

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

$$\forall A_27a.nonempty\ A_27a \Rightarrow \forall A_27b.nonempty\ A_27b \Rightarrow c_2Epair_2EABS_prod\ A_27a\ A_27b \in ((ty_2Epair_2Eprod\ A_27a\ A_27b)^{(2^{A_27b} A_27a)}) \quad (4)$$

Definition 9 We define $c_2Epair_2E_2C$ to be $\lambda A_27a : \iota.\lambda A_27b : \iota.\lambda V0x \in A_27a.\lambda V1y \in A_27b.(ap\ (c_2E$

Definition 10 We define $c_2Estate_transformer_2EUNIT$ to be $\lambda A_27a : \iota.\lambda A_27b : \iota.\lambda V0x \in A_27b.(\lambda V1s \in$

Definition 11 We define $c_2Estate_transformer_2EMCOMP$ to be $\lambda A_27a : \iota.\lambda A_27b : \iota.\lambda A_27c : \iota.\lambda A_27s :$

Assume the following.

$$True \quad (5)$$

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$$\forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0x \in A_27a.((V0x = V0x) \Leftrightarrow True)) \quad (6)$$

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$$\forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0x \in A_27a.(\forall V1y \in A_27a.((V0x = V1y) \Leftrightarrow (V1y = V0x)))) \quad (7)$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow \forall A_27b.nonempty\ A_27b \Rightarrow \forall A_27c. \\ & nonempty\ A_27c \Rightarrow \forall A_27d.nonempty\ A_27d \Rightarrow \forall A_27e.nonempty \\ & A_27e \Rightarrow \forall A_27f.nonempty\ A_27f \Rightarrow (\forall V0g \in (((ty_2Epair_2Eprod \\ & A_27c\ A_27b)^{A_27b} A_27a).(\forall V1f \in (((ty_2Epair_2Eprod \\ & A_27f\ A_27e)^{A_27e} A_27d).(((ap\ (ap\ (c_2Estate_transformer_2EMCOMP \\ & A_27a\ A_27a\ A_27c\ A_27b)\ V0g)\ (c_2Estate_transformer_2EUNIT \\ & A_27b\ A_27a)) = V0g) \wedge ((ap\ (ap\ (c_2Estate_transformer_2EMCOMP \\ & A_27d\ A_27f\ A_27f\ A_27e)\ (c_2Estate_transformer_2EUNIT\ A_27e \\ & A_27f))\ V1f) = V1f)))))) \quad (8) \end{aligned}$$

Theorem 1

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow \forall A_27b.nonempty\ A_27b \Rightarrow \forall A_27c. \\ & nonempty\ A_27c \Rightarrow (\forall V0f \in (((ty_2Epair_2Eprod\ A_27c\ A_27b)^{A_27b} A_27a). \\ & ((ap\ (ap\ (c_2Ecombin_2Eo\ A_27a\ ((ty_2Epair_2Eprod\ A_27c\ A_27b)^{A_27b} \\ & ((ty_2Epair_2Eprod\ A_27a\ A_27b)^{A_27b})))\ (ap\ (c_2Estate_transformer_2EEXT \\ & A_27a\ A_27c\ A_27b)\ V0f))\ (c_2Estate_transformer_2EUNIT\ A_27b \\ & A_27a)) = V0f)) \end{aligned}$$