

thm\_2Erelation\_2ERTC\_\_ALT\_\_RIGHT\_\_INDUCT  
 (TMXQvT-  
 NfNfa23sFLsHKrPRMNd6VogphG7X2)

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**Definition 1** We define  $c\_2Emin\_2E\_3D\_3D\_3E$  to be  $\lambda P \in 2.\lambda Q \in 2.inj\_o (p P \Rightarrow p Q)$  of type  $\iota$ .

**Definition 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  $c\_2Ebool\_2E\_2T$  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  $\lambda A\_27a : \iota.(\lambda V0P \in (2^{A\_27a}).(ap (ap (c\_2Emin\_2E\_3D (2^{A\_27a}))$

**Definition 5** 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 6** We define  $c\_2Erelation\_2ERTC$  to be  $\lambda A\_27a : \iota.\lambda V0R \in ((2^{A\_27a})^{A\_27a}).\lambda V1a \in A\_27a.\lambda V2b \in A\_27a.$

Assume the following.

$$\begin{aligned} & \forall A\_27a.nonempty A\_27a \Rightarrow (\forall V0R \in ((2^{A\_27a})^{A\_27a}). \\ & (\forall V1a \in A\_27a.(\forall V2b \in A\_27a.((p (ap (ap (ap (c\_2Erelation\_2ERTC \\ & A\_27a) V0R) V1a) V2b)) \Leftrightarrow (\forall V3Q \in (2^{A\_27a}).(((p (ap V3Q V1a)) \wedge \\ & (\forall V4y \in A\_27a.(\forall V5z \in A\_27a.(((p (ap V3Q V4y)) \wedge (p ( \\ & ap (ap V0R V4y) V5z))) \Rightarrow (p (ap V3Q V5z)))))) \Rightarrow (p (ap V3Q V2b)))))))))) \end{aligned} \tag{1}$$

**Theorem 1**

$$\begin{aligned} & \forall A\_27a.nonempty A\_27a \Rightarrow (\forall V0R \in ((2^{A\_27a})^{A\_27a}). \\ & (\forall V1Q \in (2^{A\_27a}).(\forall V2a \in A\_27a.(((p (ap V1Q V2a)) \wedge \\ & (\forall V3y \in A\_27a.(\forall V4z \in A\_27a.(((p (ap V1Q V3y)) \wedge (p ( \\ & ap (ap V0R V3y) V4z))) \Rightarrow (p (ap V1Q V4z)))))) \Rightarrow (\forall V5z \in A\_27a. \\ & ((p (ap (ap (ap (c\_2Erelation\_2ERTC A\_27a) V0R) V2a) V5z)) \Rightarrow (p (ap \\ & V1Q V5z)))))))))) \end{aligned}$$