

Definition 8 We define $c_Ebool_2E_2F_5C$ to be $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap (c_Ebool_2E_21 2) (\lambda V2t \in 2.$

Let $ty_2Epair_2Eprod : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A0.nonempty A0 \Rightarrow \forall A1.nonempty A1 \Rightarrow nonempty (ty_2Epair_2Eprod A0 A1) \quad (5)$$

Let $c_2Epair_2EABS_prod : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow \forall A_27b.nonempty A_27b \Rightarrow c_2Epair_2EABS_prod A_27a A_27b \in ((ty_2Epair_2Eprod A_27a A_27b)^{(2^{A_27b})^{A_27a}}) \quad (6)$$

Definition 9 We define $c_2Epair_2E_2C$ to be $\lambda A_27a : \iota.\lambda A_27b : \iota.\lambda V0x \in A_27a.\lambda V1y \in A_27b.(ap (c_2Epair_2EABS_prod$

Let $c_2Epred_set_2EGSPEC : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow \forall A_27b.nonempty A_27b \Rightarrow c_2Epred_set_2EGSPEC A_27a A_27b \in ((2^{A_27a})^{(ty_2Epair_2Eprod A_27a 2)^{A_27b}}) \quad (7)$$

Definition 10 We define $c_2EdirGraph_2EParents$ to be $\lambda A_27a : \iota.\lambda A_27b : \iota.\lambda V0G \in ((ty_2Elist_2Elist A_27a A_27b)$

Definition 11 We define $c_Ebool_2E_5C_2F$ to be $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap (c_Ebool_2E_21 2) (\lambda V2t \in 2.$

Definition 12 We define $c_2Epred_set_2EINSERT$ to be $\lambda A_27a : \iota.\lambda V0x \in A_27a.\lambda V1s \in (2^{A_27a}).(ap (c_2Epred_set_2EGSPEC$

Definition 13 We define $c_2Epred_set_2EEMPTY$ to be $\lambda A_27a : \iota.(\lambda V0x \in A_27a.c_Ebool_2EF)$.

Definition 14 We define $c_2Epred_set_2EFINITE$ to be $\lambda A_27a : \iota.\lambda V0s \in (2^{A_27a}).(ap (c_Ebool_2E_21 2) (\lambda V1t \in 2.$

Let $c_2Elist_2ECONS : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow c_2Elist_2ECONS A_27a \in (((ty_2Elist_2Elist A_27a)^{(ty_2Elist_2Elist A_27a)})^{A_27a}) \quad (8)$$

Let $c_2Elist_2EAPPEND : \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow c_2Elist_2EAPPEND A_27a \in (((ty_2Elist_2Elist A_27a)^{(ty_2Elist_2Elist A_27a)})^{(ty_2Elist_2Elist A_27a)}) \quad (9)$$

Definition 15 We define $c_2Emin_2E_40$ to be $\lambda A.\lambda P \in 2^A.\mathbf{if} (\exists x \in A.p (ap P x)) \mathbf{then} (the (\lambda x.x \in A \wedge p x))$ of type $\iota \Rightarrow \iota$.

Definition 16 We define c_Ebool_2ECOND to be $\lambda A_27a : \iota.(\lambda V0t \in 2.(\lambda V1t1 \in A_27a.(\lambda V2t2 \in A_27a.(\lambda V3t3 \in 2.$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty\ A_27a \Rightarrow \forall A_27b.nonempty\ A_27b \Rightarrow (\\
& \quad \forall V0G \in ((ty_2Elist_2Elist\ A_27a)^{A_27a}). (\forall V1f \in (\\
& \quad (A_27b^{A_27b})^{A_27a}). (\forall V2seen \in (ty_2Elist_2Elist\ A_27a). \\
& \quad (\forall V3acc \in A_27b. (\forall V4h \in A_27a. (\forall V5t \in (ty_2Elist_2Elist \\
& \quad A_27a). ((p\ (ap\ (c_2Epred_set_2EFINITE\ A_27a)\ (ap\ (c_2EdirGraph_2EParents \\
& \quad A_27a\ A_27a)\ V0G))) \Rightarrow (((ap\ (ap\ (ap\ (ap\ (ap\ (c_2Ebft_2EBFT\ A_27b\ A_27a) \\
& \quad V0G)\ V1f)\ V2seen)\ (c_2Elist_2ENIL\ A_27a))\ V3acc) = V3acc) \wedge ((ap \\
& \quad (ap\ (ap\ (ap\ (ap\ (c_2Ebft_2EBFT\ A_27b\ A_27a)\ V0G)\ V1f)\ V2seen)\ (ap \\
& \quad (ap\ (c_2Elist_2ECONS\ A_27a)\ V4h)\ V5t))\ V3acc) = (ap\ (ap\ (ap\ (c_2Ebool_2ECOND \\
& \quad A_27b)\ (ap\ (ap\ (c_2Ebool_2EIN\ A_27a)\ V4h)\ (ap\ (c_2Elist_2ELIST_TO_SET \\
& \quad A_27a)\ V2seen)))\ (ap\ (ap\ (ap\ (ap\ (ap\ (c_2Ebft_2EBFT\ A_27b\ A_27a) \\
& \quad V0G)\ V1f)\ V2seen)\ V5t)\ V3acc))\ (ap\ (ap\ (ap\ (ap\ (ap\ (c_2Ebft_2EBFT \\
& \quad A_27b\ A_27a)\ V0G)\ V1f)\ (ap\ (ap\ (c_2Elist_2ECONS\ A_27a)\ V4h)\ V2seen)) \\
& \quad (ap\ (ap\ (c_2Elist_2EAPPEND\ A_27a)\ V5t)\ (ap\ V0G\ V4h)))\ (ap\ (ap\ V1f \\
& \quad V4h)\ V3acc))))))))) \\
& \hspace{15em} (10)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty\ A_27a \Rightarrow \forall A_27b.nonempty\ A_27b \Rightarrow (\\
& \quad \forall V0P \in (((((2^{A_27b})^{(ty_2Elist_2Elist\ A_27a)})^{(ty_2Elist_2Elist\ A_27a)})^{((A_27b^{A_27b})^{A_27a})})^{(ty_2Elist_2Elist\ A_27a)})^{A_27a} \\
& \quad ((\forall V1G \in ((ty_2Elist_2Elist\ A_27a)^{A_27a}). (\forall V2f \in \\
& \quad ((A_27b^{A_27b})^{A_27a}). (\forall V3seen \in (ty_2Elist_2Elist\ A_27a). \\
& \quad (\forall V4h \in A_27a. (\forall V5t \in (ty_2Elist_2Elist\ A_27a). (\\
& \quad \forall V6acc \in A_27b. ((p\ (ap\ (ap\ (ap\ (ap\ (ap\ V0P\ V1G)\ V2f)\ V3seen) \\
& \quad (c_2Elist_2ENIL\ A_27a))\ V6acc)) \wedge (((p\ (ap\ (c_2Epred_set_2EFINITE \\
& \quad A_27a)\ (ap\ (c_2EdirGraph_2EParents\ A_27a\ A_27a)\ V1G))) \wedge (\neg (p\ (\\
& \quad ap\ (ap\ (c_2Ebool_2EIN\ A_27a)\ V4h)\ (ap\ (c_2Elist_2ELIST_TO_SET \\
& \quad A_27a)\ V3seen)))))) \Rightarrow (p\ (ap\ (ap\ (ap\ (ap\ (ap\ V0P\ V1G)\ V2f)\ (ap\ (ap\ (c_2Elist_2ECONS \\
& \quad A_27a)\ V4h)\ V3seen))\ (ap\ (ap\ (c_2Elist_2EAPPEND\ A_27a)\ V5t)\ (ap \\
& \quad V1G\ V4h)))\ (ap\ (ap\ V2f\ V4h)\ V6acc)))) \wedge (((p\ (ap\ (c_2Epred_set_2EFINITE \\
& \quad A_27a)\ (ap\ (c_2EdirGraph_2EParents\ A_27a\ A_27a)\ V1G))) \wedge (p\ (ap \\
& \quad (ap\ (c_2Ebool_2EIN\ A_27a)\ V4h)\ (ap\ (c_2Elist_2ELIST_TO_SET \\
& \quad A_27a)\ V3seen)))) \Rightarrow (p\ (ap\ (ap\ (ap\ (ap\ (ap\ V0P\ V1G)\ V2f)\ V3seen)\ V5t) \\
& \quad V6acc)))) \Rightarrow (p\ (ap\ (ap\ (ap\ (ap\ (ap\ V0P\ V1G)\ V2f)\ V3seen)\ (ap\ (ap\ (c_2Elist_2ECONS \\
& \quad A_27a)\ V4h)\ V5t))\ V6acc)))))) \Rightarrow (\forall V7v \in ((ty_2Elist_2Elist \\
& \quad A_27a)^{A_27a}). (\forall V8v1 \in ((A_27b^{A_27b})^{A_27a}). (\forall V9v2 \in \\
& \quad (ty_2Elist_2Elist\ A_27a). (\forall V10v3 \in (ty_2Elist_2Elist \\
& \quad A_27a). (\forall V11v4 \in A_27b. (p\ (ap\ (ap\ (ap\ (ap\ (ap\ V0P\ V7v)\ V8v1) \\
& \quad V9v2)\ V10v3)\ V11v4))))))))) \\
& \hspace{15em} (11)
\end{aligned}$$

Assume the following.

$$\text{True} \hspace{15em} (12)$$

Assume the following.

$$\begin{aligned}
& (\forall V0t \in 2.(((True \wedge (p \ V0t)) \Leftrightarrow (p \ V0t)) \wedge (((p \ V0t) \wedge True) \Leftrightarrow \\
& (p \ V0t)) \wedge (((False \wedge (p \ V0t)) \Leftrightarrow False) \wedge (((p \ V0t) \wedge False) \Leftrightarrow False) \wedge \\
& (((p \ V0t) \wedge (p \ V0t)) \Leftrightarrow (p \ V0t)))))) \quad (13)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0t \in 2.(((True \vee (p \ V0t)) \Leftrightarrow True) \wedge (((p \ V0t) \vee True) \Leftrightarrow True) \wedge \\
& (((False \vee (p \ V0t)) \Leftrightarrow (p \ V0t)) \wedge (((p \ V0t) \vee False) \Leftrightarrow (p \ V0t)) \wedge (((p \ V0t) \vee \\
& (p \ V0t)) \Leftrightarrow (p \ V0t)))))) \quad (14)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0t \in 2.(((True \Rightarrow (p \ V0t)) \Leftrightarrow (p \ V0t)) \wedge (((p \ V0t) \Rightarrow True) \Leftrightarrow \\
& True) \wedge (((False \Rightarrow (p \ V0t)) \Leftrightarrow True) \wedge (((p \ V0t) \Rightarrow (p \ V0t)) \Leftrightarrow True) \wedge ((\\
& (p \ V0t) \Rightarrow False) \Leftrightarrow (\neg(p \ V0t)))))) \quad (15)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& ((\forall V0t \in 2.((\neg(\neg(p \ V0t))) \Leftrightarrow (p \ V0t)) \wedge ((\neg True) \Leftrightarrow False) \wedge \\
& ((\neg False) \Leftrightarrow True))) \quad (16)
\end{aligned}$$

Assume the following.

$$\forall A_27a.nonempty \ A_27a \Rightarrow (\forall V0x \in A_27a.(V0x = V0x)) \quad (17)$$

Assume the following.

$$\forall A_27a.nonempty \ A_27a \Rightarrow (\forall V0x \in A_27a.((V0x = V0x) \Leftrightarrow True)) \quad (18)$$

Assume the following.

$$\forall A_27a.nonempty \ A_27a \Rightarrow (\forall V0x \in A_27a.(\forall V1y \in A_27a.((V0x = V1y) \Leftrightarrow (V1y = V0x)))) \quad (19)$$

Assume the following.

$$\begin{aligned}
& (\forall V0t \in 2.(((True \Leftrightarrow (p \ V0t)) \Leftrightarrow (p \ V0t)) \wedge (((p \ V0t) \Leftrightarrow True) \Leftrightarrow \\
& (p \ V0t)) \wedge (((False \Leftrightarrow (p \ V0t)) \Leftrightarrow (\neg(p \ V0t))) \wedge (((p \ V0t) \Leftrightarrow False) \Leftrightarrow (\neg(\\
& p \ V0t)))))) \quad (20)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty \ A_27a \Rightarrow (\forall V0P \in (2^{A_27a}).(\forall V1Q \in \\
& (2^{A_27a}).((\forall V2x \in A_27a.((p \ (ap \ V0P \ V2x)) \wedge (p \ (ap \ V1Q \ V2x)))) \Leftrightarrow \\
& ((\forall V3x \in A_27a.(p \ (ap \ V0P \ V3x))) \wedge (\forall V4x \in A_27a.(p \ (\\
& ap \ V1Q \ V4x)))))) \quad (21)
\end{aligned}$$

Assume the following.

$$\begin{aligned} \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0P \in 2. (\forall V1Q \in (\\ 2^{A_27a}. ((p\ V0P) \wedge (\forall V2x \in A_27a. (p\ (ap\ V1Q\ V2x)))) \Leftrightarrow (\forall V3x \in \\ A_27a. ((p\ V0P) \wedge (p\ (ap\ V1Q\ V3x)))))) \end{aligned} \quad (22)$$

Assume the following.

$$\begin{aligned} \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0Q \in 2. (\forall V1P \in (\\ 2^{A_27a}. ((\forall V2x \in A_27a. ((p\ (ap\ V1P\ V2x)) \vee (p\ V0Q))) \Leftrightarrow ((\forall V3x \in \\ A_27a. (p\ (ap\ V1P\ V3x)) \vee (p\ V0Q)))))) \end{aligned} \quad (23)$$

Assume the following.

$$\begin{aligned} (\forall V0A \in 2. (\forall V1B \in 2. (\forall V2C \in 2. (((p\ V0A) \vee (\\ (p\ V1B) \wedge (p\ V2C))) \Leftrightarrow (((p\ V0A) \vee (p\ V1B)) \wedge ((p\ V0A) \vee (p\ V2C)))))) \end{aligned} \quad (24)$$

Assume the following.

$$\begin{aligned} (\forall V0t1 \in 2. (\forall V1t2 \in 2. (\forall V2t3 \in 2. (((p\ V0t1) \Rightarrow \\ ((p\ V1t2) \Rightarrow (p\ V2t3))) \Leftrightarrow (((p\ V0t1) \wedge (p\ V1t2)) \Rightarrow (p\ V2t3)))))) \end{aligned} \quad (25)$$

Assume the following.

$$\begin{aligned} \forall A_27a.nonempty\ A_27a \Rightarrow \forall A_27b.nonempty\ A_27b \Rightarrow (\\ \forall V0b \in 2. (\forall V1f \in (A_27b^{A_27a}). (\forall V2g \in (A_27b^{A_27a}). \\ (\forall V3x \in A_27a. ((ap\ (ap\ (ap\ (ap\ (c_2Ebool_2ECOND\ A_27b^{A_27a}) \\ V0b)\ V1f)\ V2g)\ V3x) = (ap\ (ap\ (ap\ (c_2Ebool_2ECOND\ A_27b)\ V0b)\ (ap \\ V1f\ V3x))\ (ap\ V2g\ V3x)))))) \end{aligned} \quad (26)$$

Assume the following.

$$\begin{aligned} \forall A_27a.nonempty\ A_27a \Rightarrow \forall A_27b.nonempty\ A_27b \Rightarrow (\\ \forall V0f \in (A_27b^{A_27a}). (\forall V1b \in 2. (\forall V2x \in A_27a. \\ (\forall V3y \in A_27a. ((ap\ V0f\ (ap\ (ap\ (ap\ (c_2Ebool_2ECOND\ A_27a) \\ V1b)\ V2x)\ V3y)) = (ap\ (ap\ (ap\ (c_2Ebool_2ECOND\ A_27b)\ V1b)\ (ap\ V0f \\ V2x))\ (ap\ V0f\ V3y)))))) \end{aligned} \quad (27)$$

Assume the following.

$$\begin{aligned} (\forall V0x \in 2. (\forall V1x_27 \in 2. (\forall V2y \in 2. (\forall V3y_27 \in \\ 2. (((p\ V0x) \Leftrightarrow (p\ V1x_27)) \wedge ((p\ V1x_27) \Rightarrow ((p\ V2y) \Leftrightarrow (p\ V3y_27)))) \Rightarrow \\ ((p\ V0x) \Rightarrow (p\ V2y)) \Leftrightarrow ((p\ V1x_27) \Rightarrow (p\ V3y_27)))))) \end{aligned} \quad (28)$$

Assume the following.

$$\begin{aligned} \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0P \in 2. (\forall V1Q \in 2. \\ (\forall V2x \in A_27a. (\forall V3x_27 \in A_27a. (\forall V4y \in A_27a. \\ (\forall V5y_27 \in A_27a. (((p\ V0P) \Leftrightarrow (p\ V1Q)) \wedge (((p\ V1Q) \Rightarrow (V2x = V3x_27)) \wedge \\ ((\neg(p\ V1Q)) \Rightarrow (V4y = V5y_27)))) \Rightarrow ((ap\ (ap\ (ap\ (c_2Ebool_2ECOND\ A_27a) \\ V0P)\ V2x)\ V4y) = (ap\ (ap\ (ap\ (c_2Ebool_2ECOND\ A_27a)\ V1Q)\ V3x_27) \\ V5y_27)))))) \end{aligned} \quad (29)$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow ((\forall V0l \in (ty_2Elist_2Elist \\ & A_27a).(ap\ (ap\ (c_2Elist_2EAPPEND\ A_27a)\ (c_2Elist_2ENIL\ A_27a)) \\ & V0l) = V0l) \wedge (\forall V1l1 \in (ty_2Elist_2Elist\ A_27a).(\forall V2l2 \in \\ & (ty_2Elist_2Elist\ A_27a).(\forall V3h \in A_27a.((ap\ (ap\ (c_2Elist_2EAPPEND \\ & A_27a)\ (ap\ (ap\ (c_2Elist_2ECONS\ A_27a)\ V3h)\ V1l1))\ V2l2) = (ap\ (ap \\ & (c_2Elist_2ECONS\ A_27a)\ V3h)\ (ap\ (ap\ (c_2Elist_2EAPPEND\ A_27a) \\ & V1l1)\ V2l2))))))))) \end{aligned} \quad (30)$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow ((\forall V0l1 \in (ty_2Elist_2Elist \\ & A_27a).(\forall V1l2 \in (ty_2Elist_2Elist\ A_27a).(\forall V2l3 \in \\ & (ty_2Elist_2Elist\ A_27a).((ap\ (ap\ (c_2Elist_2EAPPEND\ A_27a) \\ & V0l1)\ V1l2) = (ap\ (ap\ (c_2Elist_2EAPPEND\ A_27a)\ V0l1)\ V2l3)) \Leftrightarrow (V1l2 = \\ & V2l3)))))) \wedge (\forall V3l1 \in (ty_2Elist_2Elist\ A_27a).(\forall V4l2 \in \\ & (ty_2Elist_2Elist\ A_27a).(\forall V5l3 \in (ty_2Elist_2Elist\ A_27a). \\ & (((ap\ (ap\ (c_2Elist_2EAPPEND\ A_27a)\ V4l2)\ V3l1) = (ap\ (ap\ (c_2Elist_2EAPPEND \\ & A_27a)\ V5l3)\ V3l1)) \Leftrightarrow (V4l2 = V5l3))))))))) \end{aligned} \quad (31)$$

Assume the following.

$$(\forall V0t \in 2.((\neg(\neg(p\ V0t))) \Leftrightarrow (p\ V0t))) \quad (32)$$

Assume the following.

$$(\forall V0A \in 2.((p\ V0A) \Rightarrow ((\neg(p\ V0A)) \Rightarrow False))) \quad (33)$$

Assume the following.

$$\begin{aligned} & (\forall V0A \in 2.(\forall V1B \in 2.(((\neg((p\ V0A) \vee (p\ V1B))) \Rightarrow False) \Leftrightarrow \\ & ((p\ V0A) \Rightarrow False) \Rightarrow ((\neg(p\ V1B)) \Rightarrow False)))))) \end{aligned} \quad (34)$$

Assume the following.

$$\begin{aligned} & (\forall V0A \in 2.(\forall V1B \in 2.(((\neg((\neg(p\ V0A)) \vee (p\ V1B))) \Rightarrow False) \Leftrightarrow \\ & ((p\ V0A) \Rightarrow ((\neg(p\ V1B)) \Rightarrow False)))))) \end{aligned} \quad (35)$$

Assume the following.

$$(\forall V0A \in 2.(((\neg(p\ V0A)) \Rightarrow False) \Rightarrow (((p\ V0A) \Rightarrow False) \Rightarrow False))) \quad (36)$$

Assume the following.

$$\begin{aligned} & (\forall V0p \in 2.(\forall V1q \in 2.(\forall V2r \in 2.(((p\ V0p) \Leftrightarrow (\\ & (p\ V1q) \Leftrightarrow (p\ V2r))) \Leftrightarrow (((p\ V0p) \vee ((p\ V1q) \vee (p\ V2r))) \wedge (((p\ V0p) \vee ((\neg \\ & p\ V2r)) \vee (\neg(p\ V1q)))) \wedge (((p\ V1q) \vee ((\neg(p\ V2r)) \vee (\neg(p\ V0p)))) \wedge ((p\ V2r) \vee \\ & ((\neg(p\ V1q)) \vee (\neg(p\ V0p))))))))))))) \end{aligned} \quad (37)$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p V0p) \Leftrightarrow (\\
& (p V1q) \wedge (p V2r))) \Leftrightarrow (((p V0p) \vee (\neg(p V1q)) \vee (\neg(p V2r)))) \wedge (((p V1q) \vee \\
& (\neg(p V0p))) \wedge ((p V2r) \vee (\neg(p V0p))))))))))
\end{aligned} \tag{38}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p V0p) \Leftrightarrow (\\
& (p V1q) \vee (p V2r))) \Leftrightarrow (((p V0p) \vee (\neg(p V1q))) \wedge ((p V0p) \vee (\neg(p V2r)))) \wedge \\
& ((p V1q) \vee ((p V2r) \vee (\neg(p V0p))))))))))
\end{aligned} \tag{39}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p V0p) \Leftrightarrow (\\
& (p V1q) \Rightarrow (p V2r))) \Leftrightarrow (((p V0p) \vee (p V1q)) \wedge ((p V0p) \vee (\neg(p V2r))) \wedge (\\
& \neg(p V1q) \vee ((p V2r) \vee (\neg(p V0p))))))))))
\end{aligned} \tag{40}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (((p V0p) \Leftrightarrow (\neg(p V1q))) \Leftrightarrow (((p V0p) \vee \\
& (p V1q)) \wedge ((\neg(p V1q)) \vee (\neg(p V0p))))))
\end{aligned} \tag{41}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (\forall V3s \in \\
& 2. (((p V0p) \Leftrightarrow (ap (ap (ap (c_2Ebool.2ECOND 2) V1q) V2r) V3s))) \Leftrightarrow \\
& (((p V0p) \vee ((p V1q) \vee (\neg(p V3s)))) \wedge (((p V0p) \vee (\neg(p V2r)) \vee (\neg(p V1q)))) \wedge \\
& (((p V0p) \vee (\neg(p V2r)) \vee (\neg(p V3s)))) \wedge ((\neg(p V1q)) \vee ((p V2r) \vee (\neg \\
& p V0p)))) \wedge ((p V1q) \vee ((p V3s) \vee (\neg(p V0p))))))))))
\end{aligned} \tag{42}$$

Assume the following.

$$(\forall V0p \in 2. (\forall V1q \in 2. ((\neg((p V0p) \Rightarrow (p V1q))) \Rightarrow (p V0p))) \tag{43}$$

Assume the following.

$$(\forall V0p \in 2. (\forall V1q \in 2. ((\neg((p V0p) \Rightarrow (p V1q))) \Rightarrow (\neg(p V1q)))) \tag{44}$$

Assume the following.

$$(\forall V0p \in 2. (\forall V1q \in 2. ((\neg((p V0p) \vee (p V1q))) \Rightarrow (\neg(p V0p)))) \tag{45}$$

Assume the following.

$$(\forall V0p \in 2. (\forall V1q \in 2. ((\neg((p V0p) \vee (p V1q))) \Rightarrow (\neg(p V1q)))) \tag{46}$$

Assume the following.

$$(\forall V0p \in 2. ((\neg(\neg(p V0p))) \Rightarrow (p V0p))) \tag{47}$$

Theorem 1

$$\begin{aligned} & \forall A_{27a}. \text{nonempty } A_{27a} \Rightarrow (\forall V0G \in ((\text{ty_2Elist_2Elist} \\ & A_{27a})^{A_{27a}}). (\forall V1f \in (((\text{ty_2Elist_2Elist } A_{27a})^{(\text{ty_2Elist_2Elist } A_{27a})})^{A_{27a}}). \\ & (\forall V2seen \in (\text{ty_2Elist_2Elist } A_{27a}). (\forall V3fringe \in \\ & (\text{ty_2Elist_2Elist } A_{27a}). (\forall V4acc \in (\text{ty_2Elist_2Elist} \\ & A_{27a}). (\forall V5a \in (\text{ty_2Elist_2Elist } A_{27a}). (\forall V6b \in \\ & (\text{ty_2Elist_2Elist } A_{27a}). (((p (ap (c_2Epred_set_2EFINITE } A_{27a}) \\ & (ap (c_2EdirGraph_2EParents } A_{27a} } A_{27a}) } V0G))) \wedge ((V1f = (c_2Elist_2ECONS \\ & A_{27a})) \wedge (V4acc = (ap (ap (c_2Elist_2EAPPEND } A_{27a}) } V5a) } V6b)))))) \Rightarrow \\ & ((ap (ap (ap (ap (ap (ap (c_2Ebft_2EBFT (ty_2Elist_2Elist } A_{27a}) } A_{27a}) \\ & V0G) } V1f) } V2seen) } V3fringe) } V4acc) = (ap (ap (c_2Elist_2EAPPEND \\ & A_{27a}) (ap (ap (ap (ap (ap (c_2Ebft_2EBFT (ty_2Elist_2Elist } A_{27a}) \\ & A_{27a}) } V0G) } V1f) } V2seen) } V3fringe) } V5a)) } V6b))))))))) \end{aligned}$$