

thm_2EOmega__Automata_2ETEMP__OPS__DEFS__TO__OMEGA (TMZDzCtH8qdzbw6HKQbGVYB9T8geuM7Xxr9)

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Definition 1 We define $c_2Emin_2E_3D$ to be $\lambda A.\lambda x \in A.\lambda y \in A.inj_o (x = y)$ of type $\iota \Rightarrow \iota$.

Definition 2 We define c_2Ebool_2ET to be $(ap (ap (c_2Emin_2E_3D (2^2)) (\lambda V0x \in 2.V0x)) (\lambda V1x \in 2.V1x))$

Definition 3 We define $c_2Ebool_2E_21$ to be $\lambda A_27a : \iota.(\lambda V0P \in (2^{A_27a}).(ap (ap (c_2Emin_2E_3D (2^{A_27a}))$

Definition 4 We define c_2Ebool_2EF to be $(ap (c_2Ebool_2E_21 2) (\lambda V0t \in 2.V0t))$.

Definition 5 We define $c_2Emin_2E_3D_3D_3E$ to be $\lambda P \in 2.\lambda Q \in 2.inj_o (p \Rightarrow q)$ of type ι .

Definition 6 We define $c_2Ebool_2E_7E$ to be $(\lambda V0t \in 2.(ap (ap c_2Emin_2E_3D_3D_3E V0t) c_2Ebool_2EF$

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

$$nonempty\ ty_2Enum_2Enum \tag{1}$$

Definition 7 We define $c_2Ebool_2E_2F_5C$ to be $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap (c_2Ebool_2E_21 2) (\lambda V2t \in 2.V2t$

Let $c_2Enum_2EREP_num : \iota$ be given. Assume the following.

$$c_2Enum_2EREP_num \in (\omega^{ty_2Enum_2Enum}) \tag{2}$$

Let $c_2Enum_2ESUC_REP : \iota$ be given. Assume the following.

$$c_2Enum_2ESUC_REP \in (\omega^{\omega}) \tag{3}$$

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

$$c_2Enum_2EABS_num \in (ty_2Enum_2Enum^{\omega}) \tag{4}$$

Definition 8 We define c_2Enum_2ESUC to be $\lambda V0m \in ty_2Enum_2Enum.(ap c_2Enum_2EABS_num$

Definition 9 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 10 We define $c_2Ebool_2E_3F$ to be $\lambda A_27a : \iota.(\lambda V0P \in (2^{A_27a}).(ap V0P (ap (c_2Emin_2E_40$

Definition 11 We define $c_2Eprim_rec_2E_3C$ to be $\lambda V0m \in ty_2Enum_2Enum.\lambda V1n \in ty_2Enum_2Enum$

Definition 12 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 13 We define $c_2Earithmetic_2E_3C_3D$ to be $\lambda V0m \in ty_2Enum_2Enum.\lambda V1n \in ty_2Enum_2Enum$

Definition 14 We define $c_2EPast_Temporal_Logic_2EPBEFORE$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in$

Definition 15 We define $c_2EPast_Temporal_Logic_2EPWHEN$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in$

Definition 16 We define $c_2EPast_Temporal_Logic_2EPUNTIL$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in$

Definition 17 We define $c_2EPast_Temporal_Logic_2EPSBEFORE$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in$

Definition 18 We define $c_2EPast_Temporal_Logic_2EPSWHEN$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in$

Definition 19 We define $c_2EPast_Temporal_Logic_2EPSUNTIL$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in$

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

$$c_2Enum_2EZERO_REP \in \omega \tag{5}$$

Definition 20 We define c_2Enum_2E0 to be $(ap c_2Enum_2EABS_num c_2Enum_2EZERO_REP)$.

Definition 21 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 22 We define $c_2Eprim_rec_2EPRE$ to be $\lambda V0m \in ty_2Enum_2Enum.(ap (ap (ap (c_2Ebool_2E$

Definition 23 We define $c_2EPast_Temporal_Logic_2EPSNEXT$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in$

Definition 24 We define $c_2EPast_Temporal_Logic_2EPEVENTUAL$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in$

Definition 25 We define $c_2EPast_Temporal_Logic_2EPNEXT$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in$

Definition 26 We define $c_2EPast_Temporal_Logic_2EPALWAYS$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in$

Definition 27 We define $c_2ETemporal_Logic_2ENEXT$ to be $\lambda V0P \in (2^{ty_2Enum_2Enum}).(\lambda V1t \in ty_2Enum$

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

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

Definition 28 We define $c_2ETemporal_Logic_2EALWAYS$ to be $\lambda V0P \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in ty_2Enum$

Definition 29 We define $c_2ETemporal_Logic_2EWATCH$ to be $\lambda V0q \in (2^{ty_2Enum_2Enum}).\lambda V1b \in (2^{ty_2Enum$

Definition 30 We define $c_2ETemporal_Logic_2ESBEFORE$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in (2^{ty_2Enum_2Enum})$.

Definition 31 We define $c_2ETemporal_Logic_2EBEFORE$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in (2^{ty_2Enum_2Enum})$.

Definition 32 We define $c_2ETemporal_Logic_2ESUNTIL$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in (2^{ty_2Enum_2Enum})$.

Definition 33 We define $c_2ETemporal_Logic_2EUNTIL$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in (2^{ty_2Enum_2Enum})$.

Definition 34 We define $c_2ETemporal_Logic_2EEVENTUAL$ to be $\lambda V0P \in (2^{ty_2Enum_2Enum}).\lambda V1t0 \in ty_2Enum_2Enum$.

Definition 35 We define $c_2ETemporal_Logic_2ESWHEN$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in (2^{ty_2Enum_2Enum})$.

Definition 36 We define $c_2ETemporal_Logic_2EWHEN$ to be $\lambda V0a \in (2^{ty_2Enum_2Enum}).\lambda V1b \in (2^{ty_2Enum_2Enum})$.

Let $c_2Earithmetic_2EEVEN : \iota$ be given. Assume the following.

$$c_2Earithmetic_2EEVEN \in (2^{ty_2Enum_2Enum}) \quad (7)$$

Let $c_2Earithmetic_2EODD : \iota$ be given. Assume the following.

$$c_2Earithmetic_2EODD \in (2^{ty_2Enum_2Enum}) \quad (8)$$

Definition 37 We define $c_2Earithmetic_2E_3E$ to be $\lambda V0m \in ty_2Enum_2Enum.\lambda V1n \in ty_2Enum_2Enum$.

Definition 38 We define $c_2Earithmetic_2E_3E_3D$ to be $\lambda V0m \in ty_2Enum_2Enum.\lambda V1n \in ty_2Enum_2Enum$.

Let $c_2Earithmetic_2EEXP : \iota$ be given. Assume the following.

$$c_2Earithmetic_2EEXP \in ((ty_2Enum_2Enum)^{ty_2Enum_2Enum})^{ty_2Enum_2Enum} \quad (9)$$

Let $c_2Earithmetic_2E_2D : \iota$ be given. Assume the following.

$$c_2Earithmetic_2E_2D \in ((ty_2Enum_2Enum)^{ty_2Enum_2Enum})^{ty_2Enum_2Enum} \quad (10)$$

Let $c_2Earithmetic_2E_2A : \iota$ be given. Assume the following.

$$c_2Earithmetic_2E_2A \in ((ty_2Enum_2Enum)^{ty_2Enum_2Enum})^{ty_2Enum_2Enum} \quad (11)$$

Definition 39 We define $c_2Enumeral_2EiZ$ to be $\lambda V0x \in ty_2Enum_2Enum.V0x$.

Definition 40 We define $c_2Earithmetic_2ENUMERAL$ to be $\lambda V0x \in ty_2Enum_2Enum.V0x$.

Definition 41 We define $c_2Earithmetic_2EBIT2$ to be $\lambda V0n \in ty_2Enum_2Enum.(ap (ap c_2Earithmetic_2EBIT2))$.

Definition 42 We define $c_2Earithmetic_2EBIT1$ to be $\lambda V0n \in ty_2Enum_2Enum.(ap (ap c_2Earithmetic_2EBIT1))$.

Definition 43 We define $c_2Earithmetic_2EZERO$ to be c_2Enum_2E0 .

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty-2Enum-2Enum}).(\forall V1b \in (2^{ty-2Enum-2Enum}). \\
& ((p (ap (ap (ap c_2EPast_Temporal_Logic_2EPNEXT V0a) c_2Enum_2E0)) \Leftrightarrow \\
& True) \wedge (((p (ap (ap (ap c_2EPast_Temporal_Logic_2EPSNEXT V0a) c_2Enum_2E0)) \Leftrightarrow \\
& False) \wedge (((p (ap (ap (ap c_2EPast_Temporal_Logic_2EPALWAYS V0a) \\
& c_2Enum_2E0)) \Leftrightarrow (p (ap V0a c_2Enum_2E0))) \wedge (((p (ap (ap (ap c_2EPast_Temporal_Logic_2EPEVENTUAL \\
& V0a) c_2Enum_2E0)) \Leftrightarrow (p (ap V0a c_2Enum_2E0))) \wedge (((p (ap (ap (ap c_2EPast_Temporal_Logic_2EPSUNT \\
& V0a) V1b) c_2Enum_2E0)) \Leftrightarrow (p (ap V1b c_2Enum_2E0))) \wedge (((p (ap (ap \\
& (ap c_2EPast_Temporal_Logic_2EPSWHEN V0a) V1b) c_2Enum_2E0)) \Leftrightarrow \\
& ((p (ap V0a c_2Enum_2E0)) \wedge (p (ap V1b c_2Enum_2E0)))) \wedge (((p (ap (\\
& ap (ap c_2EPast_Temporal_Logic_2EPSBEFORE V0a) V1b) c_2Enum_2E0)) \Leftrightarrow \\
& ((p (ap V0a c_2Enum_2E0)) \wedge (\neg (p (ap V1b c_2Enum_2E0)))) \wedge (((p (\\
& ap (ap (ap c_2EPast_Temporal_Logic_2EPUNTIL V0a) V1b) c_2Enum_2E0)) \Leftrightarrow \\
& ((p (ap V0a c_2Enum_2E0)) \vee (p (ap V1b c_2Enum_2E0)))) \wedge (((p (ap (\\
& ap (ap c_2EPast_Temporal_Logic_2EPWHEN V0a) V1b) c_2Enum_2E0)) \Leftrightarrow \\
& ((p (ap V0a c_2Enum_2E0)) \vee (\neg (p (ap V1b c_2Enum_2E0)))) \wedge (((p (ap \\
& (ap (ap c_2EPast_Temporal_Logic_2EPBEFORE V0a) V1b) c_2Enum_2E0)) \Leftrightarrow \\
& (\neg (p (ap V1b c_2Enum_2E0))))))))))))))))) \\
& \hspace{15em} (12)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}). (\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& \quad (((ap\ c_2ETemporal_Logic_2EALWAYS\ V0a) = (\lambda V2t \in ty_2Enum_2Enum. \\
& \quad (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap\ V0a\ V2t))\ (ap\ (ap\ c_2ETemporal_Logic_2ENEXT \\
& \quad (ap\ c_2ETemporal_Logic_2EALWAYS\ V0a))\ V2t)))) \wedge (((ap\ c_2ETemporal_Logic_2EEVENTUAL \\
& \quad V0a) = (\lambda V3t \in ty_2Enum_2Enum. (ap\ (ap\ c_2Ebool_2E_5C_2F\ (ap \\
& \quad V0a\ V3t))\ (ap\ (ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ c_2ETemporal_Logic_2EEVENTUAL \\
& \quad V0a))\ V3t)))) \wedge (((ap\ (ap\ c_2ETemporal_Logic_2ESUNTIL\ V0a)\ V1b) = \\
& \quad (\lambda V4t \in ty_2Enum_2Enum. (ap\ (ap\ c_2Emin_2E_3D_3D_3E\ (ap\ c_2Ebool_2E_7E \\
& \quad (ap\ V1b\ V4t)))\ (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap\ V0a\ V4t))\ (ap\ (ap\ c_2ETemporal_Logic_2ENEXT \\
& \quad (ap\ (ap\ c_2ETemporal_Logic_2ESUNTIL\ V0a)\ V1b))\ V4t)))) \wedge (((\\
& \quad ap\ (ap\ c_2ETemporal_Logic_2ESWHEN\ V0a)\ V1b) = (\lambda V5t \in ty_2Enum_2Enum. \\
& \quad (ap\ (ap\ (ap\ (c_2Ebool_2ECOND\ 2)\ (ap\ V1b\ V5t))\ (ap\ V0a\ V5t))\ (ap\ (ap \\
& \quad c_2ETemporal_Logic_2ENEXT\ (ap\ (ap\ c_2ETemporal_Logic_2ESWHEN \\
& \quad V0a)\ V1b))\ V5t)))) \wedge (((ap\ (ap\ c_2ETemporal_Logic_2ESBEFORE\ V0a) \\
& \quad V1b) = (\lambda V6t \in ty_2Enum_2Enum. (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap \\
& \quad c_2Ebool_2E_7E\ (ap\ V1b\ V6t)))\ (ap\ (ap\ c_2Ebool_2E_5C_2F\ (ap\ V0a \\
& \quad V6t))\ (ap\ (ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ (ap\ c_2ETemporal_Logic_2ESBEFORE \\
& \quad V0a)\ V1b))\ V6t)))) \wedge (((ap\ (ap\ c_2ETemporal_Logic_2EUNTIL\ V0a) \\
& \quad V1b) = (\lambda V7t \in ty_2Enum_2Enum. (ap\ (ap\ c_2Emin_2E_3D_3D_3E\ (\\
& \quad ap\ c_2Ebool_2E_7E\ (ap\ V1b\ V7t)))\ (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap\ V0a \\
& \quad V7t))\ (ap\ (ap\ c_2ETemporal_Logic_2ENEXT\ (ap\ (ap\ c_2ETemporal_Logic_2EUNTIL \\
& \quad V0a)\ V1b))\ V7t)))) \wedge (((ap\ (ap\ c_2ETemporal_Logic_2EWHEN\ V0a) \\
& \quad V1b) = (\lambda V8t \in ty_2Enum_2Enum. (ap\ (ap\ (ap\ (c_2Ebool_2ECOND\ 2) \\
& \quad (ap\ V1b\ V8t))\ (ap\ V0a\ V8t))\ (ap\ (ap\ c_2ETemporal_Logic_2ENEXT\ (\\
& \quad ap\ (ap\ c_2ETemporal_Logic_2EWHEN\ V0a)\ V1b))\ V8t)))) \wedge (((ap\ (ap \\
& \quad c_2ETemporal_Logic_2EBEFORE\ V0a)\ V1b) = (\lambda V9t \in ty_2Enum_2Enum. \\
& \quad (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap\ c_2Ebool_2E_7E\ (ap\ V1b\ V9t)))\ (ap \\
& \quad (ap\ c_2Ebool_2E_5C_2F\ (ap\ V0a\ V9t))\ (ap\ (ap\ c_2ETemporal_Logic_2ENEXT \\
& \quad (ap\ (ap\ c_2ETemporal_Logic_2EBEFORE\ V0a)\ V1b))\ V9t)))) \wedge (((\\
& \quad ap\ c_2EPast_Temporal_Logic_2EPALWAYS\ V0a) = (\lambda V10t \in ty_2Enum_2Enum. \\
& \quad (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap\ V0a\ V10t))\ (ap\ (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& \quad (ap\ c_2EPast_Temporal_Logic_2EPALWAYS\ V0a))\ V10t)))) \wedge (((\\
& \quad ap\ c_2EPast_Temporal_Logic_2EPEVENTUAL\ V0a) = (\lambda V11t \in ty_2Enum_2Enum. \\
& \quad (ap\ (ap\ c_2Ebool_2E_5C_2F\ (ap\ V0a\ V11t))\ (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSNEXT \\
& \quad (ap\ c_2EPast_Temporal_Logic_2EPEVENTUAL\ V0a))\ V11t)))) \wedge (\\
& \quad ((ap\ (ap\ c_2EPast_Temporal_Logic_2EPSUNTIL\ V0a)\ V1b) = (\lambda V12t \in \\
& \quad ty_2Enum_2Enum. (ap\ (ap\ c_2Ebool_2E_5C_2F\ (ap\ V1b\ V12t))\ (ap\ (ap \\
& \quad c_2Ebool_2E_2F_5C\ (ap\ V0a\ V12t))\ (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSNEXT \\
& \quad (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSUNTIL\ V0a)\ V1b))\ V12t)))) \wedge \\
& \quad (((ap\ (ap\ c_2EPast_Temporal_Logic_2EPSWHEN\ V0a)\ V1b) = (\lambda V13t \in \\
& \quad ty_2Enum_2Enum. (ap\ (ap\ c_2Ebool_2E_5C_2F\ (ap\ (ap\ c_2Ebool_2E_2F_5C \\
& \quad (ap\ V0a\ V13t))\ (ap\ V1b\ V13t)))\ (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap\ c_2Ebool_2E_7E \\
& \quad (ap\ V1b\ V13t)))\ (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSNEXT\ (ap \\
& \quad (ap\ c_2EPast_Temporal_Logic_2EPSWHEN\ V0a)\ V1b))\ V13t)))) \wedge \\
& \quad (((ap\ (ap\ c_2EPast_Temporal_Logic_2EPSBEFORE\ V0a)\ V1b) = (\lambda V14t \in \\
& \quad ty_2Enum_2Enum. (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap\ c_2Ebool_2E_7E \\
& \quad (ap\ V1b\ V14t)))\ (ap\ (ap\ c_2Ebool_2E_5C_2F\ (ap\ V0a\ V14t))\ (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSNEXT \\
& \quad (ap\ (ap\ c_2EPast_Temporal_Logic_2EPSBEFORE\ V0a)\ V1b))\ V14t)))) \wedge \\
& \quad (((ap\ (ap\ c_2EPast_Temporal_Logic_2EPUNTIL\ V0a)\ V1b) = (\lambda V15t \in \\
& \quad ty_2Enum_2Enum. (ap\ (ap\ c_2Ebool_2E_5C_2F\ (ap\ V1b\ V15t))\ (ap\ (ap \\
& \quad c_2Ebool_2E_2F_5C\ (ap\ V0a\ V15t))\ (ap\ (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& \quad (ap\ (ap\ c_2EPast_Temporal_Logic_2EPUNTIL\ V0a)\ V1b))\ V15t)))) \wedge \\
& \quad (((ap\ (ap\ c_2EPast_Temporal_Logic_2EPWHEN\ V0a)\ V1b) = (\lambda V16t \in \\
& \quad ty_2Enum_2Enum. (ap\ (ap\ c_2Ebool_2E_5C_2F\ (ap\ (ap\ c_2Ebool_2E_2F_5C \\
& \quad (ap\ V0a\ V16t))\ (ap\ V1b\ V16t)))\ (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap\ c_2Ebool_2E_7E \\
& \quad (ap\ V1b\ V16t)))\ (ap\ (ap\ c_2EPast_Temporal_Logic_2EPNEXT\ (ap \\
& \quad (ap\ c_2EPast_Temporal_Logic_2EPWHEN\ V0a)\ V1b))\ V16t)))) \wedge \\
& \quad (((ap\ (ap\ c_2EPast_Temporal_Logic_2EPBEFORE\ V0a)\ V1b) = (\lambda V17t \in \\
& \quad ty_2Enum_2Enum. (ap\ (ap\ c_2Ebool_2E_2F_5C\ (ap\ c_2Ebool_2E_7E \\
& \quad (ap\ V1b\ V17t)))\ (ap\ (ap\ c_2Ebool_2E_5C_2F\ (ap\ V0a\ V17t))\ (ap\ (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& \quad (ap\ (ap\ c_2EPast_Temporal_Logic_2EPBEFORE\ V0a)\ V1b))\ V17t)))) \wedge
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0b \in (2^{ty_2Enum_2Enum}).(\forall V1t0 \in ty_2Enum_2Enum. \\
& ((\exists V2d \in ty_2Enum_2Enum.((\forall V3t \in ty_2Enum_2Enum. \\
& ((p (ap (ap c_2Eprim_rec_2E_3C V3t) V2d)) \Rightarrow (\neg(p (ap V0b (ap (ap c_2Earithmetic_2E_2B \\
& V3t) V1t0)))))) \wedge (p (ap V0b (ap (ap c_2Earithmetic_2E_2B V2d) V1t0)))))) \vee \\
& (\forall V4d \in ty_2Enum_2Enum.(\neg(p (ap V0b (ap (ap c_2Earithmetic_2E_2B \\
& V4d) V1t0)))))))))
\end{aligned} \tag{14}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2t0 \in ty_2Enum_2Enum.((p (ap (ap (ap c_2ETemporal_Logic_2EWHEN \\
& V0a) V1b) V2t0)) \Leftrightarrow (\forall V3delta \in ty_2Enum_2Enum.((\forall V4t \in \\
& ty_2Enum_2Enum.((p (ap (ap c_2Eprim_rec_2E_3C V4t) V3delta)) \Rightarrow \\
& (\neg(p (ap V1b (ap (ap c_2Earithmetic_2E_2B V4t) V2t0)))))) \wedge (p (ap \\
& V1b (ap (ap c_2Earithmetic_2E_2B V3delta) V2t0)))) \Rightarrow (p (ap V0a (\\
& ap (ap c_2Earithmetic_2E_2B V3delta) V2t0)))))))))
\end{aligned} \tag{15}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2t0 \in ty_2Enum_2Enum.((p (ap (ap (ap c_2ETemporal_Logic_2ESWHEN \\
& V0a) V1b) V2t0)) \Leftrightarrow (\exists V3delta \in ty_2Enum_2Enum.((\forall V4t \in \\
& ty_2Enum_2Enum.((p (ap (ap c_2Eprim_rec_2E_3C V4t) V3delta)) \Rightarrow \\
& (\neg(p (ap V1b (ap (ap c_2Earithmetic_2E_2B V4t) V2t0)))))) \wedge ((p (\\
& ap V1b (ap (ap c_2Earithmetic_2E_2B V3delta) V2t0))) \wedge (p (ap V0a \\
& (ap (ap c_2Earithmetic_2E_2B V3delta) V2t0)))))))))
\end{aligned} \tag{16}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& ((ap (ap c_2ETemporal_Logic_2EUNTIL V0a) V1b) = (ap (ap c_2ETemporal_Logic_2EWHEN \\
& V1b) (\lambda V2t \in ty_2Enum_2Enum.(ap (ap c_2Emin_2E_3D_3D_3E (ap \\
& V0a V2t)) (ap V1b V2t))))))
\end{aligned} \tag{17}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).((ap c_2ETemporal_Logic_2EALWAYS \\
& V0a) = (ap (ap c_2ETemporal_Logic_2EUNTIL V0a) (\lambda V1t \in ty_2Enum_2Enum. \\
& c_2Ebool_2EF))))
\end{aligned} \tag{18}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& ((ap (ap c_2ETemporal_Logic_2ESBEFORE V0a) V1b) = (\lambda V2t0 \in \\
& ty_2Enum_2Enum.(ap c_2Ebool_2E_7E (ap (ap (ap c_2ETemporal_Logic_2EUNTIL \\
& (\lambda V3t \in ty_2Enum_2Enum.(ap c_2Ebool_2E_7E (ap V0a V3t)))) V1b \\
& V2t0))))))
\end{aligned} \tag{19}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& ((ap (ap c_2ETemporal_Logic_2ESUNTIL V0a) V1b) = (ap (ap c_2ETemporal_Logic_2ESWHEN \\
& V1b) (\lambda V2t \in ty_2Enum_2Enum.(ap (ap c_2Emin_2E_3D_3D_3E (ap \\
& V0a V2t)) (ap V1b V2t))))))
\end{aligned} \tag{20}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).((ap c_2ETemporal_Logic_2EEVENTUAL \\
& V0a) = (ap (ap c_2ETemporal_Logic_2ESUNTIL (\lambda V1t \in ty_2Enum_2Enum. \\
& c_2Ebool_2ET)) V0a)))
\end{aligned} \tag{21}$$

Assume the following.

$$\begin{aligned}
& (\forall V0a \in (2^{ty_2Enum_2Enum}).(\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& ((ap (ap c_2ETemporal_Logic_2EBEFORE V0a) V1b) = (\lambda V2t \in ty_2Enum_2Enum. \\
& (ap c_2Ebool_2E_7E (ap (ap (ap c_2ETemporal_Logic_2ESUNTIL (\\
& \lambda V3t \in ty_2Enum_2Enum.(ap c_2Ebool_2E_7E (ap V0a V3t)))) V1b \\
& V2t))))))
\end{aligned} \tag{22}$$

Assume the following.

$$\begin{aligned}
& (\forall V0b \in (2^{ty_2Enum_2Enum}).(\forall V1t0 \in ty_2Enum_2Enum. \\
& (((p (ap (ap c_2ETemporal_Logic_2EEVENTUAL V0b) V1t0)) \Leftrightarrow (\forall V2a \in \\
& (2^{ty_2Enum_2Enum}).((p (ap (ap (ap c_2ETemporal_Logic_2EWHEN \\
& V2a) V0b) V1t0)) \Leftrightarrow (p (ap (ap (ap c_2ETemporal_Logic_2ESWHEN V2a) \\
& V0b) V1t0)))))) \wedge (((p (ap (ap c_2ETemporal_Logic_2EEVENTUAL V0b) \\
& V1t0)) \Leftrightarrow (\forall V3a \in (2^{ty_2Enum_2Enum}).((p (ap (ap (ap c_2ETemporal_Logic_2EUNTIL \\
& V3a) V0b) V1t0)) \Leftrightarrow (p (ap (ap (ap c_2ETemporal_Logic_2ESUNTIL V3a) \\
& V0b) V1t0)))))) \wedge ((p (ap (ap c_2ETemporal_Logic_2EEVENTUAL V0b) \\
& V1t0)) \Leftrightarrow (\forall V4a \in (2^{ty_2Enum_2Enum}).((p (ap (ap (ap c_2ETemporal_Logic_2EBEFORE \\
& V4a) V0b) V1t0)) \Leftrightarrow (p (ap (ap (ap c_2ETemporal_Logic_2ESBEFORE \\
& V4a) V0b) V1t0)))))))))
\end{aligned} \tag{23}$$

Assume the following.

$$\begin{aligned}
& (\forall V0y \in (2^{ty_2Enum_2Enum}). (\forall V1b \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2a \in (2^{ty_2Enum_2Enum}). ((V0y = (\lambda V3t \in ty_2Enum_2Enum. \\
& (ap (ap (ap (c_2Ebool_2ECOND 2) (ap V1b V3t)) (ap V2a V3t)) (ap V0y \\
& (ap (ap c_2Earithmetic_2E_2B V3t) (ap c_2Earithmetic_2ENUMERAL \\
& (ap c_2Earithmetic_2EBIT1 c_2Earithmetic_2EZERO)))))) \Leftrightarrow ((\\
& V0y = (ap (ap c_2ETemporal_Logic_2EWHEN V2a) V1b)) \vee (V0y = (ap (\\
& ap c_2ETemporal_Logic_2ESWHEN V2a) V1b))))))
\end{aligned} \tag{24}$$

Assume the following.

$$\begin{aligned}
& ((ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 c_2Earithmetic_2EZERO)) = \\
& (ap c_2Enum_2ESUC c_2Enum_2E0))
\end{aligned} \tag{25}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& ((ap (ap c_2Earithmetic_2E_2B c_2Enum_2E0) V0m) = V0m) \wedge (((ap (\\
& ap c_2Earithmetic_2E_2B V0m) c_2Enum_2E0) = V0m) \wedge (((ap (ap c_2Earithmetic_2E_2B \\
& (ap c_2Enum_2ESUC V0m)) V1n) = (ap c_2Enum_2ESUC (ap (ap c_2Earithmetic_2E_2B \\
& V0m) V1n))) \wedge ((ap (ap c_2Earithmetic_2E_2B V0m) (ap c_2Enum_2ESUC \\
& V1n)) = (ap c_2Enum_2ESUC (ap (ap c_2Earithmetic_2E_2B V0m) V1n))))))
\end{aligned} \tag{26}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& (ap (ap c_2Earithmetic_2E_2B V0m) V1n) = (ap (ap c_2Earithmetic_2E_2B \\
& V1n) V0m)))
\end{aligned} \tag{27}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \forall V2p \in ty_2Enum_2Enum. ((ap (ap c_2Earithmetic_2E_2B V0m) \\
& (ap (ap c_2Earithmetic_2E_2B V1n) V2p)) = (ap (ap c_2Earithmetic_2E_2B \\
& (ap (ap c_2Earithmetic_2E_2B V0m) V1n)) V2p))))
\end{aligned} \tag{28}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& (p (ap (ap c_2Eprim_rec_2E_3C V0m) V1n)) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& (ap c_2Enum_2ESUC V0m)) V1n))))
\end{aligned} \tag{29}$$

Assume the following.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& c_2Enum_2E0) V0n)))
\end{aligned} \tag{30}$$

Assume the following.

$$(\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\neg(p (ap (ap c_2Eprim_rec_2E_3C V0m) V1n))) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D V1n) V0m)))))) \quad (31)$$

Assume the following.

$$(\forall V0m \in ty_2Enum_2Enum. ((ap c_2Enum_2ESUC V0m) = (ap (ap c_2Earithmetic_2E_2B V0m) (ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 c_2Earithmetic_2EZERO)))))) \quad (32)$$

Assume the following.

$$(\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. ((ap (ap c_2Earithmetic_2E_2A c_2Enum_2E0) V0m) = c_2Enum_2E0) \wedge ((ap (ap c_2Earithmetic_2E_2A V0m) c_2Enum_2E0) = c_2Enum_2E0) \wedge (((ap (ap c_2Earithmetic_2E_2A (ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 c_2Earithmetic_2EZERO))) V0m) = V0m) \wedge ((ap (ap c_2Earithmetic_2E_2A V0m) (ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 c_2Earithmetic_2EZERO))) = V0m) \wedge ((ap (ap c_2Earithmetic_2E_2A (ap c_2Enum_2ESUC V0m)) V1n) = (ap c_2Earithmetic_2E_2B (ap (ap c_2Earithmetic_2E_2A V0m) V1n))) \wedge ((ap (ap c_2Earithmetic_2E_2A V0m) (ap c_2Enum_2ESUC V1n)) = (ap (ap c_2Earithmetic_2E_2B V0m) (ap (ap c_2Earithmetic_2E_2A V0m) V1n)))))))))) \quad (33)$$

Assume the following.

$$(\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\forall V2p \in ty_2Enum_2Enum. ((p (ap (ap c_2Earithmetic_2E_3C_3D V0m) V1n)) \wedge (p (ap (ap c_2Earithmetic_2E_3C_3D V1n) V2p))) \Rightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D V0m) V2p)))))) \quad (34)$$

Assume the following.

$$(\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (p (ap (ap c_2Eprim_rec_2E_3C V1n) V0m)) \Rightarrow (\exists V2p \in ty_2Enum_2Enum. (V0m = (ap (ap c_2Earithmetic_2E_2B V1n) (ap (ap c_2Earithmetic_2E_2B V2p) (ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 c_2Earithmetic_2EZERO)))))))))) \quad (35)$$

Assume the following.

$$(\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (V0m = V1n) \Leftrightarrow ((p (ap (ap c_2Earithmetic_2E_3C_3D V0m) V1n)) \wedge (p (ap (ap c_2Earithmetic_2E_3C_3D V1n) V0m)))))) \quad (36)$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \quad \forall V2p \in ty_2Enum_2Enum. ((p (ap (ap c_2Earithmetic_2E_3C_3D \\
& (ap (ap c_2Earithmetic_2E_2B V0m) V1n)) (ap (ap c_2Earithmetic_2E_2B \\
& \quad V0m) V2p))) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D V1n) V2p))))))
\end{aligned} \tag{37}$$

Assume the following.

$$\begin{aligned}
& (\forall V0m \in ty_2Enum_2Enum. (\forall V1n \in ty_2Enum_2Enum. (\\
& \quad (\neg(V0m = V1n)) \Leftrightarrow ((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Enum_2ESUC \\
& \quad V0m)) V1n)) \vee (p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Enum_2ESUC \\
& \quad \quad V1n)) V0m))))))
\end{aligned} \tag{38}$$

Assume the following.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. ((ap c_2Enum_2ESUC V0n) = (ap (ap \\
& \quad c_2Earithmetic_2E_2B (ap c_2Earithmetic_2ENUMERAL (ap c_2Earithmetic_2EBIT1 \\
& \quad \quad c_2Earithmetic_2EZERO))) V0n)))
\end{aligned} \tag{39}$$

Assume the following.

$$True \tag{40}$$

Assume the following.

$$\begin{aligned}
& (\forall V0t1 \in 2. (\forall V1t2 \in 2. (((p V0t1) \Rightarrow (p V1t2)) \Rightarrow (((p \\
& \quad V1t2) \Rightarrow (p V0t1)) \Rightarrow ((p V0t1) \Leftrightarrow (p V1t2))))))
\end{aligned} \tag{41}$$

Assume the following.

$$(\forall V0t \in 2. (False \Rightarrow (p V0t))) \tag{42}$$

Assume the following.

$$(\forall V0t \in 2. ((p V0t) \vee (\neg(p V0t)))) \tag{43}$$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty A_27a \Rightarrow \forall A_27b.nonempty A_27b \Rightarrow (\\
& \quad \forall V0t1 \in A_27a. (\forall V1t2 \in A_27b. ((ap (\lambda V2x \in A_27b. \\
& \quad \quad V0t1) V1t2) = V0t1)))
\end{aligned} \tag{44}$$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty A_27a \Rightarrow (\forall V0t \in 2. ((\forall V1x \in \\
& \quad A_27a. (p V0t)) \Leftrightarrow (p V0t)))
\end{aligned} \tag{45}$$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty A_27a \Rightarrow (\forall V0t \in 2. ((\exists V1x \in \\
& \quad A_27a. (p V0t)) \Leftrightarrow (p V0t)))
\end{aligned} \tag{46}$$

Assume the following.

$$(\forall V0t \in 2.(((True \wedge (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \wedge True) \Leftrightarrow (p V0t)) \wedge (((False \wedge (p V0t)) \Leftrightarrow False) \wedge (((p V0t) \wedge False) \Leftrightarrow False) \wedge (((p V0t) \wedge (p V0t)) \Leftrightarrow (p V0t)))))) \quad (47)$$

Assume the following.

$$(\forall V0t \in 2.(((True \vee (p V0t)) \Leftrightarrow True) \wedge (((p V0t) \vee True) \Leftrightarrow True) \wedge (((False \vee (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \vee False) \Leftrightarrow (p V0t)) \wedge (((p V0t) \vee (p V0t)) \Leftrightarrow (p V0t)))))) \quad (48)$$

Assume the following.

$$(\forall V0t \in 2.(((True \Rightarrow (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \Rightarrow True) \Leftrightarrow True) \wedge (((False \Rightarrow (p V0t)) \Leftrightarrow True) \wedge (((p V0t) \Rightarrow (p V0t)) \Leftrightarrow True) \wedge (((p V0t) \Rightarrow False) \Leftrightarrow (\neg(p V0t)))))) \quad (49)$$

Assume the following.

$$((\forall V0t \in 2.((\neg(\neg(p V0t))) \Leftrightarrow (p V0t)) \wedge ((\neg True) \Leftrightarrow False) \wedge ((\neg False) \Leftrightarrow True))) \quad (50)$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow (\forall V0x \in A_27a.((V0x = V0x) \Leftrightarrow True)) \quad (51)$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow (\forall V0x \in A_27a.(\forall V1y \in A_27a.((V0x = V1y) \Leftrightarrow (V1y = V0x)))) \quad (52)$$

Assume the following.

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

Assume the following.

$$(\forall V0A \in 2.(\forall V1B \in 2.(((\neg((p V0A) \wedge (p V1B))) \Leftrightarrow ((\neg(p V0A)) \vee (\neg(p V1B)))) \wedge (((\neg(p V0A)) \vee (p V1B)) \Leftrightarrow ((\neg(p V0A)) \wedge (\neg(p V1B))))))) \quad (54)$$

Assume the following.

$$(\forall V0t \in 2.(((p V0t) \Rightarrow False) \Leftrightarrow ((p V0t) \Leftrightarrow False))) \quad (55)$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(\forall V2t3 \in 2.(((p V0t1) \Rightarrow ((p V1t2) \Rightarrow (p V2t3))) \Leftrightarrow (((p V0t1) \wedge (p V1t2)) \Rightarrow (p V2t3)))))) \quad (56)$$

Assume the following.

$$\begin{aligned}
& (\forall V0P \in (2^{ty_2Enum_2Enum}).(((p (ap V0P c_2Enum_2E0))) \wedge \\
& (\forall V1n \in ty_2Enum_2Enum.((p (ap V0P V1n)) \Rightarrow (p (ap V0P (ap c_2Enum_2ESUC \\
& V1n)))))) \Rightarrow (\forall V2n \in ty_2Enum_2Enum.(p (ap V0P V2n))))))
\end{aligned} \tag{57}$$

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.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. (\forall V1m \in ty_2Enum_2Enum. (\\
& ((p (ap (ap (ap c_2Earithmetic_2E_3C_3D c_2Earithmetic_2EZERO) V0n)) \Leftrightarrow \\
& True) \wedge (((p (ap (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT1 \\
& V0n)) c_2Earithmetic_2EZERO)) \Leftrightarrow False) \wedge (((p (ap (ap c_2Earithmetic_2E_3C_3D \\
& (ap c_2Earithmetic_2EBIT2 V0n)) c_2Earithmetic_2EZERO)) \Leftrightarrow False) \wedge \\
& (((p (ap (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT1 \\
& V0n)) (ap c_2Earithmetic_2EBIT1 V1m)) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& V0n) V1m))) \wedge (((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT1 \\
& V0n)) (ap c_2Earithmetic_2EBIT2 V1m)) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& V0n) V1m))) \wedge (((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT2 \\
& V0n)) (ap c_2Earithmetic_2EBIT1 V1m)) \Leftrightarrow (\neg (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& V1m) V0n)))) \wedge ((p (ap (ap c_2Earithmetic_2E_3C_3D (ap c_2Earithmetic_2EBIT2 \\
& V0n)) (ap c_2Earithmetic_2EBIT2 V1m)) \Leftrightarrow (p (ap (ap c_2Earithmetic_2E_3C_3D \\
& V0n) V1m)))))))))))))
\end{aligned} \tag{59}$$

Assume the following.

$$\begin{aligned}
& (((ap c_2Eprim_rec_2EPRE c_2Enum_2E0) = c_2Enum_2E0) \wedge (\forall V0m \in \\
& ty_2Enum_2Enum. ((ap c_2Eprim_rec_2EPRE (ap c_2Enum_2ESUC V0m)) = \\
& V0m)))
\end{aligned} \tag{60}$$

Assume the following.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. (\neg (p (ap (ap c_2Eprim_rec_2E_3C \\
& V0n) V0n))))
\end{aligned} \tag{61}$$

Assume the following.

$$\begin{aligned}
& (\forall V0n \in ty_2Enum_2Enum. (p (ap (ap c_2Eprim_rec_2E_3C c_2Enum_2E0) \\
& (ap c_2Enum_2ESUC V0n))))
\end{aligned} \tag{62}$$

Assume the following.

$$\begin{aligned}
& (\forall V0t \in 2. ((\neg(\neg(p V0t))) \Leftrightarrow (p V0t)))
\end{aligned} \tag{63}$$

Assume the following.

$$\begin{aligned}
& (\forall V0A \in 2. ((p V0A) \Rightarrow ((\neg(p V0A)) \Rightarrow False)))
\end{aligned} \tag{64}$$

Assume the following.

$$\begin{aligned}
& (\forall V0A \in 2. (\forall V1B \in 2. (((\neg((p V0A) \vee (p V1B))) \Rightarrow False) \Leftrightarrow \\
& (((p V0A) \Rightarrow False) \Rightarrow ((\neg(p V1B)) \Rightarrow False))))))
\end{aligned} \tag{65}$$

Assume the following.

$$\begin{aligned}
& (\forall V0A \in 2. (\forall V1B \in 2. (((\neg(\neg(p V0A)) \vee (p V1B))) \Rightarrow False) \Leftrightarrow \\
& ((p V0A) \Rightarrow ((\neg(p V1B)) \Rightarrow False))))))
\end{aligned} \tag{66}$$

Assume the following.

$$(\forall V0A \in 2.((\neg(p V0A)) \Rightarrow False) \Rightarrow ((p V0A) \Rightarrow False) \Rightarrow False)) \quad (67)$$

Assume the following.

$$\begin{aligned} & (\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p V0p) \Leftrightarrow (\\ & (p V1q) \Leftrightarrow (p V2r))) \Leftrightarrow (((p V0p) \vee ((p V1q) \vee (p V2r))) \wedge (((p V0p) \vee (\neg(\\ & p V2r)) \vee (\neg(p V1q)))) \wedge (((p V1q) \vee (\neg(p V2r)) \vee (\neg(p V0p)))) \wedge ((p V2r) \vee \\ & ((\neg(p V1q)) \vee (\neg(p V0p)))))))))) \end{aligned} \quad (68)$$

Assume the following.

$$\begin{aligned} & (\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p V0p) \Leftrightarrow (\\ & (p V1q) \wedge (p V2r))) \Leftrightarrow (((p V0p) \vee (\neg(p V1q)) \vee (\neg(p V2r))) \wedge (((p V1q) \vee \\ & (\neg(p V0p))) \wedge ((p V2r) \vee (\neg(p V0p)))))))) \end{aligned} \quad (69)$$

Assume the following.

$$\begin{aligned} & (\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p V0p) \Leftrightarrow (\\ & (p V1q) \vee (p V2r))) \Leftrightarrow (((p V0p) \vee (\neg(p V1q))) \wedge (((p V0p) \vee (\neg(p V2r))) \wedge \\ & ((p V1q) \vee ((p V2r) \vee (\neg(p V0p)))))))) \end{aligned} \quad (70)$$

Assume the following.

$$\begin{aligned} & (\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p V0p) \Leftrightarrow (\\ & (p V1q) \Rightarrow (p V2r))) \Leftrightarrow (((p V0p) \vee (p V1q)) \wedge (((p V0p) \vee (\neg(p V2r))) \wedge (\\ & \neg(p V1q)) \vee ((p V2r) \vee (\neg(p V0p)))))))) \end{aligned} \quad (71)$$

Assume the following.

$$\begin{aligned} & (\forall V0p \in 2.(\forall V1q \in 2.(((p V0p) \Leftrightarrow (\neg(p V1q))) \Leftrightarrow (((p V0p) \vee \\ & (p V1q)) \wedge ((\neg(p V1q)) \vee (\neg(p V0p)))))) \end{aligned} \quad (72)$$

Assume the following.

$$\begin{aligned} & (\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(\forall V3s \in \\ & 2.(((p V0p) \Leftrightarrow (p (ap (ap (ap (c_2Ebool_2ECOND 2) V1q) V2r) V3s))) \Leftrightarrow \\ & (((p V0p) \vee ((p V1q) \vee (\neg(p V3s)))) \wedge (((p V0p) \vee ((\neg(p V2r)) \vee (\neg(p V1q)))) \wedge \\ & (((p V0p) \vee (\neg(p V2r)) \vee (\neg(p V3s)))) \wedge (((\neg(p V1q)) \vee ((p V2r) \vee (\neg(\\ & p V0p)))) \wedge ((p V1q) \vee ((p V3s) \vee (\neg(p V0p)))))))))) \end{aligned} \quad (73)$$

Theorem 1

$$\begin{aligned}
& (\forall V0l \in (2^{ty_2Enum_2Enum}).(\forall V1a \in (2^{ty_2Enum_2Enum}). \\
& (\forall V2b \in (2^{ty_2Enum_2Enum}).(((V0l = (ap\ c_2ETemporal_Logic_2ENEXT \\
& V1a)) \Leftrightarrow (True \wedge ((\forall V3t \in ty_2Enum_2Enum.((p\ (ap\ V0l\ V3t)) \Leftrightarrow \\
& (p\ (ap\ V1a\ (ap\ c_2Enum_2ESUC\ V3t)))))) \wedge True))) \wedge (((V0l = (ap\ c_2ETemporal_Logic_2EALWAYS \\
& V1a)) \Leftrightarrow (True \wedge ((\forall V4t \in ty_2Enum_2Enum.((p\ (ap\ V0l\ V4t)) \Leftrightarrow \\
& ((p\ (ap\ V1a\ V4t)) \wedge (p\ (ap\ V0l\ (ap\ c_2Enum_2ESUC\ V4t)))))) \wedge (\forall V5t1 \in \\
& ty_2Enum_2Enum.(\exists V6t2 \in ty_2Enum_2Enum.((p\ (ap\ V1a\ (ap \\
& (ap\ c_2Earithmetic_2E_2B\ V5t1\ V6t2)))))) \Rightarrow (p\ (ap\ V0l\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V5t1\ V6t2)))))) \wedge (((V0l = (ap\ c_2ETemporal_Logic_2EEVENTUAL \\
& V1a)) \Leftrightarrow (True \wedge ((\forall V7t \in ty_2Enum_2Enum.((p\ (ap\ V0l\ V7t)) \Leftrightarrow \\
& ((p\ (ap\ V1a\ V7t)) \vee (p\ (ap\ V0l\ (ap\ c_2Enum_2ESUC\ V7t)))))) \wedge (\forall V8t1 \in \\
& ty_2Enum_2Enum.(\exists V9t2 \in ty_2Enum_2Enum.((p\ (ap\ V0l\ (ap \\
& (ap\ c_2Earithmetic_2E_2B\ V8t1\ V9t2)))))) \Rightarrow (p\ (ap\ V1a\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V8t1\ V9t2)))))) \wedge (((V0l = (ap\ (ap\ c_2ETemporal_Logic_2ESUNTIL \\
& V1a\ V2b)) \Leftrightarrow (True \wedge ((\forall V10t \in ty_2Enum_2Enum.((p\ (ap\ V0l\ V10t)) \Leftrightarrow \\
& ((\neg(p\ (ap\ V2b\ V10t))) \Rightarrow ((p\ (ap\ V1a\ V10t)) \wedge (p\ (ap\ V0l\ (ap\ c_2Enum_2ESUC \\
& V10t)))))) \wedge (\forall V11t1 \in ty_2Enum_2Enum.(\exists V12t2 \in \\
& ty_2Enum_2Enum.((p\ (ap\ V0l\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V11t1 \\
& V12t2)))) \Rightarrow ((\neg(p\ (ap\ V1a\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V11t1\ V12t2)))) \vee \\
& (p\ (ap\ V2b\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V11t1\ V12t2)))))) \wedge \\
& (((V0l = (ap\ (ap\ c_2ETemporal_Logic_2ESWHEN\ V1a)\ V2b)) \Leftrightarrow (True \wedge \\
& ((\forall V13t \in ty_2Enum_2Enum.((p\ (ap\ V0l\ V13t)) \Leftrightarrow (p\ (ap\ (ap\ (ap \\
& (c_2Ebool_2ECOND\ 2)\ (ap\ V2b\ V13t))\ (ap\ V1a\ V13t))\ (ap\ V0l\ (ap\ c_2Enum_2ESUC \\
& V13t)))))) \wedge (\forall V14t1 \in ty_2Enum_2Enum.(\exists V15t2 \in ty_2Enum_2Enum. \\
& ((p\ (ap\ V0l\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V14t1\ V15t2)))) \Rightarrow (p\ (ap\ \\
& V2b\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V14t1\ V15t2)))))) \wedge (((V0l = \\
& (ap\ (ap\ c_2ETemporal_Logic_2ESBEFORE\ V1a)\ V2b)) \Leftrightarrow (True \wedge ((\forall V16t \in \\
& ty_2Enum_2Enum.((p\ (ap\ V0l\ V16t)) \Leftrightarrow ((\neg(p\ (ap\ V2b\ V16t))) \wedge (p\ (ap \\
& V1a\ V16t)) \vee (p\ (ap\ V0l\ (ap\ c_2Enum_2ESUC\ V16t)))))) \wedge (\forall V17t1 \in \\
& ty_2Enum_2Enum.(\exists V18t2 \in ty_2Enum_2Enum.((p\ (ap\ V0l\ (ap \\
& (ap\ c_2Earithmetic_2E_2B\ V17t1\ V18t2)))) \Rightarrow ((p\ (ap\ V1a\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V17t1\ V18t2)))) \vee (p\ (ap\ V2b\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V17t1 \\
& V18t2)))))) \wedge (((V0l = (ap\ (ap\ c_2ETemporal_Logic_2EUNTIL \\
& V1a)\ V2b)) \Leftrightarrow (True \wedge ((\forall V19t \in ty_2Enum_2Enum.((p\ (ap\ V0l\ V19t)) \Leftrightarrow \\
& ((\neg(p\ (ap\ V2b\ V19t))) \Rightarrow ((p\ (ap\ V1a\ V19t)) \wedge (p\ (ap\ V0l\ (ap\ c_2Enum_2ESUC \\
& V19t)))))) \wedge (\forall V20t1 \in ty_2Enum_2Enum.(\exists V21t2 \in \\
& ty_2Enum_2Enum.((\neg(p\ (ap\ V0l\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V20t1\ V21t2)))) \vee \\
& (p\ (ap\ V2b\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V20t1\ V21t2)))))) \wedge \\
& (((V0l = (ap\ (ap\ c_2ETemporal_Logic_2EWHEN\ V1a)\ V2b)) \Leftrightarrow (True \wedge \\
& ((\forall V22t \in ty_2Enum_2Enum.((p\ (ap\ V0l\ V22t)) \Leftrightarrow (p\ (ap\ (ap\ (ap \\
& (c_2Ebool_2ECOND\ 2)\ (ap\ V2b\ V22t))\ (ap\ V1a\ V22t))\ (ap\ V0l\ (ap\ c_2Enum_2ESUC \\
& V22t)))))) \wedge (\forall V23t1 \in ty_2Enum_2Enum.(\exists V24t2 \in ty_2Enum_2Enum. \\
& ((p\ (ap\ V0l\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V23t1\ V24t2))) \vee (p\ (ap \\
& V2b\ (ap\ (ap\ c_2Earithmetic_2E_2B\ V23t1\ V24t2)))))) \wedge (((V0l = \\
& (ap\ (ap\ c_2ETemporal_Logic_2EBEFORE\ V1a)\ V2b)) \Leftrightarrow (True \wedge ((\forall V25t \in \\
& ty_2Enum_2Enum.((p\ (ap\ V0l\ V25t)) \Leftrightarrow ((\neg(p\ (ap\ V2b\ V25t))) \wedge (p\ (ap \\
& V1a\ V25t)) \vee (p\ (ap\ V0l\ (ap\ c_2Enum_2ESUC\ V25t)))))) \wedge (\forall V26t1 \in \\
& ty_2Enum_2Enum.(\exists V27t2 \in ty_2Enum_2Enum.((\neg(p\ (ap\ V0l \\
& (ap\ (ap\ c_2Earithmetic_2E_2B\ V26t1\ V27t2)))) \Rightarrow ((p\ (ap\ V1a\ (ap\ (\\
& ap\ c_2Earithmetic_2E_2B\ V26t1\ V27t2)))) \vee (p\ (ap\ V2b\ (ap\ (ap\ c_2Earithmetic_2E_2B \\
& V26t1\ V27t2)))))) \wedge (((V0l = (ap\ c_2EPast_Temporal_Logic_2EPNEXT \\
& V1a)) \Leftrightarrow ((p\ (ap\ V0l\ c_2Enum_2E0)) \Leftrightarrow True) \wedge ((\forall V28t \in ty_2Enum_2Enum. \\
& ((p\ (ap\ V0l\ (ap\ c_2Enum_2ESUC\ V28t)) \Leftrightarrow (p\ (ap\ V1a\ V28t))) \wedge True))) \wedge \\
& (((V0l = (ap\ c_2EPast_Temporal_Logic_2EPSNEXT\ V1a)) \Leftrightarrow ((p\ (\\
& ap\ V0l\ c_2Enum_2E0)) \Leftrightarrow False) \wedge ((\forall V29t \in ty_2Enum_2Enum. \\
& ((p\ (ap\ V0l\ (ap\ c_2Enum_2ESUC\ V29t)) \Leftrightarrow (p\ (ap\ V1a\ V29t))) \wedge True))) \wedge \\
& (((V0l = (ap\ c_2EPast_Temporal_Logic_2EPNEXT\ (ap\ c_2EPast_Temporal_Logic_2EPALWAYS \\
& V1a)) \Leftrightarrow ((p\ (ap\ V0l\ c_2Enum_2E0)) \Leftrightarrow True) \wedge ((\forall V30t \in ty_2Enum_2Enum.
\end{aligned}$$