

thm_2Eset__relation_2Estrict__linear__order__union__acyclic
(TMMNf-
cLNc526GTkkEZDxP5zDHRZSYBYQjuX)

October 26, 2020

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 $c_2Ebool_2E_2T$ to be $(ap (ap (c_2Emin_2E_3D (2^2)) (\lambda V0x \in 2.V0x)) (\lambda V1x \in 2.V1x))$

Definition 3 We define $c_2Ebool_2E_2IN$ to be $\lambda A_27a : \iota.(\lambda V0x \in A_27a.(\lambda V1f \in (2^{A_27a}).ap V1f V0x))$

Definition 4 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 5 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 6 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 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 $ty_2Epair_2Eprod : \iota \Rightarrow \iota \Rightarrow \iota$ be given. Assume the following.

$$\forall A0.nonempty A0 \Rightarrow \forall A1.nonempty A1 \Rightarrow nonempty (ty_2Epair_2Eprod A0 A1) \quad (1)$$

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

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

Definition 8 We define $c_2Epair_2E_2C$ to be $\lambda A_27a : \iota.\lambda A_27b : \iota.\lambda V0x \in A_27a.\lambda V1y \in A_27b.(ap (c_2Ebool_2E_21 2) (ty_2Epair_2EABS_prod A_27a A_27b))$

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

$$\forall A_27a.nonempty A_27a \Rightarrow \forall A_27b.nonempty A_27b \Rightarrow c_2Epred_set_2EGSPEC A_27a A_27b \in ((2^{A_27a})^{(ty_2Epair_2Eprod A_27a 2)^{A_27b}}) \quad (3)$$

Definition 9 We define `c_2Epred_set_2EUNION` to be $\lambda A_{.27a} : \iota. \lambda V0s \in (2^{A_{.27a}}). \lambda V1t \in (2^{A_{.27a}}). (ap (c_{.27a} _2Ebool_2E21) 2) (\lambda V0t \in 2.V0t))$.

Definition 10 We define `c_2Ebool_2EF` to be $(ap (c_{.27a} _2Ebool_2E21) 2) (\lambda V0t \in 2.V0t))$.

Definition 11 We define `c_2Emin_2E40` 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 12 We define `c_2Ebool_2E3F` to be $\lambda A_{.27a} : \iota. (\lambda V0P \in (2^{A_{.27a}}). (ap V0P (ap (c_{.27a} _2Emin_2E40) 2) (\lambda V0t \in 2.V0t))))$.

Definition 13 We define `c_2Eset_relation_2Etc` to be $\lambda A_{.27a} : \iota. (\lambda V0r \in (2^{(ty_2Epair_2Eprod A_{.27a} A_{.27a})}). (ap (c_{.27a} _2Emin_2E40) 2) (\lambda V0t \in 2.V0t))))$.

Definition 14 We define `c_2Ebool_2E7E` to be $(\lambda V0t \in 2. (ap (ap (c_{.27a} _2Emin_2E3D_3D_3E V0t) c_{.27a} _2Ebool_2E21) 2) (\lambda V0t \in 2.V0t)))$.

Definition 15 We define `c_2Eset_relation_2Etransitive` to be $\lambda A_{.27a} : \iota. \lambda V0r \in (2^{(ty_2Epair_2Eprod A_{.27a} A_{.27a})}). (ap (c_{.27a} _2Emin_2E40) 2) (\lambda V0t \in 2.V0t))$.

Definition 16 We define `c_2Eset_relation_2Erange` to be $\lambda A_{.27a} : \iota. \lambda A_{.27b} : \iota. \lambda V0r \in (2^{(ty_2Epair_2Eprod A_{.27a} A_{.27b})}). (ap (c_{.27a} _2Emin_2E40) 2) (\lambda V0t \in 2.V0t))$.

Definition 17 We define `c_2Eset_relation_2Edomain` to be $\lambda A_{.27a} : \iota. \lambda A_{.27b} : \iota. \lambda V0r \in (2^{(ty_2Epair_2Eprod A_{.27a} A_{.27b})}). (ap (c_{.27a} _2Emin_2E40) 2) (\lambda V0t \in 2.V0t))$.

Definition 18 We define `c_2Epred_set_2ESUBSET` to be $\lambda A_{.27a} : \iota. \lambda V0s \in (2^{A_{.27a}}). \lambda V1t \in (2^{A_{.27a}}). (ap (c_{.27a} _2Emin_2E40) 2) (\lambda V0t \in 2.V0t))$.

Definition 19 We define `c_2Eset_relation_2Eacyclic` to be $\lambda A_{.27a} : \iota. \lambda V0r \in (2^{(ty_2Epair_2Eprod A_{.27a} A_{.27a})}). (ap (c_{.27a} _2Emin_2E40) 2) (\lambda V0t \in 2.V0t))$.

Definition 20 We define `c_2Eset_relation_2Estrict_linear_order` to be $\lambda A_{.27a} : \iota. \lambda V0r \in (2^{(ty_2Epair_2Eprod A_{.27a} A_{.27a})}). (ap (c_{.27a} _2Emin_2E40) 2) (\lambda V0t \in 2.V0t))$.

Assume the following.

$$True \tag{4}$$

Assume the following.

$$(\forall V0t1 \in 2. (\forall V1t2 \in 2. (((p V0t1) \Rightarrow (p V1t2)) \Rightarrow (((p V1t2) \Rightarrow (p V0t1)) \Rightarrow ((p V0t1) \Leftrightarrow (p V1t2)))))) \tag{5}$$

Assume the following.

$$(\forall V0t \in 2. (False \Rightarrow (p V0t))) \tag{6}$$

Assume the following.

$$(\forall V0t \in 2. ((\neg (p V0t)) \Rightarrow ((p V0t) \Rightarrow False))) \tag{7}$$

Assume the following.

$$(\forall V0t \in 2. (((True \vee (p V0t)) \Leftrightarrow True) \wedge (((p V0t) \vee True) \Leftrightarrow True) \wedge (((False \vee (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \vee False) \Leftrightarrow (p V0t)) \wedge (((p V0t) \vee (p V0t)) \Leftrightarrow (p V0t)))))) \tag{8}$$

Assume the following.

$$(\forall V0t \in 2. (((True \Rightarrow (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \Rightarrow True) \Leftrightarrow True) \wedge (((False \Rightarrow (p V0t)) \Leftrightarrow True) \wedge (((p V0t) \Rightarrow (p V0t)) \Leftrightarrow True) \wedge (((p V0t) \Rightarrow False) \Leftrightarrow (\neg (p V0t)))))) \tag{9}$$

Assume the following.

$$((\forall V0t \in 2.((\neg(\neg(p V0t))) \Leftrightarrow (p V0t))) \wedge (((\neg True) \Leftrightarrow False) \wedge ((\neg False) \Leftrightarrow True))) \quad (10)$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow (\forall V0x \in A_27a. (\forall V1y \in A_27a. ((V0x = V1y) \Leftrightarrow (V1y = V0x)))) \quad (11)$$

Assume the following.

$$(\forall V0t \in 2. (((True \Leftrightarrow (p V0t)) \Leftrightarrow (p V0t)) \wedge (((p V0t) \Leftrightarrow True) \Leftrightarrow (p V0t)) \wedge (((False \Leftrightarrow (p V0t)) \Leftrightarrow (\neg(p V0t))) \wedge (((p V0t) \Leftrightarrow False) \Leftrightarrow (\neg(p V0t))))) \quad (12)$$

Assume the following.

$$(\forall V0A \in 2. (\forall V1B \in 2. (((\neg((p V0A) \wedge (p V1B))) \Leftrightarrow ((\neg(p V0A) \vee (\neg(p V1B)))) \wedge ((\neg((p V0A) \vee (p V1B))) \Leftrightarrow ((\neg(p V0A) \wedge (\neg(p V1B))))))) \quad (13)$$

Assume the following.

$$(\forall V0t1 \in 2. (\forall V1t2 \in 2. (\forall V2t3 \in 2. (((p V0t1) \Rightarrow ((p V1t2) \Rightarrow (p V2t3))) \Leftrightarrow (((p V0t1) \wedge (p V1t2)) \Rightarrow (p V2t3)))))) \quad (14)$$

Assume the following.

$$(\forall V0x \in 2. (\forall V1x_27 \in 2. (\forall V2y \in 2. (\forall V3y_27 \in 2. (((p V0x) \Leftrightarrow (p V1x_27)) \wedge ((p V1x_27) \Rightarrow ((p V2y) \Leftrightarrow (p V3y_27))) \Rightarrow (((p V0x) \Rightarrow (p V2y)) \Leftrightarrow ((p V1x_27) \Rightarrow (p V3y_27)))))) \quad (15)$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow \forall A_27b.nonempty A_27b \Rightarrow (\forall V0x \in A_27a. (\forall V1y \in A_27b. (\forall V2a \in A_27a. (\forall V3b \in A_27b. (((ap (ap (c_2Epair_2E_2C A_27a A_27b) V0x) V1y) = (ap (ap (c_2Epair_2E_2C A_27a A_27b) V2a) V3b)) \Leftrightarrow ((V0x = V2a) \wedge (V1y = V3b)))))) \quad (16)$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow \forall A_27b.nonempty A_27b \Rightarrow (\forall V0x \in (ty_2Epair_2Eprod A_27a A_27b). (\exists V1q \in A_27a. (\exists V2r \in A_27b. (V0x = (ap (ap (c_2Epair_2E_2C A_27a A_27b) V1q) V2r)))))) \quad (17)$$

Assume the following.

$$\forall A_27a.nonempty A_27a \Rightarrow \forall A_27b.nonempty A_27b \Rightarrow (\forall V0P \in (2^{(ty_2Epair_2Eprod A_27a A_27b)}). ((\forall V1p \in (ty_2Epair_2Eprod A_27a A_27b). (p (ap V0P V1p))) \Leftrightarrow (\forall V2p_1 \in A_27a. (\forall V3p_2 \in A_27b. (p (ap V0P (ap (ap (c_2Epair_2E_2C A_27a A_27b) V2p_1) V3p_2)))))) \quad (18)$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0s \in (2^{A_27a}). (\forall V1t \in \\ & (2^{A_27a}). ((V0s = V1t) \Leftrightarrow (\forall V2x \in A_27a. ((p\ (ap\ (ap\ (c_2Ebool_2EIN \\ & A_27a)\ V2x)\ V0s)) \Leftrightarrow (p\ (ap\ (ap\ (c_2Ebool_2EIN\ A_27a)\ V2x)\ V1t))))))) \end{aligned} \quad (19)$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow \forall A_27b.nonempty\ A_27b \Rightarrow (\\ & \forall V0f \in ((ty_2Epair_2Eprod\ A_27a\ 2)^{A_27b}). (\forall V1v \in \\ & A_27a. ((p\ (ap\ (ap\ (c_2Ebool_2EIN\ A_27a)\ V1v)\ (ap\ (c_2Epred_set_2EGSPEC \\ & A_27a\ A_27b)\ V0f))) \Leftrightarrow (\exists V2x \in A_27b. ((ap\ (ap\ (c_2Epair_2E_2C \\ & A_27a\ 2)\ V1v)\ c_2Ebool_2ET) = (ap\ V0f\ V2x)))))) \end{aligned} \quad (20)$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0s \in (2^{A_27a}). (\forall V1t \in \\ & (2^{A_27a}). (\forall V2x \in A_27a. ((p\ (ap\ (ap\ (c_2Ebool_2EIN\ A_27a)\ \\ & V2x)\ (ap\ (ap\ (c_2Epred_set_2EUNION\ A_27a)\ V0s)\ V1t))) \Leftrightarrow ((p\ (ap\ (ap\ (c_2Ebool_2EIN \\ & A_27a)\ V2x)\ V0s)) \vee (p\ (ap\ (ap\ (c_2Ebool_2EIN \\ & A_27a)\ V2x)\ V1t)))))) \end{aligned} \quad (21)$$

Assume the following.

$$\begin{aligned} & \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0s \in (2^{A_27a}). (\forall V1t \in \\ & (2^{A_27a}). (\forall V2u \in (2^{A_27a}). ((p\ (ap\ (ap\ (c_2Epred_set_2ESUBSET \\ & A_27a)\ (ap\ (ap\ (c_2Epred_set_2EUNION\ A_27a)\ V0s)\ V1t))\ V2u)) \Leftrightarrow \\ & ((p\ (ap\ (ap\ (c_2Epred_set_2ESUBSET\ A_27a)\ V0s)\ V2u)) \wedge (p\ (ap\ (ap\ \\ & (c_2Epred_set_2ESUBSET\ A_27a)\ V1t)\ V2u)))))) \end{aligned} \quad (22)$$

Assume the following.

$$(\forall V0t \in 2. ((\neg(\neg(p\ V0t))) \Leftrightarrow (p\ V0t))) \quad (23)$$

Assume the following.

$$(\forall V0A \in 2. ((p\ V0A) \Rightarrow ((\neg(p\ V0A)) \Rightarrow False))) \quad (24)$$

Assume the following.

$$\begin{aligned} & (\forall V0A \in 2. (\forall V1B \in 2. (((\neg((p\ V0A) \vee (p\ V1B))) \Rightarrow False) \Leftrightarrow \\ & (((p\ V0A) \Rightarrow False) \Rightarrow ((\neg(p\ V1B)) \Rightarrow False)))) \end{aligned} \quad (25)$$

Assume the following.

$$\begin{aligned} & (\forall V0A \in 2. (\forall V1B \in 2. (((\neg((\neg(p\ V0A)) \vee (p\ V1B))) \Rightarrow False) \Leftrightarrow \\ & ((p\ V0A) \Rightarrow ((\neg(p\ V1B)) \Rightarrow False)))) \end{aligned} \quad (26)$$

Assume the following.

$$(\forall V0A \in 2. (((\neg(p\ V0A)) \Rightarrow False) \Rightarrow (((p\ V0A) \Rightarrow False) \Rightarrow False))) \quad (27)$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p \ V0p) \Leftrightarrow (\\
& (p \ V1q) \Leftrightarrow (p \ V2r))) \Leftrightarrow (((p \ V0p) \vee ((p \ V1q) \vee (p \ V2r))) \wedge (((p \ V0p) \vee ((\neg(\\
& p \ V2r)) \vee (\neg(p \ V1q)))) \wedge (((p \ V1q) \vee ((\neg(p \ V2r)) \vee (\neg(p \ V0p)))) \wedge ((p \ V2r) \vee \\
& ((\neg(p \ V1q)) \vee (\neg(p \ V0p))))))))))
\end{aligned} \tag{28}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p \ V0p) \Leftrightarrow (\\
& (p \ V1q) \wedge (p \ V2r))) \Leftrightarrow (((p \ V0p) \vee ((\neg(p \ V1q)) \vee (\neg(p \ V2r)))) \wedge (((p \ V1q) \vee \\
& (\neg(p \ V0p))) \wedge ((p \ V2r) \vee (\neg(p \ V0p)))))))))
\end{aligned} \tag{29}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p \ V0p) \Leftrightarrow (\\
& (p \ V1q) \vee (p \ V2r))) \Leftrightarrow (((p \ V0p) \vee (\neg(p \ V1q))) \wedge (((p \ V0p) \vee (\neg(p \ V2r))) \wedge \\
& ((p \ V1q) \vee ((p \ V2r) \vee (\neg(p \ V0p))))))))))
\end{aligned} \tag{30}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (\forall V2r \in 2. (((p \ V0p) \Leftrightarrow (\\
& (p \ V1q) \Rightarrow (p \ V2r))) \Leftrightarrow (((p \ V0p) \vee (p \ V1q)) \wedge (((p \ V0p) \vee (\neg(p \ V2r))) \wedge ((\\
& \neg(p \ V1q)) \vee ((p \ V2r) \vee (\neg(p \ V0p))))))))))
\end{aligned} \tag{31}$$

Assume the following.

$$\begin{aligned}
& (\forall V0p \in 2. (\forall V1q \in 2. (((p \ V0p) \Leftrightarrow (\neg(p \ V1q))) \Leftrightarrow (((p \ V0p) \vee \\
& (p \ V1q)) \wedge ((\neg(p \ V1q)) \vee (\neg(p \ V0p))))))
\end{aligned} \tag{32}$$

Assume the following.

$$(\forall V0p \in 2. (\forall V1q \in 2. ((\neg((p \ V0p) \Rightarrow (p \ V1q))) \Rightarrow (p \ V0p))) \tag{33}$$

Assume the following.

$$(\forall V0p \in 2. (\forall V1q \in 2. ((\neg((p \ V0p) \Rightarrow (p \ V1q))) \Rightarrow (\neg(p \ V1q)))) \tag{34}$$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0r \in (2^{(ty_2Epair_2Eprod\ A_27a\ A_27a)}), \\
& \quad ((\forall V1x \in A_27a. (\forall V2y \in A_27a. ((p\ (ap\ (ap\ (c_2Ebool_2EIN \\
& \quad (ty_2Epair_2Eprod\ A_27a\ A_27a))\ (ap\ (ap\ (c_2Epair_2E_2C\ A_27a \\
& \quad A_27a)\ V1x)\ V2y))\ V0r)) \Rightarrow (p\ (ap\ (ap\ (c_2Ebool_2EIN\ (ty_2Epair_2Eprod \\
& \quad A_27a\ A_27a))\ (ap\ (ap\ (c_2Epair_2E_2C\ A_27a\ A_27a)\ V1x)\ V2y))\ (ap \\
& \quad (c_2Eset_relation_2Etc\ A_27a)\ V0r)))))) \wedge (\forall V3x \in A_27a. \\
& \quad (\forall V4y \in A_27a. ((\exists V5z \in A_27a. ((p\ (ap\ (ap\ (c_2Ebool_2EIN \\
& \quad (ty_2Epair_2Eprod\ A_27a\ A_27a))\ (ap\ (ap\ (c_2Epair_2E_2C\ A_27a \\
& \quad A_27a)\ V3x)\ V5z))\ (ap\ (c_2Eset_relation_2Etc\ A_27a)\ V0r))) \wedge (\\
& \quad p\ (ap\ (ap\ (c_2Ebool_2EIN\ (ty_2Epair_2Eprod\ A_27a\ A_27a))\ (ap\ (ap \\
& \quad (c_2Epair_2E_2C\ A_27a\ A_27a)\ V5z)\ V4y))\ (ap\ (c_2Eset_relation_2Etc \\
& \quad A_27a)\ V0r)))))) \Rightarrow (p\ (ap\ (ap\ (c_2Ebool_2EIN\ (ty_2Epair_2Eprod\ A_27a \\
& \quad A_27a))\ (ap\ (ap\ (c_2Epair_2E_2C\ A_27a\ A_27a)\ V3x)\ V4y))\ (ap\ (c_2Eset_relation_2Etc \\
& \quad A_27a)\ V0r))))))
\end{aligned} \tag{35}$$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0r \in (2^{(ty_2Epair_2Eprod\ A_27a\ A_27a)}), \\
& \quad (\forall V1x \in A_27a. ((p\ (ap\ (c_2Eset_relation_2Eacyclic\ A_27a) \\
& \quad V0r)) \Rightarrow (\neg (p\ (ap\ (ap\ (c_2Ebool_2EIN\ (ty_2Epair_2Eprod\ A_27a\ A_27a)) \\
& \quad (ap\ (ap\ (c_2Epair_2E_2C\ A_27a\ A_27a)\ V1x)\ V1x))\ V0r))))))
\end{aligned} \tag{36}$$

Assume the following.

$$\begin{aligned}
& \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0r \in (2^{(ty_2Epair_2Eprod\ A_27a\ A_27a)}), \\
& \quad (\forall V1s \in (2^{A_27a}). ((p\ (ap\ (ap\ (c_2Eset_relation_2Estrict_linear_order \\
& \quad A_27a)\ V0r)\ V1s)) \Rightarrow (p\ (ap\ (c_2Eset_relation_2Eacyclic\ A_27a) \\
& \quad V0r))))))
\end{aligned} \tag{37}$$

Theorem 1

$$\begin{aligned}
& \forall A_27a.nonempty\ A_27a \Rightarrow (\forall V0r1 \in (2^{(ty_2Epair_2Eprod\ A_27a\ A_27a)}), \\
& \quad (\forall V1r2 \in (2^{(ty_2Epair_2Eprod\ A_27a\ A_27a)}). (\forall V2s \in \\
& \quad (2^{A_27a}). (((p\ (ap\ (ap\ (c_2Eset_relation_2Estrict_linear_order \\
& \quad A_27a)\ V0r1)\ V2s)) \wedge (p\ (ap\ (ap\ (c_2Epred_set_2ESUBSET\ A_27a)\ (\\
& \quad ap\ (ap\ (c_2Epred_set_2EUNION\ A_27a)\ (ap\ (c_2Eset_relation_2Edomain \\
& \quad A_27a\ A_27a)\ V1r2))\ (ap\ (c_2Eset_relation_2Erange\ A_27a\ A_27a) \\
& \quad V1r2))) \Rightarrow ((p\ (ap\ (c_2Eset_relation_2Eacyclic\ A_27a)\ (\\
& \quad ap\ (ap\ (c_2Epred_set_2EUNION\ (ty_2Epair_2Eprod\ A_27a\ A_27a)) \\
& \quad V0r1)\ V1r2))) \Leftrightarrow (p\ (ap\ (ap\ (c_2Epred_set_2ESUBSET\ (ty_2Epair_2Eprod \\
& \quad A_27a\ A_27a))\ V1r2)\ V0r1))))))
\end{aligned}$$