

thm_2EPast__Temporal__Logic_2EPNEXT__INWARDS__NORMAL
(TMYRZ-
NAeAyxJs2wWx3GBzX6uLVWq8jZqLr9)

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Let $c_2Enum_2EZERO_REP : \iota$ be given. Assume the following.

$$c_2Enum_2EZERO_REP \in \omega \tag{1}$$

Let $ty_2Enum_2Enum : \iota$ be given. Assume the following.

$$nonempty\ ty_2Enum_2Enum \tag{2}$$

Let $c_2Enum_2EABS_num : \iota$ be given. Assume the following.

$$c_2Enum_2EABS_num \in (ty_2Enum_2Enum^{\omega}) \tag{3}$$

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_2Enum_2E0 to be $(ap\ c_2Enum_2EABS_num\ c_2Enum_2EZERO_REP)$.

Definition 3 We define $c_2EPast_Temporal_Logic_2EInitPoint$ to be $(\lambda V0t \in ty_2Enum_2Enum.(ap\ (ap\ ($

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.

$$c_2Enum_2ESUC_REP \in (\omega^{\omega}) \tag{5}$$

Definition 4 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 5 We define $c_2Ebool_2E_21$ to be $\lambda A.\lambda a : \iota.(\lambda V0P \in (2^{A-27a}).(ap\ (ap\ (c_2Emin_2E_3D\ (2^{A-27a})))$

Definition 6 We define c_2Enum_2ESUC to be $\lambda V0m \in ty_2Enum_2Enum.(ap\ c_2Enum_2EABS_num\ ($

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

Definition 8 We define $c_2Ebool_2E_21$ to be $(ap (c_2Ebool_2E_21) 2) (\lambda V0t \in 2.V0t)$.

Definition 9 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 10 We define $c_2Ebool_2E_2F_5C$ to be $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap (c_2Ebool_2E_21) 2) (\lambda V2t \in 2.V2t)))$

Definition 11 We define $c_2Ebool_2E_COND$ to be $\lambda A.27a : \iota.(\lambda V0t \in 2.(\lambda V1t1 \in A.27a.(\lambda V2t2 \in A.27a.(ap (c_2Ebool_2E_21) 2) (\lambda V3t3 \in 2.V3t3))))$

Definition 12 We define $c_2Eprim_rec_2E_PRE$ to be $\lambda V0m \in ty_2Enum_2Enum.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V1t1 \in 2.V1t1))) (\lambda V2t2 \in 2.V2t2))$

Definition 13 We define $c_2Ebool_2E_7E$ to be $(\lambda V0t \in 2.(ap (ap c_2Emin_2E_3D_3D_3E V0t) c_2Ebool_2E_21))$

Definition 14 We define $c_2Ebool_2E_3F$ to be $\lambda A.27a : \iota.(\lambda V0P \in (2^{A-27a}).(ap V0P (ap (c_2Emin_2E_40) 2) (\lambda V1t1 \in 2.V1t1))))$

Definition 15 We define $c_2Eprim_rec_2E_3C$ to be $\lambda V0m \in ty_2Enum_2Enum.\lambda V1n \in ty_2Enum_2Enum.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 16 We define $c_2EPast_Temporal_Logic_2EPSNEXT$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in 2.V1t0.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 17 We define $c_2Ebool_2E_5C_2F$ to be $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap (c_2Ebool_2E_21) 2) (\lambda V2t \in 2.V2t)))$

Definition 18 We define $c_2EPast_Temporal_Logic_2EPNEXT$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in 2.V1t0.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 19 We define $c_2Earithmetic_2E_3C_3D$ to be $\lambda V0m \in ty_2Enum_2Enum.\lambda V1n \in ty_2Enum_2Enum.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 20 We define $c_2EPast_Temporal_Logic_2EPALWAYS$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in 2.V1t0.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 21 We define $c_2EPast_Temporal_Logic_2EPEVENTUAL$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in 2.V1t0.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 22 We define $c_2EPast_Temporal_Logic_2EPSWHEN$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in 2.V1b.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 23 We define $c_2EPast_Temporal_Logic_2EPSUNTIL$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in 2.V1b.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 24 We define $c_2EPast_Temporal_Logic_2EPSBEFORE$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in 2.V1b.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 25 We define $c_2EPast_Temporal_Logic_2EPWHEN$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in 2.V1b.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 26 We define $c_2EPast_Temporal_Logic_2EPUNTIL$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in 2.V1b.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 27 We define $c_2EPast_Temporal_Logic_2EPBEFORE$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in 2.V1b.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Let $c_2Earithmetic_2E_2B : \iota$ be given. Assume the following.

$$c_2Earithmetic_2E_2B \in ((ty_2Enum_2Enum)^{ty_2Enum_2Enum})^{ty_2Enum_2Enum} \quad (6)$$

Definition 28 We define $c_2ETemporal_Logic_2EALWAYS$ to be $\lambda V0P \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in ty_2Enum_2Enum.(ap (ap (ap (c_2Ebool_2E_21) 2) (\lambda V2t2 \in 2.V2t2))) (\lambda V3t3 \in 2.V3t3))$

Definition 44 We define $c_2Earithmetic_2EBIT1$ to be $\lambda V0n \in ty_2Enum_2Enum.(ap (ap c_2Earithmetic$

Definition 45 We define $c_2Earithmetic_2EZERO$ to be c_2Enum_2E0 .

Assume the following.

$$\begin{aligned} & (\forall V0P \in (2^{ty_2Enum_2Enum}).((ap c_2ETemporal_Logic_2ENEXT \\ & (\lambda V1t \in ty_2Enum_2Enum.(ap c_2Ebool_2E_7E (ap V0P V1t)))))) = \\ & (\lambda V2t \in ty_2Enum_2Enum.(ap c_2Ebool_2E_7E (ap (ap c_2ETemporal_Logic_2ENEXT \\ & V0P) V2t)))) \end{aligned} \tag{12}$$

Assume the following.

$$\begin{aligned} & (\forall V0Q \in (2^{ty_2Enum_2Enum}).(\forall V1P \in (2^{ty_2Enum_2Enum}). \\ & ((ap c_2ETemporal_Logic_2ENEXT (\lambda V2t \in ty_2Enum_2Enum.(\\ & ap (ap c_2Ebool_2E_2F_5C (ap V1P V2t)) (ap V0Q V2t)))))) = (\lambda V3t \in \\ & ty_2Enum_2Enum.(ap (ap c_2Ebool_2E_2F_5C (ap (ap c_2ETemporal_Logic_2ENEXT \\ & V1P) V3t)) (ap (ap c_2ETemporal_Logic_2ENEXT V0Q) V3t)))))) \end{aligned} \tag{13}$$

Assume the following.

$$\begin{aligned} & (\forall V0Q \in (2^{ty_2Enum_2Enum}).(\forall V1P \in (2^{ty_2Enum_2Enum}). \\ & ((ap c_2ETemporal_Logic_2ENEXT (\lambda V2t \in ty_2Enum_2Enum.(\\ & ap (ap c_2Ebool_2E_5C_2F (ap V1P V2t)) (ap V0Q V2t)))))) = (\lambda V3t \in \\ & ty_2Enum_2Enum.(ap (ap c_2Ebool_2E_5C_2F (ap (ap c_2ETemporal_Logic_2ENEXT \\ & V1P) V3t)) (ap (ap c_2ETemporal_Logic_2ENEXT V0Q) V3t)))))) \end{aligned} \tag{14}$$

Assume the following.

$$\begin{aligned} & (\forall V0a \in (2^{ty_2Enum_2Enum}).((ap c_2ETemporal_Logic_2ENEXT \\ & (ap c_2ETemporal_Logic_2EALWAYS V0a)) = (ap c_2ETemporal_Logic_2EALWAYS \\ & (ap c_2ETemporal_Logic_2ENEXT V0a)))) \end{aligned} \tag{15}$$

Assume the following.

$$\begin{aligned} & (\forall V0a \in (2^{ty_2Enum_2Enum}).((ap c_2ETemporal_Logic_2ENEXT \\ & (ap c_2ETemporal_Logic_2EEVENTUAL V0a)) = (ap c_2ETemporal_Logic_2EEVENTUAL \\ & (ap c_2ETemporal_Logic_2ENEXT V0a)))) \end{aligned} \tag{16}$$

Assume the following.

$$\begin{aligned} & (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\ & ((ap c_2ETemporal_Logic_2ENEXT (ap (ap c_2ETemporal_Logic_2EWHEN \\ & V0a) V1b)) = (ap (ap c_2ETemporal_Logic_2EWHEN (ap c_2ETemporal_Logic_2ENEXT \\ & V0a)) (ap c_2ETemporal_Logic_2ENEXT V1b)))))) \end{aligned} \tag{17}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& ((ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ (ap\ c_2ETemporal_Logic_2EUNTIL \\
V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2EUNTIL\ (ap\ c_2ETemporal_Logic_2ENEXT \\
V0a))\ (ap\ c_2ETemporal_Logic_2ENEXT\ V1b))))))
\end{aligned} \tag{18}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& ((ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ (ap\ c_2ETemporal_Logic_2EBEFORE \\
V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2EBEFORE\ (ap\ c_2ETemporal_Logic_2ENEXT \\
V0a))\ (ap\ c_2ETemporal_Logic_2ENEXT\ V1b))))))
\end{aligned} \tag{19}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& ((ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ (ap\ c_2ETemporal_Logic_2ESWHEN \\
V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2ESWHEN\ (ap\ c_2ETemporal_Logic_2ENEXT \\
V0a))\ (ap\ c_2ETemporal_Logic_2ENEXT\ V1b))))))
\end{aligned} \tag{20}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& ((ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ (ap\ c_2ETemporal_Logic_2ESUNTIL \\
V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2ESUNTIL\ (ap\ c_2ETemporal_Logic_2ENEXT \\
V0a))\ (ap\ c_2ETemporal_Logic_2ENEXT\ V1b))))))
\end{aligned} \tag{21}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& ((ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ (ap\ c_2ETemporal_Logic_2ESBEFORE \\
V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2ESBEFORE\ (ap\ c_2ETemporal_Logic_2ENEXT \\
V0a))\ (ap\ c_2ETemporal_Logic_2ENEXT\ V1b))))))
\end{aligned} \tag{22}$$

Assume the following.

$$\begin{aligned}
& (\forall V0P \in (2^{ty_2Enum_2Enum}).(\forall V1t0 \in ty_2Enum_2Enum. \\
& ((p\ (ap\ (ap\ c_2ETemporal_Logic_2EALWAYS\ V0P)\ V1t0)) \Leftrightarrow ((p\ (ap\ V0P \\
V1t0)) \wedge (p\ (ap\ (ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ c_2ETemporal_Logic_2EALWAYS \\
V0P))\ V1t0))))))
\end{aligned} \tag{23}$$

Assume the following.

$$\begin{aligned}
& (\forall V0P \in (2^{ty_2Enum_2Enum}).(\forall V1t0 \in ty_2Enum_2Enum. \\
& ((p\ (ap\ (ap\ c_2ETemporal_Logic_2EEVENTUAL\ V0P)\ V1t0)) \Leftrightarrow ((p\ (ap \\
V0P\ V1t0)) \vee (p\ (ap\ (ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ c_2ETemporal_Logic_2EEVENTUAL \\
V0P))\ V1t0))))))
\end{aligned} \tag{24}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2t0 \in ty_2Enum_2Enum.((p (ap (ap (ap (ap c_2ETemporal_Logic_2EWHEN \\
& V0a) V1b) V2t0)) \Leftrightarrow (p (ap (ap (ap (c_2Ebool_2ECOND 2) (ap V1b V2t0)) \\
& (ap V0a V2t0)) (ap (ap c_2ETemporal_Logic_2ENEXT (ap (ap c_2ETemporal_Logic_2EWHEN \\
& V0a) V1b)) V2t0)))))))))
\end{aligned} \tag{25}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2t0 \in ty_2Enum_2Enum.((p (ap (ap (ap c_2ETemporal_Logic_2EUNTIL \\
& V0a) V1b) V2t0)) \Leftrightarrow ((\neg(p (ap V1b V2t0))) \Rightarrow ((p (ap V0a V2t0)) \wedge (p (ap \\
& (ap c_2ETemporal_Logic_2ENEXT (ap (ap c_2ETemporal_Logic_2EUNTIL \\
& V0a) V1b)) V2t0)))))))))
\end{aligned} \tag{26}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2t0 \in ty_2Enum_2Enum.((p (ap (ap (ap c_2ETemporal_Logic_2EBEFORE \\
& V0a) V1b) V2t0)) \Leftrightarrow ((\neg(p (ap V1b V2t0))) \wedge ((p (ap V0a V2t0)) \vee (p (ap \\
& (ap c_2ETemporal_Logic_2ENEXT (ap (ap c_2ETemporal_Logic_2EBEFORE \\
& V0a) V1b)) V2t0)))))))))
\end{aligned} \tag{27}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2t0 \in ty_2Enum_2Enum.((p (ap (ap (ap c_2ETemporal_Logic_2ESWHEN \\
& V0a) V1b) V2t0)) \Leftrightarrow (p (ap (ap (ap (c_2Ebool_2ECOND 2) (ap V1b V2t0)) \\
& (ap V0a V2t0)) (ap (ap c_2ETemporal_Logic_2ENEXT (ap (ap c_2ETemporal_Logic_2ESWHEN \\
& V0a) V1b)) V2t0)))))))))
\end{aligned} \tag{28}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2t0 \in ty_2Enum_2Enum.((p (ap (ap (ap c_2ETemporal_Logic_2ESUNTIL \\
& V0a) V1b) V2t0)) \Leftrightarrow ((\neg(p (ap V1b V2t0))) \Rightarrow ((p (ap V0a V2t0)) \wedge (p (ap \\
& (ap c_2ETemporal_Logic_2ENEXT (ap (ap c_2ETemporal_Logic_2ESUNTIL \\
& V0a) V1b)) V2t0)))))))))
\end{aligned} \tag{29}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2t0 \in ty_2Enum_2Enum.((p (ap (ap (ap c_2ETemporal_Logic_2ESBEFORE \\
& V0a) V1b) V2t0)) \Leftrightarrow ((\neg(p (ap V1b V2t0))) \wedge ((p (ap V0a V2t0)) \vee (p (ap \\
& (ap c_2ETemporal_Logic_2ENEXT (ap (ap c_2ETemporal_Logic_2ESBEFORE \\
& V0a) V1b)) V2t0)))))))))
\end{aligned} \tag{30}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \quad ((ap (ap c_2Earithmetic_2E_2B c_2Enum_2E0) V0m) = V0m) \wedge (((ap (\\
& \quad ap c_2Earithmetic_2E_2B V0m) c_2Enum_2E0) = V0m) \wedge (((ap (ap c_2Earithmetic_2E_2B \\
& \quad (ap c_2Enum_2ESUC V0m)) V1n) = (ap c_2Enum_2ESUC (ap (ap c_2Earithmetic_2E_2B \\
& \quad V0m) V1n))) \wedge ((ap (ap c_2Earithmetic_2E_2B V0m) (ap c_2Enum_2ESUC \\
& \quad V1n)) = (ap c_2Enum_2ESUC (ap (ap c_2Earithmetic_2E_2B V0m) V1n))))))))) \\
& \hspace{15em} (31)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \quad (ap (ap c_2Earithmetic_2E_2B V0m) V1n) = (ap (ap c_2Earithmetic_2E_2B \\
& \quad V1n) V0m)))) \\
& \hspace{15em} (32)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \quad \forall V2p \in ty_2Enum_2Enum. ((ap (ap c_2Earithmetic_2E_2B V0m) \\
& \quad (ap (ap c_2Earithmetic_2E_2B V1n) V2p)) = (ap (ap c_2Earithmetic_2E_2B \\
& \quad (ap (ap c_2Earithmetic_2E_2B V0m) V1n)) V2p)))))) \\
& \hspace{15em} (33)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \quad (p (ap (ap c_2Eprim_rec_2E_3C V0m) V1n)) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& \quad (ap c_2Enum_2ESUC V0m)) V1n)))))) \\
& \hspace{15em} (34)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& \quad c_2Enum_2E0) V0n))) \\
& \hspace{15em} (35)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \quad (\neg (p (ap (ap c_2Eprim_rec_2E_3C V0m) V1n))) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& \quad V1n) V0m)))))) \\
& \hspace{15em} (36)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& ((ap (ap c_2Earithmetic_2E_2A c_2Enum_2E0) V0m) = c_2Enum_2E0) \wedge \\
& (((ap (ap c_2Earithmetic_2E_2A V0m) c_2Enum_2E0) = c_2Enum_2E0) \wedge \\
& (((ap (ap c_2Earithmetic_2E_2A (ap c_2Earithmetic_2ENUMERAL \\
& (ap c_2Earithmetic_2EBIT1 c_2Earithmetic_2EZERO))) V0m) = V0m) \wedge \\
& (((ap (ap c_2Earithmetic_2E_2A V0m) (ap c_2Earithmetic_2ENUMERAL \\
& (ap c_2Earithmetic_2EBIT1 c_2Earithmetic_2EZERO))) = V0m) \wedge (\\
& ((ap (ap c_2Earithmetic_2E_2A (ap c_2Enum_2ESUC V0m)) V1n) = (ap \\
& (ap c_2Earithmetic_2E_2B (ap (ap c_2Earithmetic_2E_2A V0m) V1n)) \\
& V1n)) \wedge ((ap (ap c_2Earithmetic_2E_2A V0m) (ap c_2Enum_2ESUC V1n)) = \\
& (ap (ap c_2Earithmetic_2E_2B V0m) (ap (ap c_2Earithmetic_2E_2A \\
& V0m) V1n))))))))))
\end{aligned} \tag{37}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \forall V2p \in ty_2Enum_2Enum. (((p (ap (ap c_2Earithmetic_2E_3C_3D \\
& V0m) V1n)) \wedge (p (ap (ap c_2Earithmetic_2E_3C_3D V1n) V2p))) \Rightarrow (p (\\
& ap (ap c_2Earithmetic_2E_3C_3D V0m) V2p))))))
\end{aligned} \tag{38}$$

Assume the following.

$$(\forall V0m \in ty_2Enum_2Enum. (p (ap (ap c_2Earithmetic_2E_3C_3D V0m) V0m))) \tag{39}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& (V0m = V1n) \Leftrightarrow ((p (ap (ap c_2Earithmetic_2E_3C_3D V0m) V1n)) \wedge (p (\\
& ap (ap c_2Earithmetic_2E_3C_3D V1n) V0m))))))
\end{aligned} \tag{40}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \forall V2p \in ty_2Enum_2Enum. (((p (ap (ap c_2Earithmetic_2E_3C_3D \\
& (ap (ap c_2Earithmetic_2E_2B V0m) V1n)) (ap (ap c_2Earithmetic_2E_2B \\
& V0m) V2p))) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D V1n) V2p))))))
\end{aligned} \tag{41}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& (\neg (p (ap (ap c_2Earithmetic_2E_3C_3D V0m) V1n))) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& (ap c_2Enum_2ESUC V1n)) V0m))))))
\end{aligned} \tag{42}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& (\neg(V0m = V1n)) \Leftrightarrow ((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Enum_2ESUC \\
& V0m)) V1n)) \vee (p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Enum_2ESUC \\
& V1n)) V0m))))))
\end{aligned} \tag{43}$$

Assume the following.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. ((ap c_2Enum_2ESUC V0n) = (ap (ap \\
& c_2Earithmetic_2E_2B (ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 \\
& c_2Earithmetic_2EZERO))) V0n))
\end{aligned} \tag{44}$$

Assume the following.

$$True \tag{45}$$

Assume the following.

$$\begin{aligned}
& (\forall V0t1 \in 2. (\forall V1t2 \in 2. (((p V0t1) \Rightarrow (p V1t2)) \Rightarrow (((p \\
& V1t2) \Rightarrow (p V0t1)) \Rightarrow ((p V0t1) \Leftrightarrow (p V1t2))))))
\end{aligned} \tag{46}$$

Assume the following.

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

Assume the following.

$$(\forall V0t \in 2. ((p V0t) \vee \neg(p V0t))) \tag{48}$$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty A_27a \Rightarrow (\forall V0t \in 2. ((\forall V1x \in \\
& A_27a. (p V0t)) \Leftrightarrow (p V0t)))
\end{aligned} \tag{49}$$

Assume the following.

$$\begin{aligned}
& (\forall V0t1 \in 2. (\forall V1t2 \in 2. (\forall V2t3 \in 2. (((p V0t1) \wedge \\
& ((p V1t2) \wedge (p V2t3))) \Leftrightarrow (((p V0t1) \wedge (p V1t2)) \wedge (p V2t3))))))
\end{aligned} \tag{50}$$

Assume the following.

$$\begin{aligned}
& (\forall V0t \in 2. (((True \wedge (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \wedge True) \Leftrightarrow \\
& (p V0t)) \wedge (((False \wedge (p V0t)) \Leftrightarrow False) \wedge (((p V0t) \wedge False) \Leftrightarrow False) \wedge \\
& (((p V0t) \wedge (p V0t)) \Leftrightarrow (p V0t))))))
\end{aligned} \tag{51}$$

Assume the following.

$$\begin{aligned}
& (\forall V0t \in 2. (((True \vee (p V0t)) \Leftrightarrow True) \wedge (((p V0t) \vee True) \Leftrightarrow True) \wedge \\
& (((False \vee (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \vee False) \Leftrightarrow (p V0t)) \wedge (((p V0t) \vee \\
& (p V0t)) \Leftrightarrow (p V0t))))))
\end{aligned} \tag{52}$$

Assume the following.

$$(\forall V0t \in 2.(((True \Rightarrow (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \Rightarrow True) \Leftrightarrow True) \wedge (((False \Rightarrow (p V0t)) \Leftrightarrow True) \wedge (((p V0t) \Rightarrow (p V0t)) \Leftrightarrow True) \wedge ((p V0t) \Rightarrow False) \Leftrightarrow \neg(p V0t)))))) \quad (53)$$

Assume the following.

$$((\forall V0t \in 2.((\neg(\neg(p V0t))) \Leftrightarrow (p V0t)) \wedge (((\neg True) \Leftrightarrow False) \wedge ((\neg False) \Leftrightarrow True)))) \quad (54)$$

Assume the following.

$$\forall A.27a.nonempty A.27a \Rightarrow (\forall V0x \in A.27a.((V0x = V0x) \Leftrightarrow True)) \quad (55)$$

Assume the following.

$$(\forall V0t \in 2.(((True \Leftrightarrow (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \Leftrightarrow True) \Leftrightarrow (p V0t)) \wedge (((False \Leftrightarrow (p V0t)) \Leftrightarrow \neg(p V0t)) \wedge (((p V0t) \Leftrightarrow False) \Leftrightarrow \neg(p V0t)))))) \quad (56)$$

Assume the following.

$$\forall A.27a.nonempty A.27a \Rightarrow (\forall V0t1 \in A.27a.(\forall V1t2 \in A.27a.(((ap (ap (ap (c.2Ebool.2ECOND A.27a) c.2Ebool.2ET) V0t1) V1t2) = V0t1) \wedge ((ap (ap (ap (c.2Ebool.2ECOND A.27a) c.2Ebool.2EF) V0t1) V1t2) = V1t2)))))) \quad (57)$$

Assume the following.

$$(\forall V0A \in 2.(\forall V1B \in 2.(\forall V2C \in 2.(((p V0A) \vee (p V1B) \vee (p V2C)) \Leftrightarrow (((p V0A) \vee (p V1B)) \vee (p V2C))))) \quad (58)$$

Assume the following.

$$(\forall V0A \in 2.(\forall V1B \in 2.(((\neg((p V0A) \wedge (p V1B))) \Leftrightarrow ((\neg(p V0A) \vee \neg(p V1B)))) \wedge (((\neg(p V0A) \vee (p V1B)) \Leftrightarrow ((\neg(p V0A) \wedge \neg(p V1B)))))) \quad (59)$$

Assume the following.

$$(\forall V0A \in 2.(\forall V1B \in 2.(((p V0A) \Rightarrow (p V1B)) \Leftrightarrow ((\neg(p V0A) \vee (p V1B))))) \quad (60)$$

Assume the following.

$$(\forall V0t \in 2.(((p V0t) \Rightarrow False) \Leftrightarrow ((p V0t) \Leftrightarrow False))) \quad (61)$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(\forall V2t3 \in 2.(((p V0t1) \Rightarrow ((p V1t2) \Rightarrow (p V2t3))) \Leftrightarrow (((p V0t1) \wedge (p V1t2)) \Rightarrow (p V2t3))))) \quad (62)$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(((p V0t1) \Leftrightarrow (p V1t2)) \Leftrightarrow (((p V0t1) \wedge (p V1t2)) \vee ((\neg(p V0t1)) \wedge (\neg(p V1t2)))))))) \quad (63)$$

Assume the following.

$$(\forall V0P \in (2^{ty_2Enum_2Enum}).(((p (ap V0P c_2Enum_2E0)) \wedge (\forall V1n \in ty_2Enum_2Enum.((p (ap V0P V1n)) \Rightarrow (p (ap V0P (ap c_2Enum_2ESUC V1n)))))) \Rightarrow (\forall V2n \in ty_2Enum_2Enum.(p (ap V0P V2n)))))) \quad (64)$$

Assume the following.

$$\begin{aligned}
& ((\forall V0n \in ty_2Enum_2Enum.((ap (ap c_2Earithmetic_2E_2B \\
& \quad c_2Enum_2E0) V0n) = V0n)) \wedge ((\forall V1n \in ty_2Enum_2Enum.((ap \\
& \quad (ap c_2Earithmetic_2E_2B V1n) c_2Enum_2E0) = V1n)) \wedge ((\forall V2n \in \\
& \quad ty_2Enum_2Enum.(\forall V3m \in ty_2Enum_2Enum.((ap (ap c_2Earithmetic_2E_2B \\
& \quad (ap c_2Earithmetic_2ENUMERAL V2n)) (ap c_2Earithmetic_2ENUMERAL \\
& \quad V3m)) = (ap c_2Earithmetic_2ENUMERAL (ap c_2Enumeral_2EiZ (ap \\
& \quad (ap c_2Earithmetic_2E_2B V2n) V3m)))))) \wedge ((\forall V4n \in ty_2Enum_2Enum. \\
& \quad ((ap (ap c_2Earithmetic_2E_2A c_2Enum_2E0) V4n) = c_2Enum_2E0)) \wedge \\
& \quad ((\forall V5n \in ty_2Enum_2Enum.((ap (ap c_2Earithmetic_2E_2A \\
& \quad V5n) c_2Enum_2E0) = c_2Enum_2E0)) \wedge ((\forall V6n \in ty_2Enum_2Enum. \\
& \quad (\forall V7m \in ty_2Enum_2Enum.((ap (ap c_2Earithmetic_2E_2A (\\
& \quad ap c_2Earithmetic_2ENUMERAL V6n)) (ap c_2Earithmetic_2ENUMERAL \\
& \quad V7m)) = (ap c_2Earithmetic_2ENUMERAL (ap (ap c_2Earithmetic_2E_2A \\
& \quad V6n) V7m)))))) \wedge ((\forall V8n \in ty_2Enum_2Enum.((ap (ap c_2Earithmetic_2E_2D \\
& \quad c_2Enum_2E0) V8n) = c_2Enum_2E0)) \wedge ((\forall V9n \in ty_2Enum_2Enum. \\
& \quad ((ap (ap c_2Earithmetic_2E_2D V9n) c_2Enum_2E0) = V9n)) \wedge ((\forall V10n \in \\
& \quad ty_2Enum_2Enum.(\forall V11m \in ty_2Enum_2Enum.((ap (ap c_2Earithmetic_2E_2D \\
& \quad (ap c_2Earithmetic_2ENUMERAL V10n)) (ap c_2Earithmetic_2ENUMERAL \\
& \quad V11m)) = (ap c_2Earithmetic_2ENUMERAL (ap (ap c_2Earithmetic_2E_2D \\
& \quad V10n) V11m)))))) \wedge ((\forall V12n \in ty_2Enum_2Enum.((ap (ap c_2Earithmetic_2EEXP \\
& \quad c_2Enum_2E0) (ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 \\
& \quad V12n))) = c_2Enum_2E0)) \wedge ((\forall V13n \in ty_2Enum_2Enum.((ap \\
& \quad (ap c_2Earithmetic_2EEXP c_2Enum_2E0) (ap c_2Earithmetic_2ENUMERAL \\
& \quad (ap c_2Earithmetic_2EBIT2 V13n))) = c_2Enum_2E0)) \wedge ((\forall V14n \in \\
& \quad ty_2Enum_2Enum.((ap (ap c_2Earithmetic_2EEXP V14n) c_2Enum_2E0) = \\
& \quad (ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 c_2Earithmetic_2EZERO)))))) \wedge \\
& \quad ((\forall V15n \in ty_2Enum_2Enum.(\forall V16m \in ty_2Enum_2Enum. \\
& \quad ((ap (ap c_2Earithmetic_2EEXP (ap c_2Earithmetic_2ENUMERAL V15n)) \\
& \quad (ap c_2Earithmetic_2ENUMERAL V16m)) = (ap c_2Earithmetic_2ENUMERAL \\
& \quad (ap (ap c_2Earithmetic_2EEXP V15n) V16m)))))) \wedge ((ap c_2Enum_2ESUC \\
& \quad c_2Enum_2E0) = (ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 \\
& \quad c_2Earithmetic_2EZERO)))) \wedge ((\forall V17n \in ty_2Enum_2Enum. (\\
& \quad (ap c_2Enum_2ESUC (ap c_2Earithmetic_2ENUMERAL V17n)) = (ap c_2Earithmetic_2ENUMERAL \\
& \quad (ap c_2Enum_2ESUC V17n)))) \wedge ((ap c_2Eprim_rec_2EPRE c_2Enum_2E0) = \\
& \quad c_2Enum_2E0) \wedge ((\forall V18n \in ty_2Enum_2Enum.((ap c_2Eprim_rec_2EPRE \\
& \quad (ap c_2Earithmetic_2ENUMERAL V18n)) = (ap c_2Earithmetic_2ENUMERAL \\
& \quad (ap c_2Eprim_rec_2EPRE V18n)))) \wedge ((\forall V19n \in ty_2Enum_2Enum. \\
& \quad (((ap c_2Earithmetic_2ENUMERAL V19n) = c_2Enum_2E0) \Leftrightarrow (V19n = c_2Earithmetic_2EZERO))) \wedge \\
& \quad ((\forall V20n \in ty_2Enum_2Enum.((c_2Enum_2E0 = (ap c_2Earithmetic_2ENUMERAL \\
& \quad V20n)) \Leftrightarrow (V20n = c_2Earithmetic_2EZERO))) \wedge ((\forall V21n \in ty_2Enum_2Enum. \\
& \quad (\forall V22m \in ty_2Enum_2Enum.(((ap c_2Earithmetic_2ENUMERAL \\
& \quad V21n) = (ap c_2Earithmetic_2ENUMERAL V22m)) \Leftrightarrow (V21n = V22m)))) \wedge \\
& \quad ((\forall V23n \in ty_2Enum_2Enum.((p (ap (ap c_2Eprim_rec_2E_3C \\
& \quad V23n) c_2Enum_2E0)) \Leftrightarrow False)) \wedge ((\forall V24n \in ty_2Enum_2Enum. \\
& \quad ((p (ap (ap c_2Eprim_rec_2E_3C c_2Enum_2E0) (ap c_2Earithmetic_2ENUMERAL \\
& \quad V24n))) \Leftrightarrow (p (ap (ap c_2Eprim_rec_2E_3C c_2Earithmetic_2EZERO) \\
& \quad V24n)))) \wedge ((\forall V25n \in ty_2Enum_2Enum.(\forall V26m \in ty_2Enum_2Enum. \\
& \quad ((p (ap (ap c_2Eprim_rec_2E_3C (ap c_2Earithmetic_2ENUMERAL \\
& \quad V25n)) (ap c_2Earithmetic_2ENUMERAL V26m))) \Leftrightarrow (p (ap (ap c_2Eprim_rec_2E_3C \\
& \quad V25n) V26m)))))) \wedge ((\forall V27n \in ty_2Enum_2Enum.((p (ap (ap c_2Earithmetic_2E_3E \\
& \quad c_2Enum_2E0) V27n)) \Leftrightarrow False)) \wedge ((\forall V28n \in ty_2Enum_2Enum. \\
& \quad ((p (ap (ap c_2Earithmetic_2E_3E (ap c_2Earithmetic_2ENUMERAL \\
& \quad V28n)) c_2Enum_2E0)) \Leftrightarrow (p (ap (ap c_2Eprim_rec_2E_3C c_2Earithmetic_2EZERO) \\
& \quad V28n)))) \wedge ((\forall V29n \in ty_2Enum_2Enum.(\forall V30m \in ty_2Enum_2Enum. \\
& \quad ((p (ap (ap c_2Earithmetic_2E_3E (ap c_2Earithmetic_2ENUMERAL \\
& \quad V29n)) (ap c_2Earithmetic_2ENUMERAL V30m))) \Leftrightarrow (p (ap (ap c_2Eprim_rec_2E_3C \\
& \quad V30m) V29n)))))) \wedge ((\forall V31n \in ty_2Enum_2Enum.((p (ap (ap c_2Earithmetic_2E_3C_3D \\
& \quad c_2Enum_2E0) V31n)) \Leftrightarrow True)) \wedge ((\forall V32n \in ty_2Enum_2Enum. \\
& \quad ((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2ENUMERAL
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. (\forall V1m \in ty_2Enum_2Enum. (\\
& ((ap\ c_2Enumeral_2EiZ\ (ap\ (ap\ c_2Earithmetic_2E_2B\ c_2Earithmetic_2EZERO) \\
& V0n)) = V0n) \wedge (((ap\ c_2Enumeral_2EiZ\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V0n)\ c_2Earithmetic_2EZERO)) = V0n) \wedge (((ap\ c_2Enumeral_2EiZ\ (\\
& ap\ (ap\ c_2Earithmetic_2E_2B\ (ap\ c_2Earithmetic_2EBIT1\ V0n))\ (\\
& ap\ c_2Earithmetic_2EBIT1\ V1m))) = (ap\ c_2Earithmetic_2EBIT2\ (\\
& ap\ c_2Enumeral_2EiZ\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V0n)\ V1m)))) \wedge \\
& (((ap\ c_2Enumeral_2EiZ\ (ap\ (ap\ c_2Earithmetic_2E_2B\ (ap\ c_2Earithmetic_2EBIT1 \\
& V0n))\ (ap\ c_2Earithmetic_2EBIT2\ V1m))) = (ap\ c_2Earithmetic_2EBIT1 \\
& (ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V0n)\ V1m)))) \wedge (\\
& ((ap\ c_2Enumeral_2EiZ\ (ap\ (ap\ c_2Earithmetic_2E_2B\ (ap\ c_2Earithmetic_2EBIT2 \\
& V0n))\ (ap\ c_2Earithmetic_2EBIT1\ V1m))) = (ap\ c_2Earithmetic_2EBIT1 \\
& (ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V0n)\ V1m)))) \wedge (\\
& ((ap\ c_2Enumeral_2EiZ\ (ap\ (ap\ c_2Earithmetic_2E_2B\ (ap\ c_2Earithmetic_2EBIT2 \\
& V0n))\ (ap\ c_2Earithmetic_2EBIT2\ V1m))) = (ap\ c_2Earithmetic_2EBIT2 \\
& (ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V0n)\ V1m)))) \wedge (\\
& ((ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ c_2Earithmetic_2EZERO) \\
& V0n)) = (ap\ c_2Enum_2ESUC\ V0n)) \wedge (((ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V0n)\ c_2Earithmetic_2EZERO)) = (ap\ c_2Enum_2ESUC\ V0n)) \wedge (((ap \\
& c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ (ap\ c_2Earithmetic_2EBIT1 \\
& V0n))\ (ap\ c_2Earithmetic_2EBIT1\ V1m))) = (ap\ c_2Earithmetic_2EBIT1 \\
& (ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V0n)\ V1m)))) \wedge (\\
& ((ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ (ap\ c_2Earithmetic_2EBIT1 \\
& V0n))\ (ap\ c_2Earithmetic_2EBIT2\ V1m))) = (ap\ c_2Earithmetic_2EBIT2 \\
& (ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V0n)\ V1m)))) \wedge (\\
& ((ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ (ap\ c_2Earithmetic_2EBIT2 \\
& V0n))\ (ap\ c_2Earithmetic_2EBIT1\ V1m))) = (ap\ c_2Earithmetic_2EBIT2 \\
& (ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V0n)\ V1m)))) \wedge (\\
& ((ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ (ap\ c_2Earithmetic_2EBIT2 \\
& V0n))\ (ap\ c_2Earithmetic_2EBIT2\ V1m))) = (ap\ c_2Earithmetic_2EBIT1 \\
& (ap\ c_2Enumeral_2EiiSUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V0n)\ V1m)))) \wedge \\
& (((ap\ c_2Enumeral_2EiiSUC\ (ap\ (ap\ c_2Earithmetic_2E_2B\ c_2Earithmetic_2EZERO) \\
& V0n)) = (ap\ c_2Enumeral_2EiiSUC\ V0n)) \wedge (((ap\ c_2Enumeral_2EiiSUC \\
& (ap\ (ap\ c_2Earithmetic_2E_2B\ V0n)\ c_2Earithmetic_2EZERO)) = (\\
& ap\ c_2Enumeral_2EiiSUC\ V0n)) \wedge (((ap\ c_2Enumeral_2EiiSUC\ (ap\ (\\
& ap\ c_2Earithmetic_2E_2B\ (ap\ c_2Earithmetic_2EBIT1\ V0n))\ (ap\ c_2Earithmetic_2EBIT1 \\
& V1m))) = (ap\ c_2Earithmetic_2EBIT2\ (ap\ c_2Enum_2ESUC\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V0n)\ V1m)))) \wedge (((ap\ c_2Enumeral_2EiiSUC\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& (ap\ c_2Earithmetic_2EBIT1\ V0n))\ (ap\ c_2Earithmetic_2EBIT2\ V1m))) = \\
& (ap\ c_2Earithmetic_2EBIT1\ (ap\ c_2Enumeral_2EiiSUC\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V0n)\ V1m)))) \wedge (((ap\ c_2Enumeral_2EiiSUC\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& (ap\ c_2Earithmetic_2EBIT2\ V0n))\ (ap\ c_2Earithmetic_2EBIT1\ V1m))) = \\
& (ap\ c_2Earithmetic_2EBIT1\ (ap\ c_2Enumeral_2EiiSUC\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V0n)\ V1m)))) \wedge (((ap\ c_2Enumeral_2EiiSUC\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& (ap\ c_2Earithmetic_2EBIT2\ V0n))\ (ap\ c_2Earithmetic_2EBIT2\ V1m))) = \\
& (ap\ c_2Earithmetic_2EBIT2\ (ap\ c_2Enumeral_2EiiSUC\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V0n)\ V1m))
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. (\forall V1m \in ty_2Enum_2Enum. (\\
& ((p (ap (ap c_2Earithmetic_2E_3C_3D c_2Earithmetic_2EZERO) V0n)) \Leftrightarrow \\
& True) \wedge (((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT1 \\
& V0n)) c_2Earithmetic_2EZERO)) \Leftrightarrow False) \wedge (((p (ap (ap c_2Earithmetic_2E_3C_3D \\
& (ap c_2Earithmetic_2EBIT2 V0n)) c_2Earithmetic_2EZERO)) \Leftrightarrow False) \wedge \\
& (((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT1 \\
& V0n)) (ap c_2Earithmetic_2EBIT1 V1m))) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& V0n) V1m))) \wedge (((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT1 \\
& V0n)) (ap c_2Earithmetic_2EBIT2 V1m))) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& V0n) V1m))) \wedge (((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT2 \\
& V0n)) (ap c_2Earithmetic_2EBIT1 V1m))) \Leftrightarrow \neg (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& V1m) V0n)))) \wedge ((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT2 \\
& V0n)) (ap c_2Earithmetic_2EBIT2 V1m))) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& V0n) V1m))))))))))
\end{aligned} \tag{67}$$

Assume the following.

$$\begin{aligned}
& (((ap c_2Eprim_rec_2EPRE c_2Enum_2E0) = c_2Enum_2E0) \wedge (\forall V0m \in \\
& ty_2Enum_2Enum. ((ap c_2Eprim_rec_2EPRE (ap c_2Enum_2ESUC V0m)) = \\
& V0m)))
\end{aligned} \tag{68}$$

Assume the following.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. (\neg (p (ap (ap c_2Eprim_rec_2E_3C \\
& V0n) V0n))))
\end{aligned} \tag{69}$$

Assume the following.

$$\begin{aligned}
& (\forall V0t \in 2. ((\neg(\neg(p V0t))) \Leftrightarrow (p V0t)))
\end{aligned} \tag{70}$$

Assume the following.

$$\begin{aligned}
& (\forall V0A \in 2. ((p V0A) \Rightarrow ((\neg(p V0A)) \Rightarrow False)))
\end{aligned} \tag{71}$$

Assume the following.

$$\begin{aligned}
& (\forall V0A \in 2. (\forall V1B \in 2. (((\neg((p V0A) \vee (p V1B))) \Rightarrow False) \Leftrightarrow \\
& (((p V0A) \Rightarrow False) \Rightarrow ((\neg(p V1B)) \Rightarrow False))))))
\end{aligned} \tag{72}$$

Assume the following.

$$\begin{aligned}
& (\forall V0A \in 2. (\forall V1B \in 2. (((\neg(\neg(p V0A)) \vee (p V1B))) \Rightarrow False) \Leftrightarrow \\
& ((p V0A) \Rightarrow ((\neg(p V1B)) \Rightarrow False))))))
\end{aligned} \tag{73}$$

Assume the following.

$$\begin{aligned}
& (\forall V0A \in 2. (((\neg(p V0A)) \Rightarrow False) \Rightarrow (((p V0A) \Rightarrow False) \Rightarrow False)))
\end{aligned} \tag{74}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p \ V0p) \Leftrightarrow (\\
& (p \ V1q) \Leftrightarrow (p \ V2r))) \Leftrightarrow (((p \ V0p) \vee ((p \ V1q) \vee (p \ V2r))) \wedge (((p \ V0p) \vee ((\neg(\\
& p \ V2r)) \vee (\neg(p \ V1q)))) \wedge (((p \ V1q) \vee ((\neg(p \ V2r)) \vee (\neg(p \ V0p)))) \wedge ((p \ V2r) \vee \\
& ((\neg(p \ V1q)) \vee (\neg(p \ V0p))))))))))
\end{aligned} \tag{75}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p \ V0p) \Leftrightarrow (\\
& (p \ V1q) \wedge (p \ V2r))) \Leftrightarrow (((p \ V0p) \vee ((\neg(p \ V1q)) \vee (\neg(p \ V2r)))) \wedge (((p \ V1q) \vee \\
& (\neg(p \ V0p))) \wedge ((p \ V2r) \vee (\neg(p \ V0p))))))
\end{aligned} \tag{76}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p \ V0p) \Leftrightarrow (\\
& (p \ V1q) \vee (p \ V2r))) \Leftrightarrow (((p \ V0p) \vee (\neg(p \ V1q))) \wedge (((p \ V0p) \vee (\neg(p \ V2r))) \wedge \\
& ((p \ V1q) \vee ((p \ V2r) \vee (\neg(p \ V0p))))))
\end{aligned} \tag{77}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (((p \ V0p) \Leftrightarrow (\neg(p \ V1q))) \Leftrightarrow (((p \ V0p) \vee \\
& (p \ V1q)) \wedge ((\neg(p \ V1q)) \vee (\neg(p \ V0p))))))
\end{aligned} \tag{78}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (\forall V3s \in \\
& 2. (((p \ V0p) \Leftrightarrow (p \ (ap \ (ap \ (ap \ (c_2Ebool_2ECOND \ 2) \ V1q) \ V2r) \ V3s))) \Leftrightarrow \\
& (((p \ V0p) \vee ((p \ V1q) \vee (\neg(p \ V3s)))) \wedge (((p \ V0p) \vee ((\neg(p \ V2r)) \vee (\neg(p \ V1q)))) \wedge \\
& (((p \ V0p) \vee ((\neg(p \ V2r)) \vee (\neg(p \ V3s)))) \wedge (((\neg(p \ V1q)) \vee ((p \ V2r) \vee (\neg(\\
& p \ V0p)))) \wedge ((p \ V1q) \vee ((p \ V3s) \vee (\neg(p \ V0p))))))
\end{aligned} \tag{79}$$

Theorem 1

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (\lambda V2t \in ty_2Enum_2Enum. \\
& (ap\ c_2Ebool_2E_7E (ap\ V0a\ V2t)))) = (\lambda V3t \in ty_2Enum_2Enum. \\
& (ap\ c_2Ebool_2E_7E (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSNEXT \\
& V0a\ V3t)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (\lambda V4t \in \\
& ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_2F_5C (ap\ V0a\ V4t)) (ap\ V1b \\
& V4t)))) = (\lambda V5t \in ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_2F_5C \\
& (ap\ (ap\ c_2EPast_Temporal_Logic_2EPNEXT V0a)\ V5t)) (ap\ (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V1b)\ V5t)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (\lambda V6t \in \\
& ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_5C_2F (ap\ V0a\ V6t)) (ap\ V1b \\
& V6t)))) = (\lambda V7t \in ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_5C_2F \\
& (ap\ (ap\ c_2EPast_Temporal_Logic_2EPNEXT V0a)\ V7t)) (ap\ (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V1b)\ V7t)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (ap\ c_2ETemporal_Logic_2ENEXT \\
& V0a)) = (\lambda V8t \in ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_5C_2F (ap \\
& c_2EPast_Temporal_Logic_2EInitPoint V8t)) (ap\ V0a\ V8t)))) \wedge \\
& (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (ap\ c_2ETemporal_Logic_2EALWAYS \\
& V0a)) = (\lambda V9t \in ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_5C_2F (ap \\
& c_2EPast_Temporal_Logic_2EInitPoint V9t)) (ap\ (ap\ c_2ETemporal_Logic_2EALWAYS \\
& (ap\ c_2EPast_Temporal_Logic_2EPNEXT V0a))\ V9t)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& (ap\ c_2ETemporal_Logic_2EEVENTUAL V0a)) = (\lambda V10t \in ty_2Enum_2Enum. \\
& (ap\ (ap\ c_2Ebool_2E_5C_2F (ap\ c_2EPast_Temporal_Logic_2EInitPoint \\
& V10t)) (ap\ (ap\ c_2ETemporal_Logic_2EEVENTUAL (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V0a))\ V10t)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (ap \\
& (ap\ c_2ETemporal_Logic_2ESUNTIL V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2ESUNTIL \\
& (ap\ c_2EPast_Temporal_Logic_2EPNEXT V0a)) (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V1b)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (ap\ (ap\ c_2ETemporal_Logic_2ESWHEN \\
& V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2ESWHEN (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V0a)) (ap\ c_2EPast_Temporal_Logic_2EPNEXT V1b)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& (ap\ (ap\ c_2ETemporal_Logic_2ESBEFORE V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2ESBEFORE \\
& (ap\ c_2EPast_Temporal_Logic_2EPNEXT V0a)) (ap\ c_2EPast_Temporal_Logic_2EPSNEXT \\
& V1b)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (ap\ (ap\ c_2ETemporal_Logic_2EUNTIL \\
& V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2EUNTIL (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V0a)) (ap\ c_2EPast_Temporal_Logic_2EPNEXT V1b)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& (ap\ (ap\ c_2ETemporal_Logic_2EWHEN V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2EWHEN \\
& (ap\ c_2EPast_Temporal_Logic_2EPNEXT V0a)) (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V1b)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (ap\ (ap\ c_2ETemporal_Logic_2EBEFORE \\
& V0a)\ V1b)) = (ap\ (ap\ c_2ETemporal_Logic_2EBEFORE (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V0a)) (ap\ c_2EPast_Temporal_Logic_2EPSNEXT V1b)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& (ap\ c_2EPast_Temporal_Logic_2EPALWAYS V0a)) = (ap\ c_2EPast_Temporal_Logic_2EPALWAYS \\
& (ap\ c_2EPast_Temporal_Logic_2EPNEXT V0a)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& (ap\ c_2EPast_Temporal_Logic_2EPEVENTUAL V0a)) = (\lambda V11t \in \\
& ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_5C_2F (ap\ c_2EPast_Temporal_Logic_2EInitPoint \\
& V11t)) (ap\ (ap\ c_2EPast_Temporal_Logic_2EPEVENTUAL (ap\ c_2EPast_Temporal_Logic_2EPSNEXT \\
& V0a))\ V11t)))) \wedge (((ap\ c_2EPast_Temporal_Logic_2EPSUNTIL V0a)\ V1b)) = (\lambda V12t \in \\
& ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_5C_2F (ap\ c_2EPast_Temporal_Logic_2EInitPoint \\
& V12t)) (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSUNTIL (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V0a)) (ap\ c_2EPast_Temporal_Logic_2EPSNEXT V1b))\ V12t)))) \wedge \\
& (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSWHEN \\
& V0a)\ V1b)) = (\lambda V13t \in ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_5C_2F \\
& (ap\ c_2EPast_Temporal_Logic_2EInitPoint V13t)) (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSWHEN \\
& (ap\ c_2EPast_Temporal_Logic_2EPSWHEN (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V0a)) (ap\ c_2EPast_Temporal_Logic_2EPSNEXT V1b))\ V13t)))) \wedge \\
& (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSBEFORE \\
& V0a)\ V1b)) = (\lambda V14t \in ty_2Enum_2Enum.(ap\ (ap\ c_2Ebool_2E_5C_2F \\
& (ap\ c_2EPast_Temporal_Logic_2EInitPoint V14t)) (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSBEFORE \\
& (ap\ c_2EPast_Temporal_Logic_2EPSBEFORE (ap\ c_2EPast_Temporal_Logic_2EPSNEXT \\
& V0a)) (ap\ c_2EPast_Temporal_Logic_2EPNEXT V1b))\ V14t)))) \wedge \\
& (((ap\ c_2EPast_Temporal_Logic_2EPNEXT (ap\ (ap\ c_2EPast_Temporal_Logic_2EPUUNTIL
\end{aligned}$$