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Search: The 8-puzzle problem

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The 8-puzzle

Search for a shortest sequence of blank space (0) movements [1, 2]:

7	2	4
5		6
8	3	1

Start State

	1	2
3	4	5
6	7	8

Goal State

***n*-puzzle:** $(n + 1)!$ states (permutations of “01...*n*”)

$n = 3$

0	1
2	3

24

$n = 8$

0	1	2
3	4	5
6	7	8

362 880

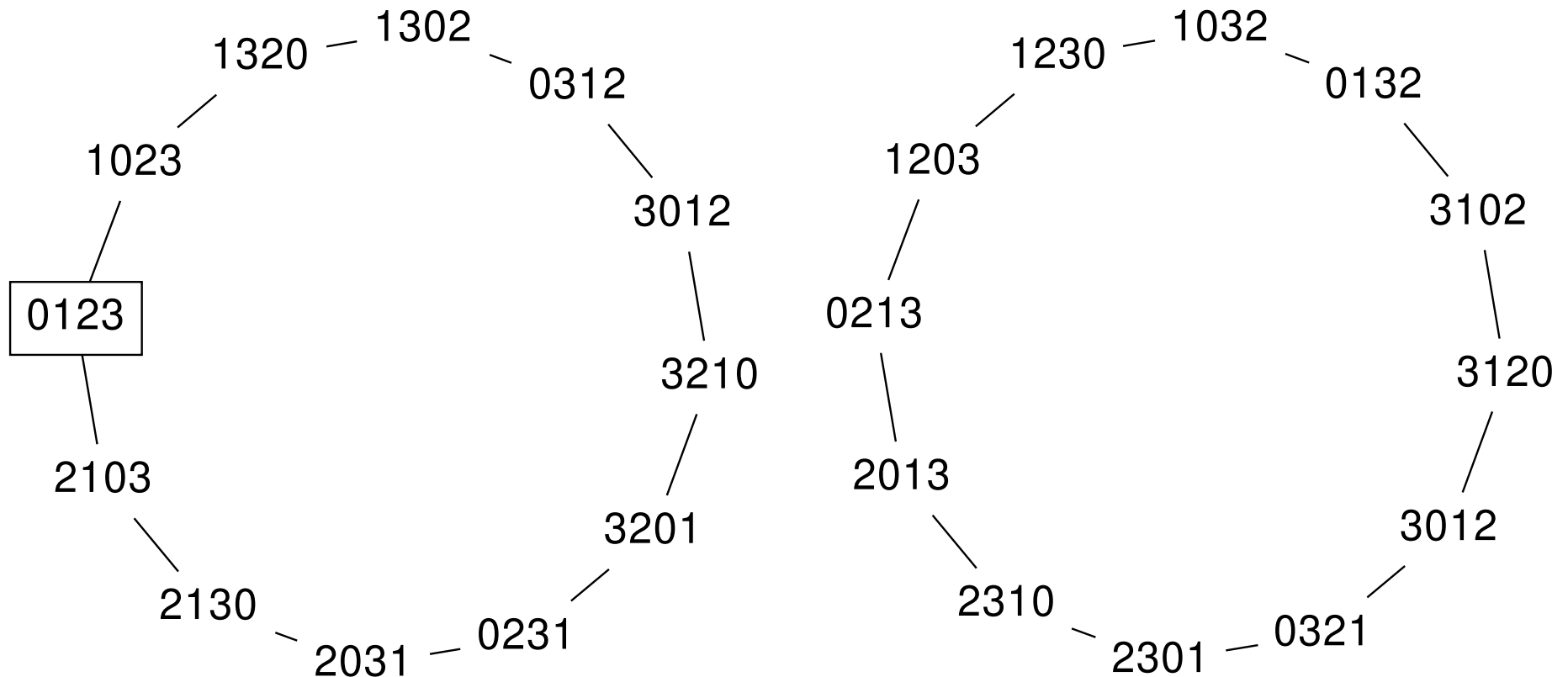
$n = 15$

0	1	2	3
4	5	6	7
8	9	10	11
12	13	14	15

$2 \cdot 10^{14}$

The 8-puzzle

The state graph has two connected components; e.g.:



Only half of the initial states has solution [3].

References

- [1] S. Russell and P. Norvig. *Artificial Intelligence: A Modern Approach*. Pearson, third edition, 2010.
- [2] J. Slocum and D. Sonneveld. *The 15 Puzzle*. Slocum Puzzle Foundation, 2006.
- [3] Wm. Woolsey Johnson and William E. Story. Notes on the "15" Puzzle. *American Journal of Mathematics*, 1879.