5.14 alldifferent_consecutive_values

DESCRIPTION LINKS GRAPH

Origin Derived from alldifferent.

Constraint alldifferent_consecutive_values(VARIABLES)

Argument VARIABLES : collection(var−dvar)

Restrictions required(VARIABLES, var)
alldifferent(VARIABLES)

Purpose Enforce (1) all variables of the collection VARIABLES to take distinct values and (2) constraint the difference between the largest and the smallest values of the VARIABLES collection to be equal to the number of variables minus one (i.e., there is no holes at all within the used values).

Example $(\langle 5, 4, 3, 6\rangle)$

The alldifferent_consecutive_values constraint holds since (1) all the values 5, 4, 3 and 6 are distinct and since (2) all values between value 3 and value 6 are actually used.

All solutions Figure 5.32 gives all solutions to the following non ground instance of the alldifferent_consecutive_values constraint: $V_1 \in \{0, 1, 3, 4, 5, 6, 7, 8\}$, $V_2 \in [4, 5]$, $V_3 \in [3, 4]$, $V_4 \in [0, 7]$, $V_5 \in [3, 4]$, alldifferent_consecutive_values$(\langle V_1, V_2, V_3, V_4, V_5\rangle)$.

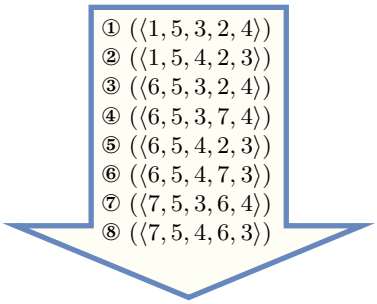


Figure 5.32: All solutions corresponding to the non ground example of the alldifferent_consecutive_values constraint of the **All solutions** slot

Typical |VARIABLES| > 2

Symmetries

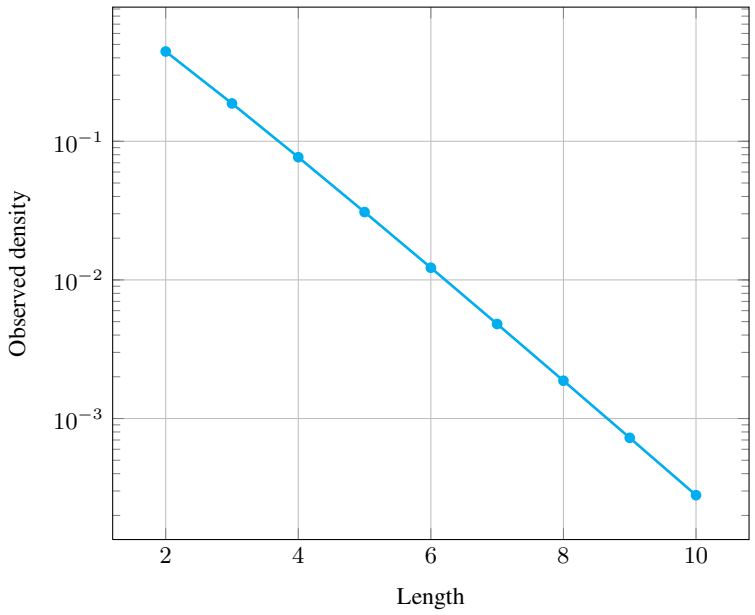
- Items of `VARIABLES` are permutable.
- Two distinct values of `VARIABLES.var` can be swapped.
- One and the same constant can be added to the `var` attribute of all items of `VARIABLES`.

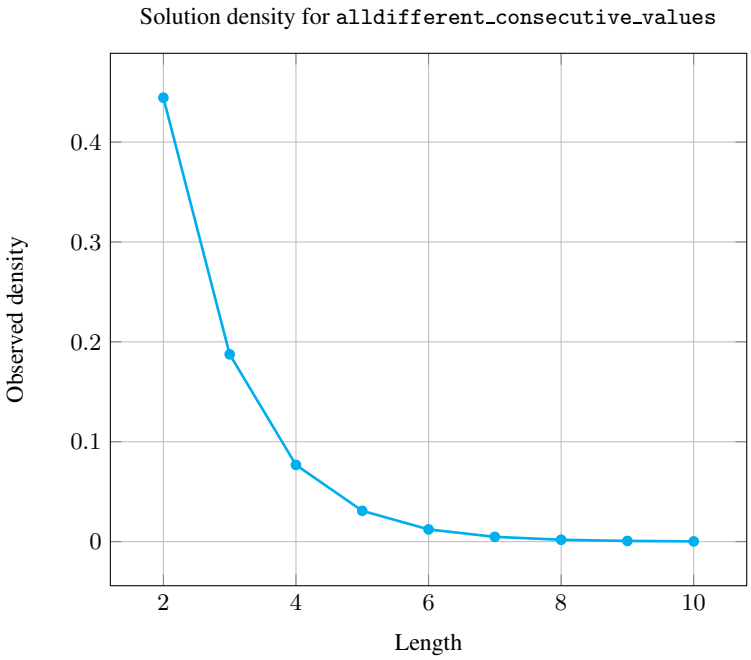
Counting

Length (n)	2	3	4	5	6	7	8	9	10
Solutions	4	12	48	240	1440	10080	80640	725760	7257600

Number of solutions for `alldifferent_consecutive_values`: domains $0..n$

Solution density for `alldifferent_consecutive_values`





See also

implied by: permutation.

implies: alldifferent, consecutive_values.

Keywords

characteristic of a constraint: all different, disequality, sort based reformulation.

combinatorial object: permutation.

constraint type: value constraint.

Cond. implications

- alldifferent_consecutive_values(VARIABLES)
  with minval(VARIABLES.var) ≤ 0
  and maxval(VARIABLES.var) ≥ 0
  implies among_diff_0(NVAR, VARIABLES)
  when NVAR $= |$VARIABLES$| - 1$.

- alldifferent_consecutive_values(VARIABLES)
  with minval(VARIABLES.var) > 0
  implies among_diff_0(NVAR, VARIABLES)
  when NVAR $= |$VARIABLES$|$.

- alldifferent_consecutive_values(VARIABLES)
  with maxval(VARIABLES.var) < 0
  implies among_diff_0(NVAR, VARIABLES)
  when NVAR $= |$VARIABLES$|$.

- alldifferent_consecutive_values(VARIABLES)
  implies balance(BALANCE, VARIABLES)
  when BALANCE $= 0$.

- alldifferent_consecutive_values(VARIABLES)
  with |VARIABLES| > 0
  implies length_first_sequence(LEN, VARIABLES)
  when LEN = 1.

- alldifferent_consecutive_values(VARIABLES)
  with |VARIABLES| > 0
  implies length_last_sequence(LEN, VARIABLES)
  when LEN = 1.

- alldifferent_consecutive_values(VARIABLES)
  implies max_n(MAX, RANK, VARIABLES)
  when MAX =maxval(VARIABLES.var) − RANK.

- alldifferent_consecutive_values(VARIABLES)
  implies min_n(MIN, RANK, VARIABLES)
  when MIN =minval(VARIABLES.var) + RANK.

- alldifferent_consecutive_values(VARIABLES)
  with |VARIABLES| > 0
  implies min_nvalue(MIN, VARIABLES)
  when MIN = 1.

- alldifferent_consecutive_values(VARIABLES)
  with minval(VARIABLES.var) = 0
  implies ninterval(NVAL, VARIABLES, SIZE_INTERVAL)
  when NVAL = (|VARIABLES| + SIZE_INTERVAL − 1)/SIZE_INTERVAL.

- alldifferent_consecutive_values(VARIABLES)
  implies range_ctr(VARIABLES, CTR, VARIABLES)
  when CTR ∈ [≤]
  and R = |VARIABLES|.

- alldifferent_consecutive_values(VARIABLES)
  implies soft_alldifferent_ctr(C, VARIABLES).

Arc input(s)	VARIABLES
Arc generator	$SELF \mapsto \texttt{collection}(\texttt{variables})$
Arc arity	1
Arc constraint(s)	TRUE
Graph property(ies)	$\textbf{RANGE}(\texttt{VARIABLES}, \texttt{var}) = \lvert\texttt{VARIABLES}\rvert - 1$