

thm_2Erelation_2ETC_INDUCT__ALT__RIGHT
 (TMXi9nC1JWcXDtLj1kNn4DuvGxxaibdXMu8)

October 26, 2020

Definition 1 We define $c_2Emin_2E_3D_3D_3E$ to be $\lambda P \in 2.\lambda Q \in 2.inj_o (p \Rightarrow p Q)$ of type ι .

Definition 2 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 3 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 4 We define $c_2Ebool_2E_21$ to be $\lambda A_27a : \iota.(\lambda V0P \in (2^{A_27a}).(ap (ap (c_2Emin_2E_3D (2^{A_27a})) (\lambda V0t \in 2.V0t)) (\lambda V1t \in 2.V1t)))$

Definition 5 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 6 We define c_2Ebool_2EF to be $(ap (c_2Ebool_2E_21 2) (\lambda V0t \in 2.V0t))$.

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

Definition 8 We define $c_2Emin_2E_40$ to be $\lambda A.\lambda P \in 2^A.\text{if } (\exists x \in A.p (ap P x)) \text{ then } (\text{the } (\lambda x.x \in A \wedge p x)) \text{ else } (\lambda x.x \in A \wedge \neg p x)$ of type $\iota \Rightarrow \iota$.

Definition 9 We define c_2Ebool_2ECOND to be $\lambda A_27a : \iota.(\lambda V0t \in 2.(\lambda V1t1 \in A_27a.(\lambda V2t2 \in A_27a.(ap (c_2Ebool_2E_21 2) (\lambda V3t3 \in 2.V3t3))))))$

Definition 10 We define $c_2Ebool_2E_7E$ to be $(\lambda V0t \in 2.(ap (ap c_2Emin_2E_3D_3D_3E V0t) c_2Ebool_2E_21 2)))$

Definition 11 We define $c_2Erelation_2ETC$ to be $\lambda A_27a : \iota.\lambda V0R \in ((2^{A_27a})^{A_27a}).\lambda V1a \in A_27a.\lambda V2b \in A_27b.(\lambda V3c \in A_27c.(\lambda V4d \in A_27d.(\lambda V5e \in A_27e.(\lambda V6f \in A_27f.(\lambda V7g \in A_27g.(\lambda V8h \in A_27h.(\lambda V9i \in A_27i.(\lambda V10j \in A_27j.(\lambda V11k \in A_27k.(\lambda V12l \in A_27l.(\lambda V13m \in A_27m.(\lambda V14n \in A_27n.(\lambda V15o \in A_27o.(\lambda V16p \in A_27p.(\lambda V17q \in A_27q.(\lambda V18r \in A_27r.(\lambda V19s \in A_27s.(\lambda V20t \in A_27t.(\lambda V21u \in A_27u.(\lambda V22v \in A_27v.(\lambda V23w \in A_27w.(\lambda V24x \in A_27x.(\lambda V25y \in A_27y.(\lambda V26z \in A_27z.(\lambda V27a \in A_27a.(\lambda V28b \in A_27b.(\lambda V29c \in A_27c.(\lambda V30d \in A_27d.(\lambda V31e \in A_27e.(\lambda V32f \in A_27f.(\lambda V33g \in A_27g.(\lambda V34h \in A_27h.(\lambda V35i \in A_27i.(\lambda V36j \in A_27j.(\lambda V37k \in A_27k.(\lambda 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\in A_27b.(\lambda V601c \in A_27c.(\lambda V602d \in A_27d.(\lambda V603e \in A_27e.(\lambda V604f \in A_27f.(\lambda V605g \in A_27g.(\lambda V606h \in A_27h.(\lambda V607i \in A_27i.(\lambda V608j \in A_27j.(\lambda V609k \in A_27k.(\lambda V610l \in A_27l.(\lambda V611m \in A_27m.(\lambda V612n \in A_27n.(\lambda V613o \in A_27o.(\lambda V614p \in A_27p.(\lambda V615q \in A_27q.(\lambda V616r \in A_27r.(\lambda V617s \in A_27s.(\lambda V618t \in A_27t.(\lambda V619u \in A_27u.(\lambda V620v \in A_27v.(\lambda V621w \in A_27w.(\lambda V622x \in A_27x.(\lambda V623y \in A_27y.(\lambda V624z \in A_27z.(\lambda V625a \in A_27a.(\lambda V626b \in A_27b.(\lambda V627c \in A_27c.(\lambda V628d \in A_27d.(\lambda V629e \in A_27e.(\lambda V630f \in A_27f.(\lambda V631g \in A_27g.(\lambda V632h \in A_27h.(\lambda V633i \in A_27i.(\lambda V634j \in A_27j.(\lambda V635k \in A_27k.(\lambda V636l \in A_27l.(\lambda V637m \in A_27m.(\lambda V638n \in A_27n.(\lambda V639o \in A_27o.(\lambda V640p \in A_27p.(\lambda V641q \in A_27q.(\lambda V642r \in A_27r.(\lambda V643s \in A_27s.(\lambda V644t \in A_27t.(\lambda V645u \in A_27u.(\lambda V646v \in A_27v.(\lambda V647w \in A_27w.(\lambda V648x \in A_27x.(\lambda V649y \in A_27y.(\lambda V650z \in A_27z.(\lambda V651a \in A_27a.(\lambda V652b \in A_27b.(\lambda V653c \in A_27c.(\lambda V654d \in A_27d.(\lambda V655e \in A_27e.(\lambda V656f \in A_27f.(\lambda V657g \in A_2$

Assume the following.

$$(\forall V0t \in 2.((p V0t) \vee (\neg(p V0t)))) \quad (4)$$

Assume the following.

$$\begin{aligned} \forall A_{27a}.nonempty A_{27a} \Rightarrow & \forall A_{27b}.nonempty A_{27b} \Rightarrow \\ & \forall V0f \in (A_{27b}^{A_{27a}}).(\forall V1y \in A_{27a}.((ap (\lambda V2x \in \\ & A_{27a}.(ap V0f V2x)) V1y) = (ap V0f V1y))) \end{aligned} \quad (5)$$

Assume the following.

$$((\forall V0t \in 2.((\neg(\neg(p V0t))) \Leftrightarrow (p V0t))) \wedge (((\neg True) \Leftrightarrow False) \wedge \\ ((\neg False) \Leftrightarrow True))) \quad (6)$$

Assume the following.

$$\forall A_{27a}.nonempty A_{27a} \Rightarrow (\forall V0x \in A_{27a}.((V0x = V0x) \Leftrightarrow \\ True)) \quad (7)$$

Assume the following.

$$\forall A_{27a}.nonempty A_{27a} \Rightarrow (\forall V0x \in A_{27a}.(\forall V1y \in \\ A_{27a}.((V0x = V1y) \Leftrightarrow (V1y = V0x)))) \quad (8)$$

Assume the following.

$$(\forall V0t \in 2.(((True \Leftrightarrow (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \Leftrightarrow True) \Leftrightarrow \\ (p V0t)) \wedge (((False \Leftrightarrow (p V0t)) \Leftrightarrow (\neg(p V0t))) \wedge (((p V0t) \Leftrightarrow False) \Leftrightarrow (\neg(p \\ V0t))))))) \quad (9)$$

Assume the following.

$$\begin{aligned} \forall A_{27a}.nonempty A_{27a} \Rightarrow & (\forall V0t1 \in A_{27a}.(\forall V1t2 \in \\ A_{27a}.((ap (ap (ap (c_{2Ebool_2ECOND} A_{27a}) c_{2Ebool_2ET}) V0t1) \\ V1t2) = V0t1) \wedge ((ap (ap (ap (c_{2Ebool_2ECOND} A_{27a}) c_{2Ebool_2EF}) \\ V0t1) V1t2) = V1t2))) \end{aligned} \quad (10)$$

Assume the following.

$$(\forall V0t1 \in 2.(\forall V1t2 \in 2.(\forall V2t3 \in 2.(((p V0t1) \Rightarrow \\ ((p V1t2) \Rightarrow (p V2t3))) \Leftrightarrow (((p V0t1) \wedge (p V1t2)) \Rightarrow (p V2t3))))) \quad (11)$$

Assume the following.

$$\begin{aligned} \forall A_{27a}.nonempty A_{27a} \Rightarrow & (\forall V0P \in 2.(\forall V1Q \in 2. \\ & (\forall V2x \in A_{27a}.(\forall V3x_{27} \in A_{27a}.(\forall V4y \in A_{27a}. \\ & (\forall V5y_{27} \in A_{27a}.(((p V0P) \Leftrightarrow (p V1Q)) \wedge (((p V1Q) \Rightarrow (V2x = V3x_{27})) \wedge \\ & ((\neg(p V1Q)) \Rightarrow (V4y = V5y_{27}))) \Rightarrow ((ap (ap (ap (c_{2Ebool_2ECOND} A_{27a}) \\ V0P) V2x) V4y) = (ap (ap (ap (c_{2Ebool_2ECOND} A_{27a}) V1Q) V3x_{27}) \\ & V5y_{27})))))))) \end{aligned} \quad (12)$$

Assume the following.

$$\begin{aligned}
& \forall A_{27a}. nonempty A_{27a} \Rightarrow (\forall V0R \in ((2^{A_{27a}})^{A_{27a}}). \\
& ((\forall V1x \in A_{27a}. (\forall V2y \in A_{27a}. ((p (ap (ap V0R V1x) V2y)) \Rightarrow \\
& (p (ap (ap (ap (c_2Erelation_2ETC A_{27a}) V0R) V1x) V2y))))))) \wedge (\forall V3x \in \\
& A_{27a}. (\forall V4y \in A_{27a}. (\forall V5z \in A_{27a}. (((p (ap (ap (ap \\
& (c_2Erelation_2ETC A_{27a}) V0R) V3x) V4y)) \wedge (p (ap (ap (ap (c_2Erelation_2ETC \\
& A_{27a}) V0R) V4y) V5z)))) \Rightarrow (p (ap (ap (ap (c_2Erelation_2ETC A_{27a}) \\
& V0R) V3x) V5z))))))) \\
\end{aligned} \tag{13}$$

Assume the following.

$$\begin{aligned}
& \forall A_{27a}. nonempty A_{27a} \Rightarrow (\forall V0R \in ((2^{A_{27a}})^{A_{27a}}). \\
& ((\forall V1x \in A_{27a}. (\forall V2y \in A_{27a}. ((p (ap (ap V0R V1x) V2y)) \Rightarrow \\
& (p (ap (ap (ap (c_2Erelation_2ETC A_{27a}) V0R) V1x) V2y))))))) \\
\end{aligned} \tag{14}$$

Assume the following.

$$\begin{aligned}
& \forall A_{27a}. nonempty A_{27a} \Rightarrow (\forall V0R \in ((2^{A_{27a}})^{A_{27a}}). \\
& ((\forall V1P \in ((2^{A_{27a}})^{A_{27a}}). (((\forall V2x \in A_{27a}. (\forall V3y \in \\
& A_{27a}. ((p (ap (ap V0R V2x) V3y)) \Rightarrow (p (ap (ap V1P V2x) V3y))))))) \wedge (\forall V4x \in \\
& A_{27a}. (\forall V5y \in A_{27a}. (\forall V6z \in A_{27a}. (((p (ap (ap V1P \\
& V4x) V5y) \in A_{27a}. (\forall V7x \in A_{27a}. (\forall V8y \in A_{27a}. ((p (ap (ap (c_2Erelation_2ETC \\
& A_{27a}) V0R) V7x) V8y)) \Rightarrow (p (ap (ap V1P V7x) V8y))))))) \\
\end{aligned} \tag{15}$$

Theorem 1

$$\begin{aligned}
& \forall A_{27a}. nonempty A_{27a} \Rightarrow (\forall V0a \in A_{27a}. (\forall V1R \in \\
& ((2^{A_{27a}})^{A_{27a}}). (\forall V2Q \in (2^{A_{27a}}). (((\forall V3y \in A_{27a}. \\
& ((p (ap (ap V1R V0a) V3y)) \Rightarrow (p (ap V2Q V3y)))) \wedge (\forall V4x \in A_{27a}. \\
& (\forall V5y \in A_{27a}. (((p (ap V2Q V4x)) \wedge (p (ap (ap V1R V4x) V5y)) \Rightarrow \\
& (p (ap V2Q V5y))))))) \Rightarrow (\forall V6b \in A_{27a}. ((p (ap (ap (c_2Erelation_2ETC \\
& A_{27a}) V1R) V0a) V6b)) \Rightarrow (p (ap V2Q V6b))))))) \\
\end{aligned}$$