## 1 Problems

Write  $\operatorname{Succ}(s,t) = \operatorname{Succ}'(s,t) = \operatorname{Succ}''(s,t)$  for the succesors and  $\operatorname{Pred}(s,t) = \operatorname{Pred}'(s,t) = \operatorname{Pred}''(s,t)$  for the predecessors (ancessors) of the pair in D, D', D'', respectively.

Since  $D = D' \cup D''$ , we also have  $\operatorname{Succ}(s,t) = \operatorname{Succ}'(s,t) \cup \operatorname{Succ}''(s,t)$  and  $\operatorname{Pred}(s,t) = \operatorname{Pred}''(s,t) \cup \operatorname{Pred}''(s,t)$ .

#### 1.1 Lemma 3.1.

Suppose (x, y) and (a, b) are birth-death pairs of  $f: X \to R$ , a, x are consecutive in the ordering of the cells by f, and the transposition a, x is a switch. Then

$$Succ'(a, y) = \{(x, b)\} \cup Succ'(a, b) \cup \{(s, t) \in Succ'(x, y) | f(t) < f(b)\}$$
$$Succ'(x, b) = \{(s, t) \in Succ'(x, y) | f(t) > f(b)\}$$

#### 1.2 Lemma 3.2.

Suppose (a, b) and (x, y) are birth-death pairs of  $f: X \to R$ , y, b are consecutive in the ordering by f, and transposition of y, b is a switch. Then

$$Succ''(x,b) = \{(a,y)\} \cup Succ''(a,b) \cup \{(s,t) \in Succ''(x,y) | f(a) < f(s) < f(x)\}$$
$$Succ''(a,y) = \{(s,t) \in Succ''(x,y) | f(s) < f(a)\}$$

#### 1.3 Lemma 3.3.

Suppose (a, b) and (x, y) are birth-death pairs of  $f: X \to R$ , b, x are consecutive in the ordering by f, and the transposition of b, x is a switch. Then

$$Succ(a, x) = Succ(a, b)$$
 and  $Succ(b, y) = Succ(x, y)$ 

### 1.4 Hypothesis 1

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Suppose a and b are 2-simplices consecutive in the ordering by f. And there is another Morse function  $f^*$ :

$$f^*(s) = \begin{cases} f(s), & \text{if } s \neq a, b \\ f(b), & \text{if } s = a \\ f(a), & \text{if } s = b \end{cases}$$

Let's denote  $DP_f$  the transitive reduction of the Depth Poset defined by the filtration f. And let's denote  $DP_f(s)$  the set of nodes in  $DP_f(s)$  which are pairs containing cell s and the set of edges with these nodes.

**Hypothesis:** if the cell s has no faces and cofaces with a and b, then  $DP_f(s) = DP_{f^*}(s)$ .

# 2 Model

The probabilistic model is simple. The first we just generate the cloud of n points uniformly distributed in  $[0,1]^d$ . After this we calculate the Alpha complex with these points, and then find its depth poset. Then we itarate all neighbour pairs of simplices and check if their transposition will be possible filtration, calculating the scores for the switch-forward transpositions.

The number of points in the cloud n and the dimension  $d = \dim$  for each generated cloud and coresponding complex are given in the table:

complex	n	dim	simplices				
Complex				complex	n	$\dim$	simplices
0	6	2	23	13	12	2	51
1	6	2	21		12	$\frac{2}{2}$	
2	6	2	23	14			55
3	6	2	23	15	12	2	53
4	8	2	33	16	12	2	55
	_	_		17	12	$^{2}$	55
5	8	2	33	18	16	2	77
6	8	2	31	19	16	2	77
7	8	$^{2}$	29		8		65
8	8	2	31	20		3	
9	8	2	37	21	8	3	65
10	8	2	33	22	8	3	73
				23	8	3	69
11	8	2	35	24	8	3	73
12	12	2	53	25	8	3	65
13	12	2	51		0	<u> </u>	00

### 3 Scores

- jacard\_nodes\_filtration: The Jacard index of node sets from 2 depth posets. The birth-death pairs are equal in terms of filtration values.
- jacard\_nodes\_simplex: The Jacard index of nodes from 2 depth posets. The birth-death pairs are equal in terms of simplices.
- jacard\_edges\_filtration: The Jacard index of edge sets from transitive reductions of 2 depth posets. The birth-death pairs are equal in terms of filtration values.
- jacard\_edges\_simplex: The Jacard index of edge sets from transitive reductions of 2 depth posets. The birth-death pairs are equal in terms of simplices.
- jacard\_l31a: Jacard Index of Succ'(x,b) and  $\{(a,y)\}\cup$ Succ' $(a,b)\cup$  $\{(s,t)\in$ Succ' $(x,y)|f(t)< f(b)\}$
- jacard\_l31b: Jacard Index of Succ'(x,b) and  $\{(s,t) \in \text{Succ'}(x,y)|f(t) > f(b)\}$

- jacard\_l32a: Jacard Index of Succ"(x,b) and  $\{(a,y)\} \cup$  Succ" $(a,b) \cup$   $\{(s,t) \in$  Succ" $(x,y)|f(a) < f(s) < f(x)\}$
- jacard\_l32b: Jacard Index of Succ''(a, y) and  $\{(s,t) \in \text{Succ''}(x,y) | f(s) < f(a)\}$
- jacard\_l33a: Jacard Index of Succ(a, x) and Succ(a, b)
- jacard\_133b: Jacard Index of Succ(b, y) and Succ(x, y)
- jacard\_nn\_nodes: The Jacard index of subsets of nodes (s,t) from 2 depth posets, s.t.  $s,t \notin \nabla \partial \sigma_0 \cup \partial \nabla \sigma_0 \cup \nabla \partial \sigma_1 \cup \partial \nabla \sigma_1$ , where  $\sigma_0$  and  $\sigma_1$  are transposing simplices.
- **jacard\_nn\_edges**: The Jacard index of subsets of edges  $((s_0, t_0), (s_1, t_1))$  from 2 depth posets, s.t.  $s_0, t_0, s_1, t_1 \notin \nabla \partial \sigma_0 \cup \partial \nabla \sigma_0 \cup \nabla \partial \sigma_1 \cup \partial \nabla \sigma_1$ , where  $\sigma_0$  and  $\sigma_1$  are transposing simplices.

## 4 Results

Here are the tables, containing the scores for the switch transpositions in the experiment:

complex	dim	n	dim 0	dim 1	type	jacard_nodes_filtration	jacard_nodes_simplex
0	2	6	0	0	birth-birth	1.00	0.69
0	2	6	1	1	birth-death	1.00	0.69
0	2	6	1	1	birth-death	1.00	0.69
1	2	6	0	0	birth-birth	1.00	0.67
1	2	6	1	1	birth-death	1.00	0.67
2	2	6	0	0	birth-birth	1.00	0.69
2	2	6	1	1	birth-death	1.00	0.69
2	2	6	1	1	birth-death	1.00	0.69
3	2	6	1	1	birth-death	1.00	0.69
3	2	6	1	1	birth-death	1.00	0.69
4	2	8	0	0	birth-birth	1.00	0.78
4	2	8	1	1	birth-death	1.00	0.78
4	2	8	1	1	birth-birth	1.00	0.78
5	2	8	1	1	birth-death	1.00	0.78
5	2	8	2	2	death-death	1.00	0.78
5	2	8	1	1	birth-death	1.00	0.78
6	2	8	1	1	death-death	1.00	0.76
6	2	8	1	1	birth-death	1.00	0.76
6	2	8	1	1	death-death	1.00	0.76
7	2	8	1	1	birth-birth	1.00	0.75
7	2	8	2	2	death-death	1.00	0.75
8	2	8	1	1	birth-death	1.00	0.76
8	2	8	1	1	death-death	1.00	0.76
8	2	8	1	1	birth-death	1.00	0.76
8	2	8	2	2	death-death	1.00	0.76
9	2	8	1	1	birth-death	1.00	0.80
9	2	8	1	1	birth-death	1.00	0.80
9	2	8	1	1	birth-death	1.00	0.80
10	2	8	1	1	birth-death	1.00	0.78
11	2	8	1	1	birth-death	1.00	0.79
12	2	12	0	0	birth-birth	1.00	0.86
12	2	12	1	1	birth-death	1.00	0.86
12	2	12	2	2	death-death	1.00	0.86
12	2	12	1	1	birth-birth	1.00	0.86
13	2	12	0	0	birth-birth	1.00	0.85
13	2	12	1	1	birth-death	1.00	0.85
13	2	12	1	1	birth-death	1.00	0.85
14	2	12	1	1	birth-death	1.00	0.86
14	2	12	1	1	death-death	1.00	0.86
14	2	12	2	2	death-death	1.00	0.86
14	2	12	1	1	birth-birth	1.00	0.86
15	2	12	0	0	birth-birth	1.00	0.86
15	2	12	1	1	birth-death	1.00	0.86
16	2	12	0	0	birth-birth	1.00	0.86
16	2	12	1	1	death-death	1.00	0.86
16	2	12	1		4 birth-death	1.00	0.86
17	$\overline{2}$	12	1	1	birth-death	1.00	0.86
17	$\overline{2}$	12	1	1	birth-death	1.00	0.86
18	$\overline{2}$	16	0	0	birth-birth	1.00	0.90
18	2	16	1	1	birth-death	1.00	0.90

complex	$\dim$	n	$\dim 0$	dim 1	type	jacard_nodes_filtration	jacard_nodes_simplex
18	2	16	1	1	birth-death	1.00	0.90
18	2	16	1	1	birth-death	1.00	0.90
18	2	16	2	2	death-death	1.00	0.90
19	2	16	0	0	birth-birth	1.00	0.90
19	2	16	1	1	death-death	1.00	0.90
20	3	8	0	0	birth-birth	1.00	0.88
20	3	8	1	1	death-death	1.00	0.88
20	3	8	1	1	birth-death	1.00	0.88
20	3	8	2	2	birth-death	1.00	0.88
20	3	8	2	2	birth-death	1.00	0.88
20	3	8	2	2	birth-death	1.00	0.88
20	3	8	2	2	birth-death	1.00	0.88
20	3	8	2	2	birth-death	1.00	0.88
20	3	8	2	2	birth-death	1.00	0.88
20	3	8	2	2	birth-death	1.00	0.88
21	3	8	0	0	birth-birth	1.00	0.88
21	3	8	0	0	birth-birth	1.00	0.88
21	3	8	2	2	birth-death	1.00	0.88
21	3	8	2	2	birth-death	1.00	0.88
21	3	8	1	1	birth-death	1.00	0.88
21	3	8	2	2	birth-death	1.00	0.88
21	3	8	2	2	birth-death	1.00	0.88
21	3	8	2	2	birth-death	1.00	0.88
21	3	8	2	2	birth-death	1.00	0.88
21	3	8	2	2	birth-death	1.00	0.88
21	3	8	2	2	birth-death	1.00	0.88
22	3	8	0	0	birth-birth	1.00	0.89
22	3	8	1	1	birth-death	1.00	0.89
22	3	8	1	1	birth-death	1.00	0.89
22	3	8	1	1	birth-death	1.00	0.89
22	3	8	2	2	birth-death	1.00	0.89
22	3	8	2	2	death-death	1.00	0.89
22	3	8	2	2	birth-death	1.00	0.89
22	3	8	2	2	birth-death	1.00	0.89
22	3	8	2	2	birth-death	1.00	0.89
22	3	8	2	2	birth-death	1.00	0.89
22	3	8	2	2	birth-death	1.00	0.89
22	3	8	2	2	birth-death	1.00	0.89
22	3	8	2	2	birth-death	1.00	0.89
22	3	8	2	2	birth-death	1.00	0.89
23	3	8	0	0	birth-birth	1.00	0.89
23	3	8	1	1	death-death	1.00	0.89
23	3	8	1	1	birth-death	1.00	0.89
23	3	8	2	2	death-death	1.00	0.89
23	3	8	2	2	birth-death	1.00	0.89
23	3	8	2	2	birth-death	1.00	0.89
23	3	8	2		birth-death	1.00	0.89
23	3	8	2	2	birth-death	1.00	0.89
23	3	8	2	2	birth-death	1.00	0.89
23	3	8	2	2	birth-death	1.00	0.89

complex	dim	n	dim 0	dim 1	type	jacard_nodes_filtration	jacard_nodes_simplex
23	3	8	2	2	birth-death	1.00	0.89
24	3	8	1	1	birth-death	1.00	0.89
24	3	8	1	1	birth-death	1.00	0.89
24	3	8	2	2	birth-death	1.00	0.89
24	3	8	2	2	birth-death	1.00	0.89
24	3	8	2	2	birth-death	1.00	0.89
24	3	8	2	2	birth-death	1.00	0.89
24	3	8	2	2	birth-death	1.00	0.89
24	3	8	2	2	birth-death	1.00	0.89
25	3	8	0	0	birth-birth	1.00	0.88
25	3	8	0	0	birth-birth	1.00	0.88
25	3	8	1	1	birth-death	1.00	0.88
25	3	8	2	2	death-death	1.00	0.88
25	3	8	2	2	birth-death	1.00	0.88
25	3	8	2	2	birth-death	1.00	0.88
25	3	8	2	2	birth-death	1.00	0.88
25	3	8	2	2	birth-death	1.00	0.88
25	3	8	2	2	birth-death	1.00	0.88
25	3	8	2	2	birth-death	1.00	0.88
25	3	8	2	2	birth-death	1.00	0.88
25	3	8	2	2	birth-death	1.00	0.88

complex	dim	n	dim 0	dim 1	type	jacard_edges_filtration	jacard_edges_simplex
0	2	6	0	0	birth-birth	1.00	0.20
0	2	6	1	1	birth-death	1.00	0.20
0	2	6	1	1	birth-death	1.00	1.00
1	2	6	0	0	birth-birth	0.50	0.20
1	2	6	1	1	birth-death	1.00	0.20
2	2	6	0	0	birth-birth	1.00	0.33
2	2	6	1	1	birth-death	0.60	0.14
2	2	6	1	1	birth-death	1.00	0.33
3	2	6	1	1	birth-death	1.00	0.20
3	2	6	1	1	birth-death	1.00	0.20
4	2	8	0	0	birth-birth	1.00	0.67
4	2	8	1	1	birth-death	0.80	0.50
4	2	8	1	1	birth-birth	1.00	0.67
5	2	8	1	1	birth-death	0.60	0.00
5	2	8	2	2	death-death	1.00	0.60
5	2	8	1	1	birth-death	0.80	0.29
6	2	8	1	1	death-death	1.00	0.50
6	2	8	1	1	birth-death	0.71	0.50
6	2	8	1	1	death-death	1.00	0.50
7	2	8	1	1	birth-birth	1.00	0.45
7	2	8	2	2	death-death	1.00	0.45
8	2	8	1	1	birth-death	0.67	0.43
8	2	8	1	1	death-death	1.00	0.43
8	2	8	1	1	birth-death	1.00	0.67
8	2	8	2	2	death-death	1.00	0.67
9	2	8	1	1	birth-death	1.00	0.25
9	2	8	1	1	birth-death	1.00	0.43
9	2	8	1	1	birth-death	0.67	0.67
10	2	8	1	1	birth-death	0.75	0.56
11	2	8	1	1	birth-death	0.75	0.75
12	2	12	0	0	birth-birth	1.00	0.45
12	2	12	1	1	birth-death	1.00	0.78
12	2	12	2	2	death-death	1.00	0.78
12	2	12	1	1	birth-birth	1.00	0.78
13	2	12	0	0	birth-birth	1.00	0.67
13	2	12	1	1	birth-death	0.82	0.67
13	2	12	1	1	birth-death	1.00	1.00
14	2	12	1	1	birth-death	0.92	0.79
14	2	12	1	1	death-death	1.00	0.60
14	2	12	2	2	death-death	1.00	0.85
14	2	12	1	1	birth-birth	1.00	0.71
15	2	12	0	0	birth-birth	0.83	0.47
15	2	12	1	1	birth-death	1.00	0.57
16	2	12	0	0	birth-birth	0.80	0.38
16	2	12	1	1	death-death	0.80	0.29
16	2	12	1	1	birth-death	0.70	0.70
17	2	12	1	1 '	7 birth-death	1.00	0.60
17	2	12	1	1	birth-death	0.70	0.31
18	2	16	0	0	birth-birth	0.88	0.52
18	2	16	1	1	birth-death	0.88	0.67

complex	dim	n	dim 0	dim 1	type	$jacard\_edges\_filtration$	$jacard\_edges\_simplex$
18	2	16	1	1	birth-death	0.88	0.78
18	2	16	1	1	birth-death	1.00	0.68
18	2	16	2	2	death-death	1.00	0.78
19	2	16	0	0	birth-birth	0.75	0.47
19	2	16	1	1	death-death	1.00	0.75
20	3	8	0	0	birth-birth	0.62	0.18
20	3	8	1	1	death-death	0.62	0.30
20	3	8	1	1	birth-death	0.86	0.62
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
21	3	8	0	0	birth-birth	0.71	0.20
21	3	8	0	0	birth-birth	1.00	0.50
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	1	1	birth-death	0.86	0.18
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	$\overline{2}$	$\overline{2}$	birth-death	1.00	1.00
22	3	8	0	0	birth-birth	1.00	0.33
22	3	8	1	1	birth-death	1.00	0.71
22	3	8	1	1	birth-death	1.00	0.71
22	3	8	1	1	birth-death	0.86	0.62
$\frac{-}{22}$	3	8	$\overline{2}$	$\overline{2}$	birth-death	0.86	0.62
$\frac{-2}{22}$	3	8	$\overline{2}$	$\overline{2}$	death-death	1.00	0.71
22	3	8	$\frac{1}{2}$	$\frac{1}{2}$	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
22	3	8	2	$\frac{2}{2}$	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
$\frac{22}{22}$	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
23	3	8	0	0	birth-birth	1.00	0.23
23	3	8	1	1	death-death	1.00	0.45
23	3	8	1	1	birth-death	0.88	0.36
23 23	3	8	2	2	death-death	1.00	0.50
23 23		8	$\frac{2}{2}$	$\frac{2}{2}$			
	3				birth-death	1.00	1.00
23	$\frac{3}{3}$	8	$\frac{2}{2}$	2	birth-death birth-death	1.00	1.00
23		8				1.00	1.00
23	3	8	2	2	birth-death	1.00	1.00
23	3	8	2	2	birth-death	1.00	1.00
23	3	8	2	2	birth-death	1.00	1.00

complex	dim	n	dim 0	dim 1	type	jacard_edges_filtration	jacard_edges_simplex
23	3	8	2	2	birth-death	1.00	1.00
24	3	8	1	1	birth-death	1.00	0.43
24	3	8	1	1	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
25	3	8	0	0	birth-birth	1.00	0.33
25	3	8	0	0	birth-birth	1.00	0.50
25	3	8	1	1	birth-death	1.00	0.50
25	3	8	2	2	death-death	1.00	0.71
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00

$jacard\_l31b$	$jacard\_l31a$	type	$\dim 1$	$\dim0$	n	$\dim$	complex
1.00	1.00	birth-birth	0	0	6	2	0
NaN	NaN	birth-death	1	1	6	2	0
NaN	NaN	birth-death	1	1	6	2	0
1.00	1.00	birth-birth	0	0	6	2	1
NaN	NaN	birth-death	1	1	6	2	1
1.00	1.00	birth-birth	0	0	6	2	2
NaN	NaN	birth-death	1	1	6	2	2
NaN	NaN	birth-death	1	1	6	2	2
NaN	NaN	birth-death	1	1	6	2	3
NaN	NaN	birth-death	1	1	6	2	3
1.00	1.00	birth-birth	0	0	8	2	4
NaN	NaN	birth-death	1	1	8	2	4
1.00	1.00	birth-birth	1	1	8	2	4
NaN	NaN	birth-death	1	1	8	2	5
0.00	0.00	death-death	2	2	8	2	5
NaN	NaN	birth-death	1	1	8	2	5
0.50	0.50	death-death	1	1	8	2	6
NaN	NaN	birth-death	1	1	8	2	6
0.00	0.00	death-death	1	1	8	2	6
1.00	1.00	birth-birth	1	1	8	2	7
0.00	0.00	death-death	2	2	8	2	7
NaN	NaN	birth-death	1	1	8	2	8
0.00	0.00	death-death	1	1	8	2	8
NaN	NaN	birth-death	1	1	8	2	8
0.00	0.00	death-death	2	2	8	2	8
NaN	NaN	birth-death	1	1	8	2	9
NaN	NaN	birth-death	1	1	8	2	9
NaN	NaN	birth-death	1	1	8	2	9
NaN	NaN	birth-death	1	1	8	2	10
NaN	NaN	birth-death	1	1	8	2	11
1.00	1.00	birth-birth	0	0	12	2	12
NaN	NaN	birth-death	1	1	12	2	12
0.00	0.00	death-death	2	2	12	2	12
1.00	1.00	birth-birth	1	1	12	2	12
1.00	1.00	birth-birth	0	0	12	2	13
NaN	NaN	birth-death	1	1	12	2	13
NaN	NaN	birth-death	1	1	12	2	13
NaN	NaN	birth-death	1	1	12	2	14
0.00	0.00	death-death	1	1	12	2	14
0.00	0.00	death-death	2	2	12	2	14
1.00	1.00	birth-birth	1	1	12	2	14
1.00	1.00	birth-birth	0	0	12	2	15
NaN	NaN	birth-death	1	1	12	2	15
1.00	1.00	birth-birth	0	0	12	$\overline{2}$	16
0.50	0.00	death-death	1	1	12	$\overline{2}$	16
NaN	NaN	birth-death	1	1	12	2	16
NaN	NaN	0 birth-death		1	12	2	17
NaN	NaN	birth-death	1	1	12	2	17
1.00	1.00	birth-birth	0	0	16	2	18
NaN	NaN	birth-death	1	1	16	2	18

jacard_l31b	$jacard\_l31a$	type	$\dim 1$	$\dim 0$	n	$\dim$	complex
NaN	NaN	birth-death	1	1	16	2	18
NaN	NaN	birth-death	1	1	16	2	18
0.00	0.00	death-death	2	2	16	2	18
1.00	1.00	birth-birth	0	0	16	2	19
0.67	0.67	death-death	1	1	16	2	19
1.00	1.00	birth-birth	0	0	8	3	20
0.67	0.33	death-death	1	1	8	3	20
NaN	NaN	birth-death	1	1	8	3	20
NaN	NaN	birth-death	2	2	8	3	20
NaN	NaN	birth-death	2	2	8	3	20
NaN	NaN	birth-death	2	2	8	3	20
NaN	NaN	birth-death	2	2	8	3	20
NaN	NaN	birth-death	2	2	8	3	20
NaN	NaN	birth-death	2	2	8	3	20
NaN	NaN	birth-death	2	2	8	3	20
1.00	1.00	birth-birth	0	0	8	3	21
1.00	1.00	birth-birth	0	0	8	3	21
NaN	NaN	birth-death	2	2	8	3	21
NaN	NaN	birth-death	2	2	8	3	21
NaN	NaN	birth-death	1	1	8	3	21
NaN	NaN	birth-death	2	2	8	3	21
NaN	NaN	birth-death	2	2	8	3	21
NaN	NaN	birth-death	2	2	8	3	21
NaN	NaN	birth-death	2	2	8	3	21
NaN	NaN	birth-death	2	2	8	3	21
NaN	NaN	birth-death	2	2	8	3	21
1.00	1.00	birth-birth	0	0	8	3	22
NaN	NaN	birth-death	1	1	8	3	22
NaN	NaN	birth-death	1	1	8	3	22
NaN	NaN	birth-death	1	1	8	3	22
NaN	NaN	birth-death	2	2	8	3	22
0.00	0.00	death-death	2	2	8	3	22
NaN	NaN	birth-death	2	2	8	3	22
NaN	NaN	birth-death	2	2	8	3	22
NaN	NaN	birth-death	2	2	8	3	22
NaN	NaN	birth-death	2	2	8	3	22
NaN	NaN	birth-death	2	2	8	3	22
NaN	NaN	birth-death	2	2	8	3	22
NaN	NaN	birth-death	2	2	8	3	22
NaN	NaN	birth-death	2	2	8	3	22
0.00	1.00	birth-birth	0	0	8	3	23
0.50	0.00	death-death	1	1	8	3	23
NaN	NaN	birth-death	1	1	8	3	23
0.00	0.00	death-death	2	2	8	3	23
NaN	NaN	birth-death	2	2	8	3	23
NaN	NaN	birth-death	$\frac{1}{2}$	$\frac{1}{2}$	8	3	23
NaN	NaN	1 birth-death		2	8	3	23
NaN	NaN	birth-death	2	2	8	3	23
NaN	NaN	birth-death	$\frac{2}{2}$	$\frac{2}{2}$	8	3	23
NaN	NaN	birth-death	$\frac{2}{2}$	$\frac{2}{2}$	8	3	23

complex	dim	n	dim 0	dim 1	type	jacard_l31a	jacard_l31b
23	3	8	2	2	birth-death	NaN	NaN
24	3	8	1	1	birth-death	NaN	NaN
24	3	8	1	1	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
25	3	8	0	0	birth-birth	1.00	1.00
25	3	8	0	0	birth-birth	1.00	0.50
25	3	8	1	1	birth-death	NaN	NaN
25	3	8	2	2	death-death	0.00	0.00
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN

complex	dim	n	dim 0	dim 1	type	jacard_l32a	jacard_l32b
0	2	6	0	0	birth-birth	0.00	0.00
0	2	6	1	1	birth-death	NaN	NaN
0	2	6	1	1	birth-death	NaN	NaN
1	2	6	0	0	birth-birth	0.00	0.00
1	2	6	1	1	birth-death	NaN	NaN
2	2	6	0	0	birth-birth	0.50	0.50
2	2	6	1	1	birth-death	NaN	NaN
2	2	6	1	1	birth-death	NaN	NaN
3	2	6	1	1	birth-death	NaN	NaN
3	2	6	1	1	birth-death	NaN	NaN
4	2	8	0	0	birth-birth	0.00	0.00
4	2	8	1	1	birth-death	NaN	NaN
4	2	8	1	1	birth-birth	0.00	0.00
5	2	8	1	1	birth-death	NaN	NaN
5	2	8	2	2	death-death	1.00	1.00
5	$\frac{-}{2}$	8	1	1	birth-death	NaN	NaN
6	2	8	1	1	death-death	1.00	1.00
6	2	8	1	1	birth-death	NaN	NaN
6	$\frac{2}{2}$	8	1	1	death-death	1.00	1.00
7	$\frac{2}{2}$	8	1	1	birth-birth	0.00	0.00
7	2	8	2	2	death-death	1.00	1.00
8	$\frac{2}{2}$	8	1	1	birth-death	NaN	NaN
8	$\frac{2}{2}$	8	1	1	death-death	1.00	1.00
8	$\frac{2}{2}$	8	1	1	birth-death	NaN	NaN
8	$\frac{2}{2}$	8	2	2	death-death	1.00	1.00
9	$\frac{2}{2}$	8	1	1	birth-death	NaN	NaN
9	$\frac{2}{2}$	8	1	1	birth-death	NaN	NaN
9	$\frac{2}{2}$	8	1	1	birth-death	NaN	NaN
10	$\frac{2}{2}$	8	1	1	birth-death	NaN	NaN
11	$\frac{2}{2}$	8	1	1	birth-death	NaN	NaN
12	$\frac{2}{2}$	12	0	0	birth-birth	0.00	0.00
12	$\frac{2}{2}$	12	1	1	birth-death	NaN	NaN
12	$\frac{2}{2}$	12	$\overset{1}{2}$	$\overset{1}{2}$	death-death	1.00	
12	$\frac{2}{2}$	$\frac{12}{12}$	1	1	birth-birth		1.00 0.00
						0.00	
13	2	12	0	0	birth-birth	0.50	0.50
13	2	12	1	1	birth-death	NaN	NaN
13	2	12	1	1	birth-death	NaN	NaN N-N
14	2	12	1	1	birth-death	NaN	NaN
14	2	12	1	1	death-death	1.00	1.00
14	2	12	2	2	death-death	1.00	1.00
14	2	12	1	1	birth-birth	0.00	0.00
15	2	12	0	0	birth-birth	0.50	0.50
15	2	12	1	1	birth-death	NaN	NaN
16	2	12	0	0	birth-birth	0.00	0.00
16	2	12	1	1	death-death	1.00	1.00
16	2	12	1	1	birth-death	NaN	NaN
17	2	12	1		3 birth-death	NaN	NaN
17	2	12	1	1	birth-death	NaN	NaN
18	2	16	0	0	birth-birth	0.00	0.00
18	2	16	1	1	birth-death	NaN	NaN

complex	dim	n	dim 0	dim 1	type	jacard_l32a	jacard_l32b
18	2	16	1	1	birth-death	NaN	NaN
18	2	16	1	1	birth-death	NaN	NaN
18	2	16	2	2	death-death	1.00	1.00
19	2	16	0	0	birth-birth	0.50	0.50
19	2	16	1	1	death-death	1.00	1.00
20	3	8	0	0	birth-birth	0.00	0.00
20	3	8	1	1	death-death	1.00	1.00
20	3	8	1	1	birth-death	NaN	NaN
20	3	8	2	2	birth-death	NaN	NaN
20	3	8	2	2	birth-death	NaN	NaN
20	3	8	2	2	birth-death	NaN	NaN
20	3	8	2	2	birth-death	NaN	NaN
20	3	8	2	2	birth-death	NaN	NaN
20	3	8	2	2	birth-death	NaN	NaN
20	3	8	2	2	birth-death	NaN	NaN
21	3	8	0	0	birth-birth	0.00	0.00
21	3	8	0	0	birth-birth	0.50	0.50
21	3	8	$\overset{\circ}{2}$	$\overset{\circ}{2}$	birth-death	NaN	NaN
21	3	8	2	2	birth-death	NaN	NaN
21	3	8	1	1	birth-death	NaN	NaN
21	3	8	2	2	birth-death	NaN	NaN
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	NaN	NaN
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	NaN	NaN
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	NaN	NaN
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	NaN	NaN
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	NaN	NaN
$\frac{21}{22}$	3	8	0	0	birth-birth	0.00	0.00
$\frac{22}{22}$	3	8	1	1	birth-death	NaN	NaN
$\frac{22}{22}$	3	8	1	1	birth-death	NaN	NaN
$\frac{22}{22}$	3	8	1	1	birth-death	NaN	NaN
$\frac{22}{22}$	3	8	$\frac{1}{2}$	$\frac{1}{2}$	birth-death	NaN	NaN
$\frac{22}{22}$	3	8	$\frac{2}{2}$	$\frac{2}{2}$	death-death	1.00	1.00
$\frac{22}{22}$	3	8	$\frac{2}{2}$	$\overset{2}{2}$	birth-death	NaN	NaN
$\frac{22}{22}$	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death		
	3	8	$\frac{2}{2}$			NaN N-N	NaN N-N
22				2	birth-death	NaN N-N	NaN N-N
22	3	8	2	2	birth-death	NaN	NaN
22	3	8	2	2	birth-death	NaN	NaN N-N
22	3	8	2	2	birth-death	NaN	NaN
22	3	8	2	2	birth-death	NaN	NaN
22	3	8	2	2	birth-death	NaN	NaN
23	3	8	0	0	birth-birth	0.50	0.50
23	3	8	1	1	death-death	1.00	1.00
23	3	8	1	1	birth-death	NaN	NaN
23	3	8	2	2	death-death	1.00	1.00
23	3	8	2	2	birth-death	NaN	NaN
23	3	8	2	2	birth-death	NaN	NaN
23	3	8	2		4 birth-death	NaN	NaN
23	3	8	2	2	birth-death	NaN	NaN
23	3	8	2	2	birth-death	NaN	NaN
23	3	8	2	2	birth-death	NaN	NaN

complex	dim	n	dim 0	dim 1	type	jacard_l32a	jacard_l32b
23	3	8	2	2	birth-death	NaN	NaN
24	3	8	1	1	birth-death	NaN	NaN
24	3	8	1	1	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
24	3	8	2	2	birth-death	NaN	NaN
25	3	8	0	0	birth-birth	0.00	0.00
25	3	8	0	0	birth-birth	0.50	0.50
25	3	8	1	1	birth-death	NaN	NaN
25	3	8	2	2	death-death	1.00	1.00
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN
25	3	8	2	2	birth-death	NaN	NaN

0 2 6 1 1 birth-death 0 2 6 1 1 birth-death 1 2 6 0 0 birth-birth 1 2 6 0 0 birth-birth 1 2 6 1 1 birth-death 2 2 6 1 1 birth-death 2 2 6 1 1 birth-death 2 2 6 1 1 birth-death 3 2 6 1 1 birth-death 3 2 6 1 1 birth-death 4 2 8 0 0 birth-birth 4 2 8 1 1 birth-death 5 2 8 1 1 birth-death 5 2 8 2 death-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 7 2 8 2 2 death-death 8 2 8 1 1 birth-death 8 2 8 1 1 birth-death 9 2 8 1 1 birth-death 1 1 birth-death 1 2 8 1 1 birth-death 2 8 1 1 birth-death 3 1 birth-death 4 1 1 birth-death 5 2 8 2 2 death-death 5 3 2 8 2 2 death-death 6 3 2 8 1 1 birth-death 6 3 2 8 1 1 birth-death 6 3 2 8 1 1 birth-death 7 3 2 8 2 2 death-death 8 3 3 1 birth-death 9 3 8 1 1 birth-death 9 4 8 1 1 birth-death 1 1 birth-death 1 1 birth-death 1 2 2 2 2 death-death 1 1 birth-death 1 2 3 2 2 2 death-death 1 1 birth-death 1	rd_l33a	rd_l33a jacard_l33b
0         2         6         1         1         birth-death           1         2         6         0         0         birth-birth           1         2         6         1         1         birth-death           2         2         6         1         1         birth-death           3         2         6         1         1         birth-death           3         2         6         1         1         birth-death           4         2         8         0         0         birth-birth           4         2         8         1         1         birth-birth           4         2         8         1         1         birth-birth           5         2         8         2         2         death-death           5         2         8         1         1         birth-death           6         2         8         1         1         birth-death           6         2         8         1         1         birth-death           6         2         8         1         1         birth-death           7         2<	NaN	NaN NaN
1         2         6         0         0         birth-birth           1         2         6         1         1         birth-death           2         2         6         0         0         birth-birth           2         2         6         1         1         birth-death           3         2         6         1         1         birth-death           4         2         8         0         0         birth-birth           4         2         8         0         0         birth-birth           4         2         8         1         birth-birth           4         2         8         1         birth-death           4         2         8         1         birth-death           5         2         8         2         2         death-death           5         2         8         1         birth-birth         birth-death           6         2         8         1         birth-death         birth-death           6         2         8         1         birth-death         birth-death         birth-death         birth-death         birth-dea	1.00	1.00 1.00
1         2         6         1         1         birth-death           2         2         6         0         0         birth-birth           2         2         6         1         1         birth-death           3         2         6         1         1         birth-death           4         2         8         0         0         birth-death           4         2         8         1         1         birth-death           5         2         8         2         2         death-death           5         2         8         1         1         birth-death           6         2         8         1         1         birth-death           6         2         8         1         1         birth-death           7         2         8         2         2         death-death           8         2<	1.00	1.00 1.00
2	NaN	NaN NaN
2 2 6 1 1 birth-death 2 2 6 1 1 birth-death 3 2 6 1 1 birth-death 3 2 6 1 1 birth-death 4 2 8 0 0 birth-birth 4 2 8 1 1 birth-death 4 2 8 1 1 birth-birth 5 2 8 1 1 birth-death 5 2 8 2 death-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-birth 7 2 8 2 death-death 7 2 8 1 1 birth-death 8 2 8 1 1 birth-death 8 2 8 1 1 birth-death 9 2 8 1 1 birth-death	1.00	1.00 1.00
2	NaN	NaN NaN
3 2 6 1 1 birth-death 3 2 6 1 1 birth-death 4 2 8 0 0 birth-birth 4 2 8 1 1 birth-death 4 2 8 1 1 birth-death 5 2 8 1 1 birth-death 5 2 8 2 death-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 7 2 8 1 1 birth-birth 7 2 8 2 death-death 8 2 8 1 1 birth-death 8 2 8 1 1 birth-death 8 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 10 2 8 1 1 birth-death 11 2 8 1 1 birth-death 12 2 12 0 0 birth-birth 13 2 12 1 1 birth-death 13 2 12 1 1 birth-death 14 2 12 1 1 birth-death 14 2 12 1 1 birth-death 15 2 12 0 0 birth-birth 16 2 12 1 1 birth-death 17 2 1 1 birth-death 18 2 1 1 birth-death 19 2 2 2 death-death 10 2 8 1 1 birth-death 11 2 8 1 1 birth-death 12 2 12 2 2 death-death 13 2 12 1 1 birth-death 14 2 12 1 1 birth-death 15 2 12 1 1 birth-death 16 2 12 1 1 birth-death 17 2 12 1 1 birth-death 18 2 12 1 1 birth-death 19 2 12 1 1 birth-death 10 2 12 1 1 birth-death 11 2 2 12 1 1 birth-birth 11 2 12 1 1 birth-death	1.00	1.00 1.00
3	1.00	1.00 1.00
4 2 8 1 1 birth-death 5 2 8 1 1 birth-death 5 2 8 2 2 death-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 7 2 8 1 1 birth-birth 7 2 8 2 2 death-death 8 2 8 1 1 birth-birth 8 2 8 1 1 birth-death 8 2 8 1 1 birth-death 8 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 10 2 8 1 1 birth-death 11 2 8 1 1 birth-death 12 2 12 1 1 birth-death 13 2 12 1 1 birth-death 14 2 12 1 1 birth-death 14 2 12 1 1 birth-death 15 2 12 1 1 birth-death 16 2 12 1 1 birth-death 17 2 1 1 birth-death 18 2 1 1 birth-death 19 2 8 1 1 birth-death 10 2 8 1 1 birth-death 11 2 8 1 1 birth-death 12 2 12 1 1 birth-death 13 2 12 1 1 birth-death 14 2 12 1 1 birth-death 15 2 12 1 1 birth-death 16 2 12 1 1 birth-death 17 2 1 1 birth-death 18 2 1 1 birth-death 19 2 1 1 birth-death 19 2 1 1 birth-death 10 2 1 1 birth-death 10 2 1 1 birth-death 11 2 1 1 birth-birth 12 1 1 birth-birth 13 1 1 birth-birth 14 1 1 1 birth-birth 15 1 1 1 birth-birth	1.00	1.00 1.00
4 2 8 1 1 birth-death 5 2 8 1 1 birth-death 5 2 8 2 2 death-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 7 2 8 1 1 birth-birth 7 2 8 2 2 death-death 8 2 8 1 1 birth-birth 8 2 8 1 1 birth-death 8 2 8 1 1 birth-death 8 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 10 2 8 1 1 birth-death 11 2 8 1 1 birth-death 12 2 12 1 1 birth-death 13 2 12 1 1 birth-death 14 2 12 1 1 birth-death 14 2 12 1 1 birth-death 15 2 12 1 1 birth-death 16 2 12 1 1 birth-death 17 2 1 1 birth-death 18 2 1 1 birth-death 19 2 8 1 1 birth-death 10 2 8 1 1 birth-death 11 2 8 1 1 birth-death 12 2 12 1 1 birth-death 13 2 12 1 1 birth-death 14 2 12 1 1 birth-death 15 2 12 1 1 birth-death 16 2 12 1 1 birth-death 17 2 1 1 birth-death 18 2 1 1 birth-death 19 2 1 1 birth-death 19 2 1 1 birth-death 10 2 1 1 birth-death 10 2 1 1 birth-death 11 2 1 1 birth-birth 12 1 1 birth-birth 13 1 1 birth-birth 14 1 1 1 birth-birth 15 1 1 1 birth-birth	1.00	1.00 1.00
4 2 8 1 1 birth-death 4 2 8 1 1 birth-birth 5 2 8 2 2 death-death 5 2 8 1 1 birth-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 6 2 8 1 1 birth-death 7 2 8 1 1 birth-birth 7 2 8 2 2 death-death 8 2 8 1 1 birth-birth 7 2 8 2 2 death-death 8 2 8 1 1 birth-death 8 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 10 2 8 1 1 birth-death 11 2 8 1 1 birth-death 12 2 12 1 1 birth-death 12 2 12 1 1 birth-death 13 2 12 1 1 birth-death 14 2 12 1 1 birth-death 15 2 12 1 1 birth-death 16 2 12 1 1 birth-death 17 2 12 1 1 birth-death 18 2 12 1 1 birth-death 19 2 12 1 1 birth-death 10 2 8 1 1 birth-death 11 2 8 1 1 birth-death 12 2 12 2 2 death-death 13 2 12 1 1 birth-death 14 2 12 1 1 birth-death 15 2 12 1 1 birth-death 16 2 12 1 1 birth-death 17 2 2 2 2 death-death 18 2 12 1 1 birth-death 19 2 12 1 1 birth-death 10 2 12 1 1 birth-death 11 2 1 1 birth-birth 12 2 12 1 1 birth-birth 13 2 12 1 1 birth-birth	NaN	NaN NaN
4 2 8 1 1 birth-birth 5 2 8 2 2 death-death 5 2 8 1 1 birth-death 6 2 8 1 1 birth-death 7 2 8 1 1 birth-birth 7 2 8 2 2 death-death 8 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 9 2 8 1 1 birth-death 10 2 8 1 1 birth-death 11 2 8 1 1 birth-death 12 2 12 0 0 birth-birth 12 2 12 1 1 birth-death 13 2 12 1 1 birth-death 14 2 12 1 1 birth-death 15 2 12 1 1 birth-death 16 2 12 1 1 birth-death 17 2 10 0 birth-birth 18 2 12 1 1 birth-death 19 2 10 0 birth-birth 10 0 0 birth-birth 11 0 0 0 birth-birth 12 10 0 0 birth-birth 13 10 0 0 birth-birth 14 15 16 17 10 0 0 birth-birth 15 18 19 10 0 0 birth-birth 18 19 10 0 0 birth-birth 19 10 0 0 birth-birth 10 0 0 birth-birth 11 0 0 0 birth-birth 12 11 1 birth-death 14 12 12 1 1 birth-death 15 12 12 1 1 birth-death 16 15 12 1 1 birth-birth 17 15 15 12 12 1 1 birth-birth 18 15 12 12 1 1 birth-birth 18 16 18 18 18 18 18 18 18 18 18 18 18 18 18	1.00	
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5         2         8         1         1         birth-death           6         2         8         1         1         death-death           6         2         8         1         1         birth-death           6         2         8         1         1         birth-death           7         2         8         2         2         death-death           8         2         8         1         1         birth-death           9         2         8         1         1         birth-death           9         2         8         1         1         birth-death           10         2         8         1         1         birth-death           11         2         8         1         1         birth-death           12         2         12         2         death-death           12         2         <	NaN	
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8       2       8       1       1       birth-death         8       2       8       1       1       death-death         8       2       8       1       1       birth-death         9       2       8       1       1       birth-death         9       2       8       1       1       birth-death         9       2       8       1       1       birth-death         10       2       8       1       1       birth-death         11       2       8       1       1       birth-death         11       2       8       1       1       birth-death         12       2       12       0       0       birth-birth         12       2       12       1       1       birth-birth         13       2       12       1       1       birth-birth         13       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2	NaN	
8       2       8       1       1       death-death         8       2       8       2       2       death-death         9       2       8       1       1       birth-death         9       2       8       1       1       birth-death         9       2       8       1       1       birth-death         10       2       8       1       1       birth-death         11       2       8       1       1       birth-death         11       2       8       1       1       birth-death         12       2       12       0       0       birth-birth         12       2       12       1       birth-birth         13       2       12       1       1       birth-birth         13       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       1       1       birth-birth         15       2       12       <	1.00	
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10       2       8       1       1       birth-death         11       2       8       1       1       birth-death         12       2       12       0       0       birth-birth         12       2       12       1       1       birth-death         12       2       12       2       death-death         12       2       12       1       1       birth-birth         13       2       12       1       1       birth-death         13       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       1       1       birth-birth         14       2       12       1       1       birth-birth         15       2       12       1       1       birth-birth         15       2       12       1       1       birth-death         16       2       12       1       1       birth-birth         16       2       12       1       1       death-death         16       2       12 </td <td>1.00</td> <td></td>	1.00	
11       2       8       1       1       birth-death         12       2       12       0       0       birth-birth         12       2       12       1       1       birth-death         12       2       12       2       2       death-death         12       2       12       1       1       birth-birth         13       2       12       0       0       birth-birth         13       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       2       2       death-death         14       2       12       1       1       birth-birth         15       2       12       1       1       birth-birth         15       2       12       1       1       birth-death         16       2       12       0       0       birth-birth         16       2       12       1       1       death-death         16       2 </td <td>1.00</td> <td></td>	1.00	
12       2       12       0       0       birth-birth         12       2       12       1       birth-death         12       2       12       2       death-death         12       2       12       1       birth-birth         13       2       12       1       birth-death         13       2       12       1       birth-death         14       2       12       1       birth-death         14       2       12       1       death-death         14       2       12       2       death-death         14       2       12       1       birth-birth         15       2       12       0       birth-birth         15       2       12       1       birth-death         16       2       12       1       death-death         16       2	1.00	
12       2       12       1       birth-death         12       2       12       2       death-death         12       2       12       1       birth-birth         13       2       12       0       0       birth-birth         13       2       12       1       1       birth-death         13       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       1       1       birth-birth         14       2       12       1       1       birth-birth         15       2       12       1       1       birth-birth         15       2       12       1       1       birth-death         16       2       12       1       1       death-death         16       2       12       1       1	NaN	
12       2       12       2       2 death-death         12       2       12       1       birth-birth         13       2       12       1       birth-birth         13       2       12       1       birth-death         14       2       12       1       birth-death         14       2       12       1       death-death         14       2       12       2       death-death         14       2       12       1       birth-birth         15       2       12       0       birth-birth         15       2       12       1       birth-death         16       2       12       1       death-death         1       death-death       <	1.00	
12       2       12       1       1       birth-birth         13       2       12       1       1       birth-birth         13       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       1       1       death-death         14       2       12       2       2       death-death         14       2       12       1       1       birth-birth         15       2       12       0       0       birth-birth         15       2       12       1       1       birth-death         16       2       12       1       1       death-death         16       2<	NaN	
13       2       12       0       0       birth-birth         13       2       12       1       1       birth-death         13       2       12       1       1       birth-death         14       2       12       1       1       death-death         14       2       12       2       2       death-death         14       2       12       1       1       birth-birth         15       2       12       0       0       birth-birth         15       2       12       1       1       birth-death         16       2       12       1       1       death-death         16       2       12       1       1       death-death         16       2       12       1       1       death-death	NaN	
13       2       12       1       1       birth-death         13       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       2       2       death-death         14       2       12       1       1       birth-birth         15       2       12       0       0       birth-birth         15       2       12       1       1       birth-death         16       2       12       0       0       birth-birth         16       2       12       1       1       death-death         16       2       12       1       1       death-death         16       2       12       1       1       death-death	NaN	
13       2       12       1       1       birth-death         14       2       12       1       1       birth-death         14       2       12       1       1       death-death         14       2       12       2       2       death-death         14       2       12       1       1       birth-birth         15       2       12       0       0       birth-birth         15       2       12       1       1       birth-death         16       2       12       1       1       death-death         16       2       12       1       1       death-death         16       2       12       1       1       birth-death	1.00	
14       2       12       1       1       birth-death         14       2       12       1       1       death-death         14       2       12       2       2       death-death         14       2       12       1       1       birth-birth         15       2       12       0       0       birth-birth         15       2       12       1       1       birth-death         16       2       12       1       1       death-death         16       2       12       1       1       birth-death         16       2       12       1       1       birth-death	1.00	
14       2       12       1       1       death-death         14       2       12       2       2       death-death         14       2       12       1       1       birth-birth         15       2       12       0       0       birth-birth         15       2       12       1       1       birth-death         16       2       12       1       1       death-death         16       2       12       1       1       death-death         16       2       12       1       1       birth-death	1.00	
14       2       12       2       2 death-death         14       2       12       1       1 birth-birth         15       2       12       0       0 birth-birth         15       2       12       1       1 birth-death         16       2       12       0       0 birth-birth         16       2       12       1       1 death-death         16       2       12       1       1 birth-death	NaN	
14       2       12       1       1       birth-birth         15       2       12       0       0       birth-birth         15       2       12       1       1       birth-death         16       2       12       0       0       birth-birth         16       2       12       1       1       death-death         16       2       12       1       1       birth-death	NaN	
15 2 12 0 0 birth-birth 15 2 12 1 1 birth-death 16 2 12 0 0 birth-birth 16 2 12 1 1 death-death 16 2 12 1 1 birth-death	NaN	
15 2 12 1 1 birth-death 16 2 12 0 0 birth-birth 16 2 12 1 1 death-death 16 2 12 1 1 birth-death	NaN	
16 2 12 0 0 birth-birth 16 2 12 1 1 death-death 16 2 12 1 1 birth-death	1.00	
16 2 12 1 1 death-death 16 2 12 1 1 birth-death	NaN	
16 2 12 1 1 birth-death	NaN	
	1.00	
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17 2 12 1 1 1 birth-death	1.00	
17 2 12 1 1 birth-death 18 2 16 0 0 birth-birth	NaN	
18 2 16 0 0 birth-birth 18 2 16 1 1 birth-death	1.00	

complex	dim	n	dim 0	dim 1	type	jacard_l33a	jacard_l33b
18	2	16	1	1	birth-death	1.00	1.00
18	$\frac{2}{2}$	16	1	1	birth-death	1.00	1.00
18	$\frac{2}{2}$	16	$\frac{1}{2}$	$\frac{1}{2}$	death-death	NaN	NaN
19	$\frac{2}{2}$	16	0	0	birth-birth	NaN	NaN
19	$\frac{2}{2}$	16	1	1	death-death	NaN	NaN
20	3	8	0	0	birth-birth	NaN	NaN
20	3	8	1	1	death-death	NaN	NaN
20	3	8	1	1	birth-death	1.00	1.00
20	3	8	$\frac{1}{2}$	$\frac{1}{2}$	birth-death	1.00	1.00
20	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
20	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
20	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
20	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
20	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
20	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
21	3	8	0	0	birth-birth	NaN	NaN
21	3	8	0	0	birth-birth	NaN	NaN
21	3	8	$\overset{\circ}{2}$	$\overset{\circ}{2}$	birth-death	1.00	1.00
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
21	3	8	1	1	birth-death	1.00	1.00
21	3	8	$\frac{1}{2}$	$\frac{1}{2}$	birth-death	1.00	1.00
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
21	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
22	3	8	0	0	birth-birth	NaN	NaN
$\frac{22}{22}$	3	8	1	1	birth-death	1.00	1.00
22	3	8	1	1	birth-death	1.00	1.00
$\frac{22}{22}$	3	8	1	1	birth-death	1.00	1.00
22	3	8	$\frac{1}{2}$	$\frac{1}{2}$	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	death-death	NaN	NaN
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
$\frac{22}{22}$	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
$\frac{22}{22}$	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
$\frac{22}{22}$	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
$\frac{22}{22}$	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
23	3	8	0	0	birth-birth	NaN	NaN
23	3	8	1	1	death-death birth-death	NaN 1.00	NaN 1.00
23	3	8	1	1		1.00 No.N	1.00 NoN
23	3	8	2	2	death-death	NaN	NaN
23	3	8	2	2	birth-death	1.00	1.00
23	3	8	2	2	birth-death	1.00	1.00
23	3	8	2		7 birth-death	1.00	1.00
23	3	8	2	2	birth-death	1.00	1.00
23	3	8	2	2	birth-death	1.00	1.00
23	3	8	2	2	birth-death	1.00	1.00

complex	dim	n	dim 0	dim 1	type	jacard_l33a	jacard_l33b
23	3	8	2	2	birth-death	1.00	1.00
24	3	8	1	1	birth-death	1.00	1.00
24	3	8	1	1	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
25	3	8	0	0	birth-birth	NaN	NaN
25	3	8	0	0	birth-birth	NaN	NaN
25	3	8	1	1	birth-death	1.00	1.00
25	3	8	2	2	death-death	NaN	NaN
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00

complex	dim	n	dim 0	dim 1	type	jacard_nn_nodes	jacard_nn_edges
0	2	6	0	0	birth-birth	1.00	1.00
0	2	6	1	1	birth-death	1.00	1.00
0	2	6	1	1	birth-death	1.00	1.00
1	2	6	0	0	birth-birth	1.00	1.00
1	2	6	1	1	birth-death	1.00	1.00
2	2	6	0	0	birth-birth	1.00	1.00
2	2	6	1	1	birth-death	1.00	1.00
2	2	6	1	1	birth-death	1.00	1.00
3	2	6	1	1	birth-death	1.00	1.00
3	2	6	1	1	birth-death	1.00	1.00
4	2	8	0	0	birth-birth	1.00	1.00
4	2	8	1	1	birth-death	1.00	1.00
4	2	8	1	1	birth-birth	1.00	1.00
5	2	8	1	1	birth-death	1.00	1.00
5	2	8	2	2	death-death	1.00	1.00
5	2	8	1	1	birth-death	1.00	1.00
6	2	8	1	1	death-death	1.00	1.00
6	2	8	1	1	birth-death	1.00	1.00
6	2	8	1	1	death-death	1.00	1.00
7	2	8	1	1	birth-birth	1.00	1.00
7	2	8	2	2	death-death	1.00	1.00
8	2	8	1	1	birth-death	1.00	1.00
8	2	8	1	1	death-death	1.00	1.00
8	2	8	1	1	birth-death	1.00	1.00
8	2	8	2	2	death-death	1.00	1.00
9	2	8	1	1	birth-death	1.00	1.00
9	2	8	1	1	birth-death	1.00	1.00
9	2	8	1	1	birth-death	1.00	1.00
10	2	8	1	1	birth-death	1.00	1.00
11	2	8	1	1	birth-death	1.00	1.00
12	2	12	0	0	birth-birth	1.00	1.00
12	2	12	1	1	birth-death	1.00	1.00
12	2	12	2	2	death-death	1.00	1.00
12	2	12	1	1	birth-birth	1.00	1.00
13	2	12	0	0	birth-birth	1.00	1.00
13	2	12	1	1	birth-death	1.00	1.00
13	2	12	1	1	birth-death	1.00	1.00
14	$\overline{2}$	12	1	1	birth-death	1.00	1.00
14	2	12	1	1	death-death	1.00	1.00
14	$\overline{2}$	12	$\overline{2}$	$\stackrel{-}{2}$	death-death	1.00	1.00
14	2	12	1	1	birth-birth	1.00	1.00
15	2	12	0	0	birth-birth	1.00	1.00
15	2	12	1	1	birth-death	1.00	1.00
16	2	12	0	0	birth-birth	1.00	1.00
16	2	12	1	1	death-death	1.00	1.00
16	$\frac{2}{2}$	12	1	1	birth-death	1.00	1.00
17	$\frac{2}{2}$	12	1		9 birth-death	1.00	1.00
17	$\frac{2}{2}$	12	1	1	birth-death	1.00	1.00
18	2	16	0	0	birth-birth	1.00	1.00
18	2	16	1	1	birth-death	1.00	1.00

complex	dim	n	dim 0	dim 1	type	jacard_nn_nodes	jacard_nn_edges
18	2	16	1	1	birth-death	1.00	1.00
18	2	16	1	1	birth-death	1.00	1.00
18	2	16	2	2	death-death	1.00	1.00
19	2	16	0	0	birth-birth	1.00	1.00
19	2	16	1	1	death-death	1.00	1.00
20	3	8	0	0	birth-birth	1.00	1.00
20	3	8	1	1	death-death	1.00	1.00
20	3	8	1	1	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
20	3	8	2	2	birth-death	1.00	1.00
21	3	8	0	0	birth-birth	1.00	1.00
21	3	8	0	0	birth-birth	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	1	1	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
21	3	8	2	2	birth-death	1.00	1.00
22	3	8	0	0	birth-birth	1.00	1.00
22	3	8	1	1	birth-death	1.00	1.00
22	3	8	1	1	birth-death	1.00	1.00
22	3	8	1	1	birth-death	1.00	1.00
22	3	8	2	2	birth-death	1.00	1.00
22	3	8	2	2	death-death	1.00	1.00
22	3	8	2	2	birth-death	1.00	1.00
22	3	8	2	2	birth-death	1.00	1.00
22	3	8	2	2	birth-death	1.00	1.00
22	3	8	2	2	birth-death	1.00	1.00
22	3	8	2	2	birth-death	1.00	1.00
22	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
$\frac{-}{22}$	3	8	$\overline{2}$	$\overline{2}$	birth-death	1.00	1.00
$\frac{-}{22}$	3	8	$\overline{2}$	$\overline{2}$	birth-death	1.00	1.00
23	3	8	0	0	birth-birth	1.00	1.00
23	3	8	1	1	death-death	1.00	1.00
23	3	8	1	1	birth-death	1.00	1.00
23	3	8	2	$\frac{1}{2}$	death-death	1.00	1.00
$\frac{23}{23}$	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
$\frac{23}{23}$	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
23	3	8	$\frac{2}{2}$		0 birth-death	1.00	1.00
23	3	8	$\frac{2}{2}$	$\frac{2}{2}$	birth-death	1.00	1.00
23	3	8	$\frac{2}{2}$	$\overset{2}{2}$	birth-death	1.00	1.00
23	3	8	$\frac{2}{2}$	$\overset{2}{2}$	birth-death	1.00	1.00

complex	dim	n	dim 0	dim 1	type	jacard_nn_nodes	jacard_nn_edges
23	3	8	2	2	birth-death	1.00	1.00
24	3	8	1	1	birth-death	1.00	1.00
24	3	8	1	1	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
24	3	8	2	2	birth-death	1.00	1.00
25	3	8	0	0	birth-birth	1.00	1.00
25	3	8	0	0	birth-birth	1.00	1.00
25	3	8	1	1	birth-death	1.00	1.00
25	3	8	2	2	death-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00
25	3	8	2	2	birth-death	1.00	1.00

### 4.1 Unexpected results

The Hypothesis problem can be measured by 2 scores with expected values: **jac-ard\_nn\_edges**, **jacard\_nn\_nodes** There are 2 cases, which does not corespond the expectations:

complex	dim 0	dim 1	type	jacard_nn_edges	jacard_nn_nodes	Figure
11	1	1	death-death	0.00	1.00	Figure 1
25	1	1	birth-birth	0.00	1.00	

The Lemma 3.1 problem can be measured by 2 scores with expected values: **jacard\_l31a**, **jacard\_l31b** There are 2 cases, which does not corespond the expectations:

complex	$\dim 0$	dim 1	type	jacard_l31a	jacard_l31b	Figure
23 25	0		birth-birth birth-birth	1.00 1.00	$0.00 \\ 0.50$	

The Lemma 3.2 problem can be measured by 2 scores with expected values: **jacard\_l32a**, **jacard\_l32b** There are 0 cases, which does not corespond the expectations.

The Lemma 3.3 problem can be measured by 2 scores with expected values: **jacard\_l33a**, **jacard\_l33b** There are 0 cases, which does not corespond the expectations.

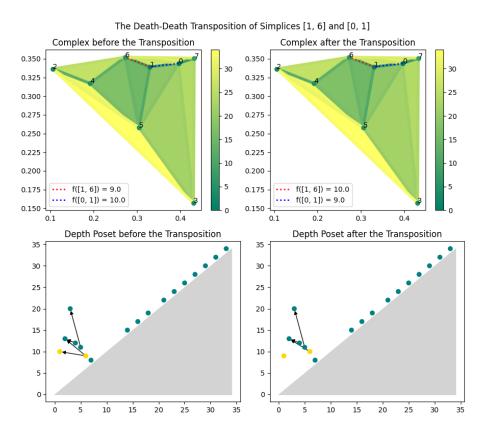


Figure 1: The Death-Death Transposition of simplices [1, 6] and [0, 1]

#### 4.1.1 Complex 11

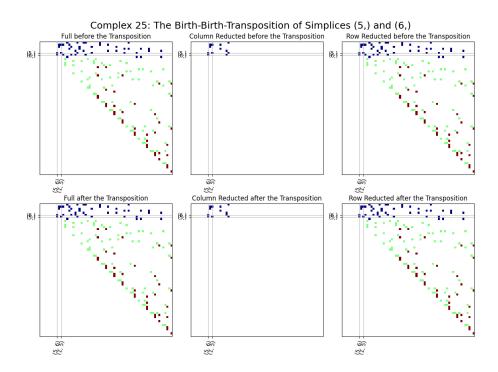
The switch transposition and unexpected scores are given in the table:

simplex 0	simplex 1	type
(3, 5)	(0, 3)	birth-death

### 4.1.2 Complex 25

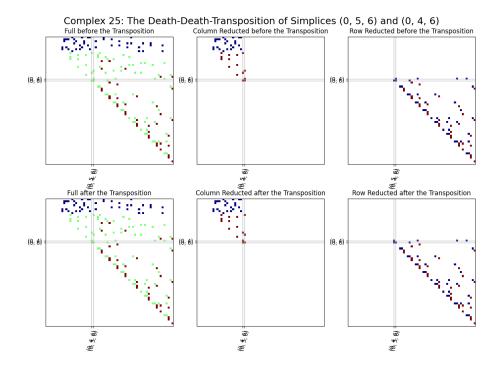
The switch transposition and unexpected scores are given in the table:

simplex 0	simplex 1	type	jacard_l31b
(1)	(2)	birth-birth	1.00
(5)	(6)	birth-birth	0.50
(1, 5)	(1, 6)	birth-death	NaN
(0, 5, 6)	(0, 4, 6)	death-death	0.00
(1, 2, 5)	(2, 5, 6)	birth-death	NaN
(0, 1, 5)	(0, 1, 6)	birth-death	NaN
(1, 4, 6)	(0, 1, 4)	birth-death	NaN
(2, 4, 6)	(1, 2, 4)	birth-death	NaN
(0, 1, 3)	(0, 3, 5)	birth-death	NaN
(0, 3, 7)	(3, 5, 7)	birth-death	NaN
(1, 3, 4)	(0, 3, 4)	birth-death	NaN
(0, 4, 7)	(3, 4, 7)	birth-death	NaN



## 4.1.3 Complex 23

The switch transposition and unexpected scores are given in the table:



simplex 0	simplex 1	type	jacard_l31b
(2)	(3)	birth-birth	0.00
(2, 7)	(3, 7)	death-death	0.50
(5, 7)	(2, 4)	birth-death	NaN
(4, 5, 7)	(2, 4, 7)	death-death	0.00
(2, 4, 6)	(4, 6, 7)	birth-death	NaN
(0, 2, 4)	(0, 2, 6)	birth-death	NaN
(4, 5, 6)	(5, 6, 7)	birth-death	NaN
(2, 3, 6)	(3, 6, 7)	birth-death	NaN
(2, 3, 4)	(3, 4, 7)	birth-death	NaN
(1, 5, 6)	(1, 5, 7)	birth-death	NaN
(0, 4, 5)	(0, 5, 6)	birth-death	NaN

