\ (\lambda V2t \in$

**Definition 18** *We define* c_2EPast__Temporal__Logic_2EPNEXT *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1t0 \in$

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

$$c\_2Earithmetic\_2E\_2B \in ((ty\_2Enum\_2Enum^{ty\_2Enum\_2Enum})^{ty\_2Enum\_2Enum}) \tag{8}$$

**Definition 19** *We define* c_2ETemporal__Logic_2EWATCH *to be* $\lambda V0q \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in (2^{ty\_2E}$

**Definition 20** *We define* c_2ETemporal__Logic_2EBEFORE *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in (2^{ty\_2E}$

**Definition 21** *We define* c_2ETemporal__Logic_2EWHEN *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in (2^{ty\_2En}$

**Definition 22** *We define* c_2ETemporal__Logic_2EUNTIL *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in (2^{ty\_2En}$

**Definition 23** *We define* c_2ETemporal__Logic_2ESBEFORE *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in (2^{ty\_...}$

**Definition 24** *We define* c_2ETemporal__Logic_2ESWHEN *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in (2^{ty\_2E...}$

**Definition 25** *We define* c_2ETemporal__Logic_2ESUNTIL *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in (2^{ty\_2E...}$

**Definition 26** *We define* c_2ETemporal__Logic_2EEVENTUAL *to be* $\lambda V0P \in (2^{ty\_2Enum\_2Enum}).\lambda V1t0 \in t_{\flat}...$

**Definition 27** *We define* c_2ETemporal__Logic_2EALWAYS *to be* $\lambda V0P \in (2^{ty\_2Enum\_2Enum}).\lambda V1t0 \in ty\_2...$

**Definition 28** *We define* c_2Earithmetic_2E_3C_3D *to be* $\lambda V0m \in ty\_2Enum\_2Enum.\lambda V1n \in ty\_2Enum\_2...$

**Definition 29** *We define* c_2EPast__Temporal__Logic_2EPSBEFORE *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b$

**Definition 30** *We define* c_2EPast__Temporal__Logic_2EPWHEN *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in ($

**Definition 31** *We define* c_2EPast__Temporal__Logic_2EPSWHEN *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in$

**Definition 32** *We define* c_2EPast__Temporal__Logic_2EPUNTIL *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in ($

**Definition 33** *We define* c_2EPast__Temporal__Logic_2EPSUNTIL *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in$

**Definition 34** *We define* c_2EPast__Temporal__Logic_2EPEVENTUAL *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1$

**Definition 35** *We define* c_2EPast__Temporal__Logic_2EPBEFORE *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1b \in$

**Definition 36** *We define* c_2EPast__Temporal__Logic_2EPALWAYS *to be* $\lambda V0a \in (2^{ty\_2Enum\_2Enum}).\lambda V1t0$

**Definition 37** *We define* c_2ETemporal__Logic_2ENEXT *to be* $\lambda V0P \in (2^{ty\_2Enum\_2Enum}).(\lambda V1t \in ty\_2En...$

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

$$c\_2Earithmetic\_2EEVEN \in (2^{ty\_2Enum\_2Enum}) \tag{9}$$

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

$$c\_2Earithmetic\_2EODD \in (2^{ty\_2Enum\_2Enum}) \tag{10}$$

**Definition 38** *We define* c_2Earithmetic_2E_3E *to be* $\lambda V0m \in ty\_2Enum\_2Enum.\lambda V1n \in ty\_2Enum\_2Enu...$

**Definition 39** *We define* c_2Earithmetic_2E_3E_3D *to be* $\lambda V0m \in ty\_2Enum\_2Enum.\lambda V1n \in ty\_2Enum\_2...$

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

$$c\_2Earithmetic\_2EEXP \in ((ty\_2Enum\_2Enum^{ty\_2Enum\_2Enum})^{ty\_2Enum\_2Enum})$$
$$\tag{11}$$

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

$$c\_2Earithmetic\_2E\_2D \in ((ty\_2Enum\_2Enum^{ty\_2Enum\_2Enum})^{ty\_2Enum\_2Enum})$$
$$\tag{12}$$

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

$$c\_2Earithmetic\_2E\_2A \in ((ty\_2Enum\_2Enum^{ty\_2Enum\_2Enum})^{ty\_2Enum\_2Enum})$$
$$\tag{13}$$

3

**Definition 40** *We define* c_2Enumeral_2EiZ *to be* $\lambda V0x \in ty\_2Enum\_2Enum.V0x.$

**Definition 41** *We define* c_2Earithmetic_2ENUMERAL *to be* $\lambda V0x \in ty\_2Enum\_2Enum.V0x.$

**Definition 42** *We define* c_2Earithmetic_2EBIT2 *to be* $\lambda V0n \in ty\_2Enum\_2Enum.(ap\ (ap\ c\_2Earithmetic$

**Definition 43** *We define* c_2Earithmetic_2EBIT1 *to be* $\lambda V0n \in ty\_2Enum\_2Enum.(ap\ (ap\ c\_2Earithmetic$

**Definition 44** *We define* c_2Earithmetic_2EZERO *to be* c_2Enum_2E0.

Assume the following.

$$(\forall V0a \in (2^{ty\_2Enum\_2Enum}).(\forall V1b \in (2^{ty\_2Enum\_2Enum}).$$

$$(((p\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPNEXT}\ V0a)\ \mathsf{c\_2Enum\_2E0}))\Leftrightarrow$$
$$True)\wedge(((p\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEXT}\ V0a)\ \mathsf{c\_2Enum\_2E0}))\Leftrightarrow$$
$$False)\wedge(((p\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPALWAYS}\ V0a)$$
$$\mathsf{c\_2Enum\_2E0}))\Leftrightarrow(p\ (ap\ V0a\ \mathsf{c\_2Enum\_2E0})))\wedge(((p\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPEVENTUAL}$$
$$V0a)\ \mathsf{c\_2Enum\_2E0}))\Leftrightarrow(p\ (ap\ V0a\ \mathsf{c\_2Enum\_2E0})))\wedge(((p\ (ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNT}$$
$$V0a)\ V1b)\ \mathsf{c\_2Enum\_2E0}))\Leftrightarrow(p\ (ap\ V1b\ \mathsf{c\_2Enum\_2E0})))\wedge(((p\ (ap\ (ap$$
$$(ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSWHEN}\ V0a)\ V1b)\ \mathsf{c\_2Enum\_2E0}))\Leftrightarrow$$
$$((p\ (ap\ V0a\ \mathsf{c\_2Enum\_2E0}))\wedge(p\ (ap\ V1b\ \mathsf{c\_2Enum\_2E0}))))\wedge(((p\ (ap\ ($$
$$ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSBEFORE}\ V0a)\ V1b)\ \mathsf{c\_2Enum\_2E0}))\Leftrightarrow$$
$$((p\ (ap\ V0a\ \mathsf{c\_2Enum\_2E0}))\wedge(\neg(p\ (ap\ V1b\ \mathsf{c\_2Enum\_2E0})))))\wedge(((p\ ($$
$$ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPUNTIL}\ V0a)\ V1b)\ \mathsf{c\_2Enum\_2E0}))\Leftrightarrow$$
$$((p\ (ap\ V0a\ \mathsf{c\_2Enum\_2E0}))\vee(p\ (ap\ V1b\ \mathsf{c\_2Enum\_2E0}))))\wedge(((p\ (ap\ ($$
$$ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPWHEN}\ V0a)\ V1b)\ \mathsf{c\_2Enum\_2E0}))\Leftrightarrow$$
$$((p\ (ap\ V0a\ \mathsf{c\_2Enum\_2E0}))\vee(\neg(p\ (ap\ V1b\ \mathsf{c\_2Enum\_2E0})))))\wedge((p\ (ap$$
$$(ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}\ V0a)\ V1b)\ \mathsf{c\_2Enum\_2E0}))\Leftrightarrow$$
$$(\neg(p\ (ap\ V1b\ \mathsf{c\_2Enum\_2E0}))))))))))))))$$

$$(14)$$

Assume the following.

$$(\forall V0a \in (2^{ty\_2Enum\_2Enum}).(\forall V1b \in (2^{ty\_2Enum\_2Enum}).$$

$(((ap\ \mathsf{c\_2ETemporal\_\_Logic\_2EALWAYS}\ V0a) = (\lambda V2t \in ty\_2Enum\_2Enum.$

$(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ V0a\ V2t))\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ENEXT}$

$(ap\ \mathsf{c\_2ETemporal\_\_Logic\_2EALWAYS}\ V0a))\ V2t))))\wedge(((ap\ \mathsf{c\_2ETemporal\_\_Logic\_2EEVENTUAL}$

$V0a) = (\lambda V3t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap$

$V0a\ V3t))\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ENEXT}\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2EEVENTUAL}$

$V0a))\ V3t))))\wedge(((ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ESUNTIL}\ V0a)\ V1b) =$

$(\lambda V4t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Emin\_2E\_3D\_3D\_3E}\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}$

$(ap\ V1b\ V4t)))\ (ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ V0a\ V4t))\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ENEXT}$

$(ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ESUNTIL}\ V0a)\ V1b))\ V4t)))))\wedge(((($

$ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ESWHEN}\ V0a)\ V1b) = (\lambda V5t \in ty\_2Enum\_2Enum.$

$(ap\ (ap\ (ap\ (\mathsf{c\_2Ebool\_2ECOND}\ 2)\ (ap\ V1b\ V5t))\ (ap\ V0a\ V5t))\ (ap\ (ap$

$\mathsf{c\_2ETemporal\_\_Logic\_2ENEXT}\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ESWHEN}$

$V0a)\ V1b))\ V5t))))\wedge(((ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ESBEFORE}\ V0a)$

$V1b) = (\lambda V6t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap$

$\mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V6t)))\ (ap\ (ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap\ V0a$

$V6t))\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ENEXT}\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ESBEFORE}$

$V0a)\ V1b))\ V6t)))))\wedge(((ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2EUNTIL}\ V0a)$

$V1b) = (\lambda V7t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Emin\_2E\_3D\_3D\_3E}\ ($

$ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V7t)))\ (ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ V0a$

$V7t))\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ENEXT}\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2EUNTIL}$

$V0a)\ V1b))\ V7t)))))\wedge(((ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2EWHEN}\ V0a)$

$V1b) = (\lambda V8t \in ty\_2Enum\_2Enum.(ap\ (ap\ (ap\ (\mathsf{c\_2Ebool\_2ECOND}\ 2)$

$(ap\ V1b\ V8t))\ (ap\ V0a\ V8t))\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ENEXT}\ ($

$ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2EWHEN}\ V0a)\ V1b))\ V8t))))\wedge(((ap\ (ap$

$\mathsf{c\_2ETemporal\_\_Logic\_2EBEFORE}\ V0a)\ V1b) = (\lambda V9t \in ty\_2Enum\_2Enum.$

$(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V9t)))\ (ap$

$(ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap\ V0a\ V9t))\ (ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ENEXT}$

$(ap\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2EBEFORE}\ V0a)\ V1b))\ V9t)))))\wedge((($

$ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPALWAYS}\ V0a) = (\lambda V10t \in ty\_2Enum\_2Enum.$

$(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ V0a\ V10t))\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPNEXT}$

$(ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPALWAYS}\ V0a))\ V10t))))\wedge((($

$ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPEVENTUAL}\ V0a) = (\lambda V11t \in ty\_2Enum\_2Enum.$

$(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap\ V0a\ V11t))\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEXT}$

$(ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPEVENTUAL}\ V0a))\ V11t))))\wedge($

$((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}\ V0a)\ V1b) = (\lambda V12t \in$

$ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap\ V1b\ V12t))\ (ap\ (ap$

$\mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ V0a\ V12t))\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEXT}$

$(ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}\ V0a)\ V1b))\ V12t)))))\wedge$

$(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSWHEN}\ V0a)\ V1b) = (\lambda V13t \in$

$ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}$

$(ap\ V0a\ V13t))\ (ap\ V1b\ V13t)))\ (ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}$

$(ap\ V1b\ V13t)))\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEXT}\ (ap$

$(ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSWHEN}\ V0a)\ V1b))\ V13t)))))\wedge$

$(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSBEFORE}\ V0a)\ V1b) = (\lambda V14t \in$

$ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}$

$(ap\ V1b\ V14t)))\ (ap\ (ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap\ V0a\ V14t))\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEX}$

$(ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSBEFORE}\ V0a)\ V1b))\ V14t)))))\wedge$

$(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPUNTIL}\ V0a)\ V1b) = (\lambda V15t \in$

$ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap\ V1b\ V15t))\ (ap\ (ap$

$\mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ V0a\ V15t))\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPNEXT}$

$(ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPUNTIL}\ V0a)\ V1b))\ V15t)))))\wedge$

$(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPWHEN}\ V0a)\ V1b) = (\lambda V16t \in$

$ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}$

$(ap\ V0a\ V16t))\ (ap\ V1b\ V16t)))\ (ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}$

$(ap\ V1b\ V16t)))\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPNEXT}\ (ap$

$(ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPWHEN}\ V0a)\ V1b))\ V16t)))))\wedge$

$((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}\ V0a)\ V1b) = (\lambda V17t \in$

$ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}$

Assume the following.

$$(\forall V0a \in (2^{ty\_2Enum\_2Enum}).(\forall V1b \in (2^{ty\_2Enum\_2Enum}).$$
$$(((ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPALWAYS}\ V0a) = (\lambda V2t \in ty\_2Enum\_2Enum.$$
$$(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}$$
$$(\lambda V3t \in ty\_2Enum\_2Enum.\mathsf{c\_2Ebool\_2ET}))\ (\lambda V4t \in ty\_2Enum\_2Enum.$$
$$(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V0a\ V4t))))\ V2t))))\wedge(((ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPEVENTUAL}$$
$$V0a) = (\lambda V5t \in ty\_2Enum\_2Enum.(ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}$$
$$(\lambda V6t \in ty\_2Enum\_2Enum.\mathsf{c\_2Ebool\_2ET}))\ V0a)\ V5t)))\wedge(((ap\ ($$
$$ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPUNTIL}\ V0a)\ V1b) = (\lambda V7t \in ty\_2Enum\_2Enum.$$
$$(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}$$
$$(\lambda V8t \in ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V8t))))\ ($$
$$\lambda V9t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}$$
$$(ap\ V0a\ V9t)))\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V9t)))))\ V7t))))\wedge(((ap$$
$$(ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPWHEN}\ V0a)\ V1b) = (\lambda V10t \in$$
$$ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}$$
$$(\lambda V11t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_5C\_2F}\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}$$
$$(ap\ V0a\ V11t)))\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V11t)))))\ (\lambda V12t \in$$
$$ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}$$
$$(ap\ V0a\ V12t)))\ (ap\ V1b\ V12t))))\ V10t))))\wedge(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}$$
$$V0a)\ V1b) = (\lambda V13t \in ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ ($$
$$ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}\ (\lambda V14t \in ty\_2Enum\_2Enum.$$
$$(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V0a\ V14t))))\ V1b)\ V13t))))\wedge(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSWHEN}$$
$$V0a)\ V1b) = (\lambda V15t \in ty\_2Enum\_2Enum.(ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}$$
$$(\lambda V16t \in ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V16t))))$$
$$(\lambda V17t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ V0a\ V17t))$$
$$(ap\ V1b\ V17t))))\ V15t)))\wedge((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSBEFORE}$$
$$V0a)\ V1b) = (\lambda V18t \in ty\_2Enum\_2Enum.(ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}$$
$$(\lambda V19t \in ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V19t))))$$
$$(\lambda V20t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ V0a\ V20t))$$
$$(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V20t)))))\ V18t)))))))))))$$
$$(16)$$

Assume the following.

$$(\forall V0a \in (2^{ty\_2Enum\_2Enum}).(\forall V1b \in (2^{ty\_2Enum\_2Enum}).$$
$$(((ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPALWAYS}\ V0a) = (\lambda V2t \in ty\_2Enum\_2Enum.$$
$$(ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}\ (\lambda V3t \in ty\_2Enum\_2Enum.$$
$$\mathsf{c\_2Ebool\_2EF}))\ (\lambda V4t \in ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}$$
$$(ap\ V0a\ V4t))))\ V2t)))\wedge(((ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPEVENTUAL}$$
$$V0a) = (\lambda V5t \in ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ (ap\ (ap$$
$$\mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}\ (\lambda V6t \in ty\_2Enum\_2Enum.$$
$$\mathsf{c\_2Ebool\_2EF}))\ V0a)\ V5t))))\wedge(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}$$
$$V0a)\ V1b) = (\lambda V7t \in ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ (ap$$
$$(ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}\ (\lambda V8t \in ty\_2Enum\_2Enum.$$
$$(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V0a\ V8t))))\ V1b)\ V7t))))\wedge(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPUNTIL}$$
$$V0a)\ V1b) = (\lambda V9t \in ty\_2Enum\_2Enum.(ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}$$
$$V1b)\ (\lambda V10t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap$$
$$\mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V0a\ V10t)))\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V10t)))))$$
$$V9t)))\wedge(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSWHEN}\ V0a)\ V1b) =$$
$$(\lambda V11t \in ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}$$
$$V1b)\ (\lambda V12t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap$$
$$V0a\ V12t))\ (ap\ V1b\ V12t))))\ V11t))))\wedge(((ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPWHEN}$$
$$V0a)\ V1b) = (\lambda V13t \in ty\_2Enum\_2Enum.(ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}$$
$$(\lambda V14t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap\ V0a\ V14t))$$
$$(ap\ V1b\ V14t))))\ (\lambda V15t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}$$
$$(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V0a\ V15t)))\ (ap\ V1b\ V15t))))\ V13t)))\wedge((ap$$
$$(ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSBEFORE}\ V0a)\ V1b) = (\lambda V16t \in$$
$$ty\_2Enum\_2Enum.(ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ (ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPBEFORE}$$
$$V1b)\ (\lambda V17t \in ty\_2Enum\_2Enum.(ap\ (ap\ \mathsf{c\_2Ebool\_2E\_2F\_5C}\ (ap$$
$$V0a\ V17t))\ (ap\ \mathsf{c\_2Ebool\_2E\_7E}\ (ap\ V1b\ V17t)))))\ V16t)))))))))))))$$

$$(17)$$

Assume the following.

$$((ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}\ \mathsf{c\_2Earithmetic\_2EZERO})) =$$
$$(ap\ \mathsf{c\_2Enum\_2ESUC}\ \mathsf{c\_2Enum\_2E0}))$$

$$(18)$$

Assume the following.

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

$$(19)$$

Assume the following.

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

(20)

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$(p\ (ap\ (ap\ \mathsf{c\_2Eprim\_\_rec\_2E\_3C}\ V0m)\ V1n)){\Leftrightarrow}(p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$(ap\ \mathsf{c\_2Enum\_2ESUC}\ V0m))\ V1n))))))$$

(21)

Assume the following.

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

(22)

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.(\forall V1n \in ty\_2Enum\_2Enum.($$
$$(\neg(p\ (ap\ (ap\ \mathsf{c\_2Eprim\_\_rec\_2E\_3C}\ V0m)\ V1n))){\Leftrightarrow}(p\ (ap\ (ap\ \mathsf{c\_2Earithmetic\_2E\_3C\_3D}$$
$$V1n)\ V0m)))))$$

(23)

Assume the following.

$$(\forall V0m \in ty\_2Enum\_2Enum.((ap\ \mathsf{c\_2Enum\_2ESUC}\ V0m) = (ap\ (ap$$
$$c\_2Earithmetic\_2E\_2B\ V0m)\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}$$
$$\mathsf{c\_2Earithmetic\_2EZERO))))))$$

(24)

Assume the following.

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

(25)

Assume the following.

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

(26)

Assume the following.

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

$$(27)$$

Assume the following.

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

$$(28)$$

Assume the following.

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

$$(29)$$

Assume the following.

$$True \tag{30}$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(((p\ V0t1) \Rightarrow (p\ V1t2)) \Rightarrow (((p$$
$$V1t2) \Rightarrow (p\ V0t1)) \Rightarrow ((p\ V0t1) \Leftrightarrow (p\ V1t2)))))) \tag{31}$$

Assume the following.

$$(\forall V0t \in 2.(False \Rightarrow (p\ V0t))) \tag{32}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow \forall A\_27b.nonempty\ A\_27b \Rightarrow ($$
$$\forall V0t1 \in A\_27a.(\forall V1t2 \in A\_27b.((ap\ (\lambda V2x \in A\_27b.$$
$$V0t1)\ V1t2) = V0t1))) \tag{33}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow (\forall V0t \in 2.((\forall V1x \in$$
$$A\_27a.(p\ V0t)) \Leftrightarrow (p\ V0t))) \tag{34}$$

Assume the following.

$$(\forall V0t \in 2.(((True \wedge (p\ V0t)) \Leftrightarrow (p\ V0t)) \wedge ((((p\ V0t) \wedge True) \Leftrightarrow$$
$$(p\ V0t)) \wedge (((False \wedge (p\ V0t)) \Leftrightarrow False) \wedge ((((p\ V0t) \wedge False) \Leftrightarrow False) \wedge$$
$$(((p\ V0t) \wedge (p\ V0t)) \Leftrightarrow (p\ V0t))))))) \tag{35}$$

Assume the following.

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

9

Assume the following.

$$((\forall V0t \in 2.((\neg(\neg(p\ V0t)))\Leftrightarrow(p\ V0t)))\wedge(((\neg True)\Leftrightarrow False)\wedge\\ ((\neg False)\Leftrightarrow True))) \tag{37}$$

Assume the following.

$$\forall A\_27a.nonempty\ A\_27a\Rightarrow(\forall V0x \in A\_27a.((V0x = V0x)\Leftrightarrow\\ True)) \tag{38}$$

Assume the following.

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

Assume the following.

$$(\forall V0t \in 2.(((p\ V0t)\Rightarrow False)\Leftrightarrow((p\ V0t)\Leftrightarrow False))) \tag{40}$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(\forall V2t3 \in 2.(((p\ V0t1)\Rightarrow\\ ((p\ V1t2)\Rightarrow(p\ V2t3)))\Leftrightarrow(((p\ V0t1)\wedge(p\ V1t2))\Rightarrow(p\ V2t3)))))) \tag{41}$$

Assume the following.

$$(\forall V0P \in (2^{ty\_2Enum\_2Enum}).(((p\ (ap\ V0P\ \mathsf{c\_2Enum\_2E0}))\wedge\\ (\forall V1n \in ty\_2Enum\_2Enum.((p\ (ap\ V0P\ V1n))\Rightarrow(p\ (ap\ V0P\ (ap\ \mathsf{c\_2Enum\_2ESUC}\\ V1n)))))) \Rightarrow(\forall V2n \in ty\_2Enum\_2Enum.(p\ (ap\ V0P\ V2n)))))) \tag{42}$$

Assume the following.

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

Assume the following.

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

(44)

Assume the following.

$$(((ap\ \mathsf{c\_2Eprim\_\_rec\_2EPRE}\ \mathsf{c\_2Enum\_2E0}) = \mathsf{c\_2Enum\_2E0}) \wedge (\forall V0m \in$$
$$ty\_2Enum\_2Enum.((ap\ \mathsf{c\_2Eprim\_\_rec\_2EPRE}\ (ap\ \mathsf{c\_2Enum\_2ESUC}\ V0m)) =$$
$$V0m)))$$

(45)

Assume the following.

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

(46)

Assume the following.

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

(47)

Assume the following.

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

(48)

Assume the following.

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

(49)

Assume the following.

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

(50)

Assume the following.

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

(51)

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p\ V0p)\Leftrightarrow($$
$$(p\ V1q)\wedge(p\ V2r)))\Leftrightarrow((((p\ V0p)\vee((\neg(p\ V1q))\vee(\neg(p\ V2r))))\wedge(((p\ V1q)\vee$$
$$(\neg(p\ V0p)))\wedge((p\ V2r)\vee(\neg(p\ V0p)))))))))) \tag{52}$$

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p\ V0p)\Leftrightarrow($$
$$(p\ V1q)\vee(p\ V2r)))\Leftrightarrow((((p\ V0p)\vee(\neg(p\ V1q)))\wedge(((p\ V0p)\vee(\neg(p\ V2r)))\wedge$$
$$((p\ V1q)\vee((p\ V2r)\vee(\neg(p\ V0p)))))))))) \tag{53}$$

Assume the following.

$$(\forall V0p \in 2.(\forall V1q \in 2.(((p\ V0p)\Leftrightarrow(\neg(p\ V1q)))\Leftrightarrow(((p\ V0p)\vee$$
$$(p\ V1q))\wedge((\neg(p\ V1q))\vee(\neg(p\ V0p))))))) \tag{54}$$

**Theorem 1**

$$\forall A\_27a.nonempty\ A\_27a \Rightarrow \forall A\_27b.nonempty\ A\_27b \Rightarrow ($$
$$\forall V0Phi\_\_I1 \in (2^{(A\_27a^{ty\_2Enum\_2Enum})}).(\forall V1Phi\_\_R1 \in$$
$$(2^{(A\_27a^{ty\_2Enum\_2Enum})}).(\forall V2Phi\_\_I2 \in (2^{(A\_27b^{ty\_2Enum\_2Enum})}).$$
$$(\forall V3Phi\_\_R2 \in (2^{(ty\_2Epair\_2Eprod\ (A\_27b^{ty\_2Enum\_2Enum})\ (A\_27a^{ty\_2Enum\_2Enum}))}).$$
$$(\forall V4Phi\_\_F \in (2^{(ty\_2Epair\_2Eprod\ (A\_27a^{ty\_2Enum\_2Enum})\ (A\_27b^{ty\_2Enum\_2Enum}))}).$$
$$(\forall V5Phi \in (2^{(2^{ty\_2Enum\_2Enum})}).(\forall V6phi \in (2^{ty\_2Enum\_2Enum}).$$
$$(\forall V7a \in (2^{ty\_2Enum\_2Enum}).(\forall V8b \in (2^{ty\_2Enum\_2Enum}).$$
$$(((\exists V9q1 \in (A\_27a^{ty\_2Enum\_2Enum}).((p\ (ap\ V0Phi\_\_I1\ V9q1))\wedge$$
$$((p\ (ap\ V1Phi\_\_R1\ V9q1))\wedge(\exists V10q2 \in (A\_27b^{ty\_2Enum\_2Enum}).$$
$$((p\ (ap\ V2Phi\_\_I2\ V10q2))\wedge((p\ (ap\ V3Phi\_\_R2\ (ap\ (ap\ (\mathsf{c\_2Epair\_2E\_2C}$$
$$(A\_27b^{ty\_2Enum\_2Enum})\ (A\_27a^{ty\_2Enum\_2Enum}))\ V10q2)\ V9q1)))\wedge$$
$$(p\ (ap\ V4Phi\_\_F\ (ap\ (ap\ (\mathsf{c\_2Epair\_2E\_2C}\ (A\_27a^{ty\_2Enum\_2Enum})$$
$$(A\_27b^{ty\_2Enum\_2Enum}))\ V9q1)\ V10q2)))))))))) \Leftrightarrow (\exists V11q1 \in$$
$$(A\_27a^{ty\_2Enum\_2Enum}).(\exists V12q2 \in (A\_27b^{ty\_2Enum\_2Enum}).$$
$$(((p\ (ap\ V0Phi\_\_I1\ V11q1))\wedge(p\ (ap\ V2Phi\_\_I2\ V12q2)))\wedge(((p\ (ap\ V1Phi\_\_R1$$
$$V11q1))\wedge(p\ (ap\ V3Phi\_\_R2\ (ap\ (ap\ (\mathsf{c\_2Epair\_2E\_2C}\ (A\_27b^{ty\_2Enum\_2Enum})$$
$$(A\_27a^{ty\_2Enum\_2Enum}))\ V12q2)\ V11q1))))\wedge(p\ (ap\ V4Phi\_\_F\ (ap\ ($$
$$ap\ (\mathsf{c\_2Epair\_2E\_2C}\ (A\_27a^{ty\_2Enum\_2Enum})\ (A\_27b^{ty\_2Enum\_2Enum}))$$
$$V11q1)\ V12q2))))))))))\wedge(((p\ (ap\ V5Phi\ (ap\ \mathsf{c\_2ETemporal\_\_Logic\_2ENEXT}$$
$$V6phi)))\Leftrightarrow(\exists V13q0 \in (2^{ty\_2Enum\_2Enum}).(\exists V14q1 \in$$
$$(2^{ty\_2Enum\_2Enum}).(True\wedge((\forall V15t \in ty\_2Enum\_2Enum.($$
$$((p\ (ap\ V13q0\ V15t))\Leftrightarrow(p\ (ap\ V6phi\ V15t)))\wedge((p\ (ap\ V14q1\ V15t))\Leftrightarrow($$
$$p\ (ap\ V13q0\ (ap\ (ap\ c\_2Earithmetic\_2E\_2B\ V15t)\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}$$
$$(ap\ \mathsf{c\_2Earithmetic\_2EBIT1}\ \mathsf{c\_2Earithmetic\_2EZERO})))))))))\wedge($$
$$p\ (ap\ V5Phi\ V14q1)))))))\wedge(((p\ (ap\ V5Phi\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPNEXT}$$
$$V6phi)))\Leftrightarrow(\exists V16q \in (2^{ty\_2Enum\_2Enum}).((p\ (ap\ V16q\ \mathsf{c\_2Enum\_2E0}))\wedge$$
$$((\forall V17t \in ty\_2Enum\_2Enum.((p\ (ap\ V16q\ (ap\ (ap\ c\_2Earithmetic\_2E\_2B$$
$$V17t)\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}$$
$$\mathsf{c\_2Earithmetic\_2EZERO}))))) \Leftrightarrow(p\ (ap\ V6phi\ V17t))))\wedge(p\ (ap\ V5Phi$$
$$V16q)))))))\wedge(((p\ (ap\ V5Phi\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEXT}$$
$$V6phi)))\Leftrightarrow(\exists V18q \in (2^{ty\_2Enum\_2Enum}).((\neg(p\ (ap\ V18q\ \mathsf{c\_2Enum\_2E0})))\wedge$$
$$((\forall V19t \in ty\_2Enum\_2Enum.((p\ (ap\ V18q\ (ap\ (ap\ c\_2Earithmetic\_2E\_2B$$
$$V19t)\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}$$
$$\mathsf{c\_2Earithmetic\_2EZERO}))))) \Leftrightarrow(p\ (ap\ V6phi\ V19t))))\wedge(p\ (ap\ V5Phi$$
$$V18q)))))))\wedge(((p\ (ap\ V5Phi\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPNEXT}$$
$$(ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPALWAYS}\ V7a)))) \Leftrightarrow(\exists V20q \in$$
$$(2^{ty\_2Enum\_2Enum}).((p\ (ap\ V20q\ \mathsf{c\_2Enum\_2E0}))\wedge((\forall V21t \in$$
$$ty\_2Enum\_2Enum.((p\ (ap\ V20q\ (ap\ (ap\ c\_2Earithmetic\_2E\_2B\ V21t)$$
$$(ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}\ \mathsf{c\_2Earithmetic\_2EZERO})))))) \Leftrightarrow$$
$$((p\ (ap\ V7a\ V21t))\wedge(p\ (ap\ V20q\ V21t)))))\wedge(p\ (ap\ V5Phi\ V20q)))))))\wedge$$
$$((((p\ (ap\ V5Phi\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEXT}\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPEVENTUA}$$
$$V7a)))) \Leftrightarrow(\exists V22q \in (2^{ty\_2Enum\_2Enum}).((\neg(p\ (ap\ V22q\ \mathsf{c\_2Enum\_2E0})))\wedge$$
$$((\forall V23t \in ty\_2Enum\_2Enum.((p\ (ap\ V22q\ (ap\ (ap\ c\_2Earithmetic\_2E\_2B$$
$$V23t)\ (ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}$$
$$\mathsf{c\_2Earithmetic\_2EZERO}))))) \Leftrightarrow((p\ (ap\ V7a\ V23t))\vee(p\ (ap\ V22q\ V23t))))) \wedge$$
$$(p\ (ap\ V5Phi\ V22q)))))))\wedge(((p\ (ap\ V5Phi\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEXT}$$
$$(ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSUNTIL}\ V7a)\ V8b)))) \Leftrightarrow(\exists V24q \in$$
$$(2^{ty\_2Enum\_2Enum}).((\neg(p\ (ap\ V24q\ \mathsf{c\_2Enum\_2E0})))\wedge((\forall V25t \in$$
$$ty\_2Enum\_2Enum.((p\ (ap\ V24q\ (ap\ (ap\ c\_2Earithmetic\_2E\_2B\ V25t)$$
$$(ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}\ \mathsf{c\_2Earithmetic\_2EZERO}))))) \Leftrightarrow$$
$$((p\ (ap\ V8b\ V25t))\vee((p\ (ap\ V7a\ V25t))\wedge(p\ (ap\ V24q\ V25t))))))\wedge(p\ ($$
$$ap\ V5Phi\ V24q)))))))\wedge(((p\ (ap\ V5Phi\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEXT}$$
$$(ap\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSWHEN}\ V7a)\ V8b)))) \Leftrightarrow(\exists V26q \in$$
$$(2^{ty\_2Enum\_2Enum}).((\neg(p\ (ap\ V26q\ \mathsf{c\_2Enum\_2E0})))\wedge((\forall V27t \in$$
$$ty\_2Enum\_2Enum.((p\ (ap\ V26q\ (ap\ (ap\ c\_2Earithmetic\_2E\_2B\ V27t)$$
$$(ap\ \mathsf{c\_2Earithmetic\_2ENUMERAL}\ (ap\ \mathsf{c\_2Earithmetic\_2EBIT1}\ \mathsf{c\_2Earithmetic\_2EZERO}))))) \Leftrightarrow$$
$$(((p\ (ap\ V7a\ V27t))\wedge(p\ (ap\ V8b\ V27t)))\vee((\neg(p\ (ap\ V8b\ V27t)))\wedge(p\ ($$
$$ap\ V26q\ V27t))))))\wedge(p\ (ap\ V5Phi\ V26q)))))))\wedge(((p\ (ap\ V5Phi\ (ap\ \mathsf{c\_2EPast\_\_Temporal\_\_Logic\_2EPSNEX}$$