

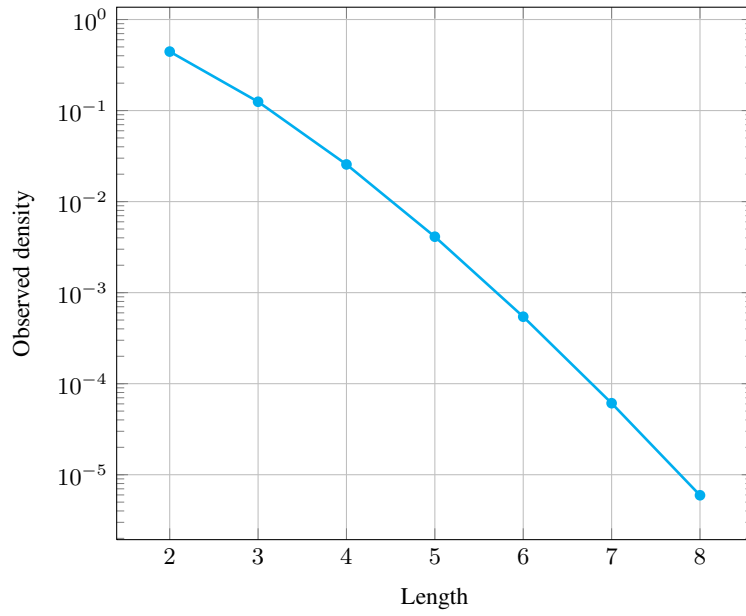
5.270 nand

	DESCRIPTION	LINKS	AUTOMATON
Origin	Logic		
Constraint	nand(VAR, VARIABLES)		
Synonym	clause.		
Arguments	VAR : dvar VARIABLES : collection (var-dvar)		
Restrictions	$VAR \geq 0$ $VAR \leq 1$ $ VARIABLES \geq 2$ required (VARIABLES, var) $VARIABLES.var \geq 0$ $VARIABLES.var \leq 1$		
Purpose	<div style="border: 1px solid pink; padding: 5px;"> Let VARIABLES be a collection of 0-1 variables $VAR_1, VAR_2, \dots, VAR_n$ ($n \geq 2$). Enforce $VAR = \neg(VAR_1 \wedge VAR_2 \wedge \dots \wedge VAR_n)$. </div>		
Example	<div style="border: 1px solid blue; padding: 5px;"> $(1, \langle 0, 0 \rangle)$ $(1, \langle 0, 1 \rangle)$ $(1, \langle 1, 0 \rangle)$ $(0, \langle 1, 1 \rangle)$ $(1, \langle 1, 0, 1 \rangle)$ </div>		
Symmetry	Items of VARIABLES are permutable .		
Arg. properties	<ul style="list-style-type: none"> • Functional dependency: VAR determined by VARIABLES. • Contractible wrt. VARIABLES when $VAR = 0$. • Extensible wrt. VARIABLES when $VAR = 1$. • Aggregate: $VAR(\vee), VARIABLES(\text{union})$. 		
Counting			

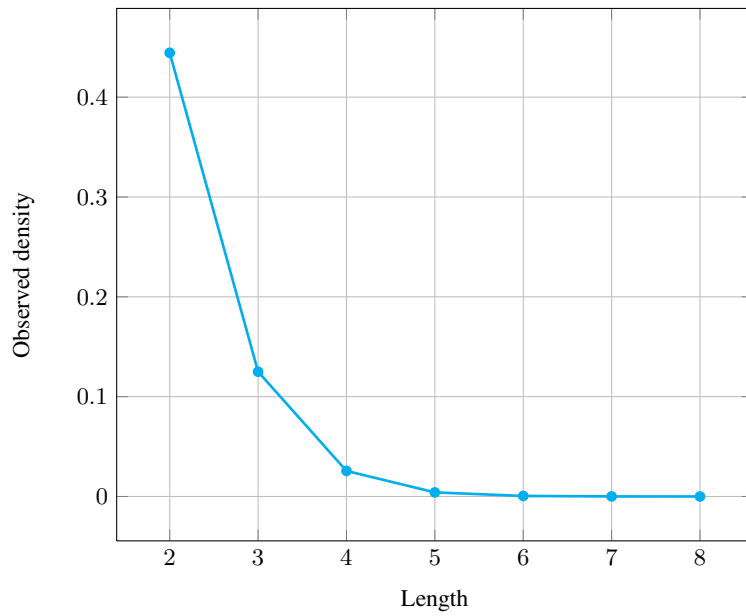
Length (n)	2	3	4	5	6	7	8
Solutions	4	8	16	32	64	128	256

Number of solutions for nand: domains $0..n$

Solution density for nand

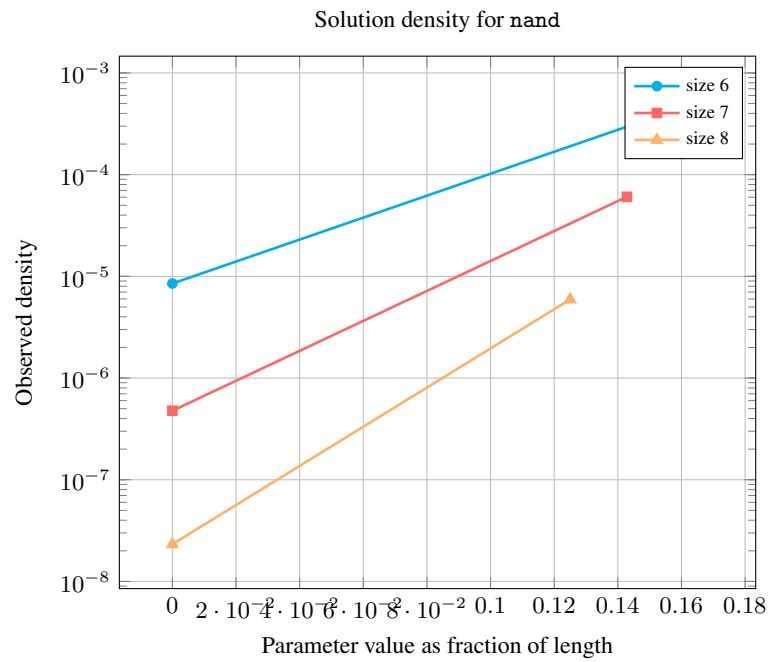


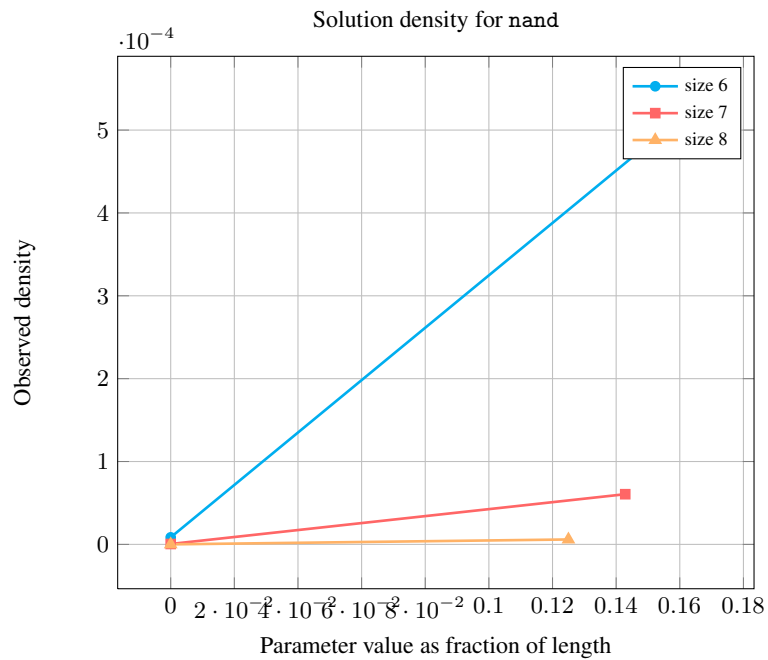
Solution density for nand



Length (n)	2	3	4	5	6	7	8
Total	4	8	16	32	64	128	256
Parameter value	0	1	1	1	1	1	1
	1	3	7	15	31	63	127

Solution count for nand: domains 0.. n





Systems	clause in Choco , clause in Gecode , #/" in SICStus .
See also	common keyword: and, equivalent, imply, nor, or, xor (<i>Boolean constraint</i>). implies: atleast_nvalue.
Keywords	characteristic of a constraint: automaton, automaton without counters, reified automaton constraint. constraint arguments: pure functional dependency. constraint network structure: Berge-acyclic constraint network. constraint type: Boolean constraint. filtering: arc-consistency. modelling: functional dependency.
Cond. implications	nand(VAR, VARIABLES) with VARIABLES > 2 implies some_equal(VARIABLES).

Automaton

Figure 5.571 depicts the automaton associated with the nand constraint. To the first argument VAR of the nand constraint corresponds the first signature variable. To each variable VAR_i of the second argument VARIABLES of the nand constraint corresponds the next signature variable. There is no signature constraint.

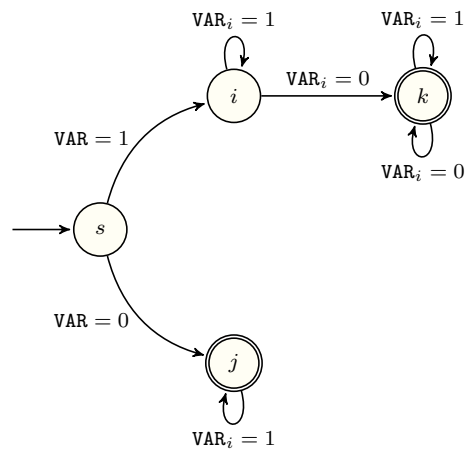


Figure 5.571: Automaton of the nand constraint

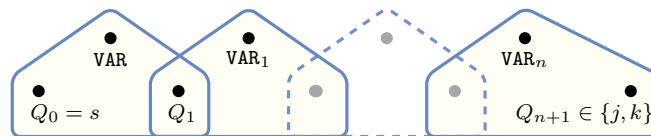


Figure 5.572: Hypergraph of the reformulation corresponding to the automaton of the nand constraint

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