

LAST UPDATE: December 25, 2024

NUMBER CONNECTIONS puzzles by Rodolfo Kurchan and Claudio Meller

Connect pairs of numbers, covering the entire board and without passing through the same square twice.

All different numbers that appear in each board should have one connection.

For $N \times M$ boards, you use numbers from 1 to N , minimum 2 of each so can make a path.

Which is the disposition with most quantity of solutions?

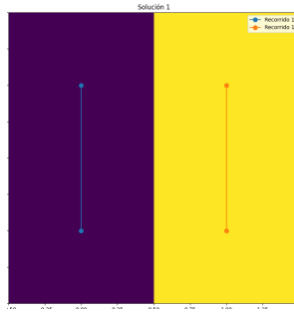
You can use the quantity of N different numbers you want, but at least 2 of each.

<https://oeis.org/A379241>

OEIS $2 \times M$: 1, 5, 22, 54, 134, 269, 534, 934, 1618, 2573, 4062, 6030, 8902, 12549, 17614, 23854, 32194, 42229, 55238,

$$2 \times 2 = 1$$

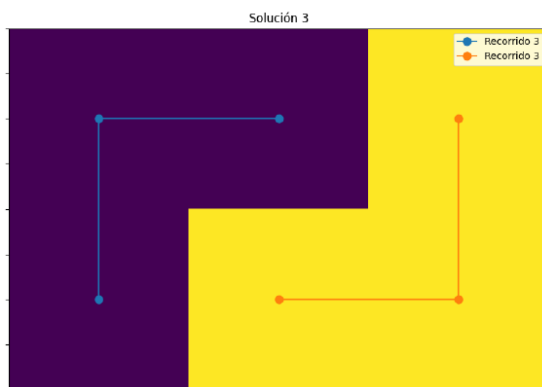
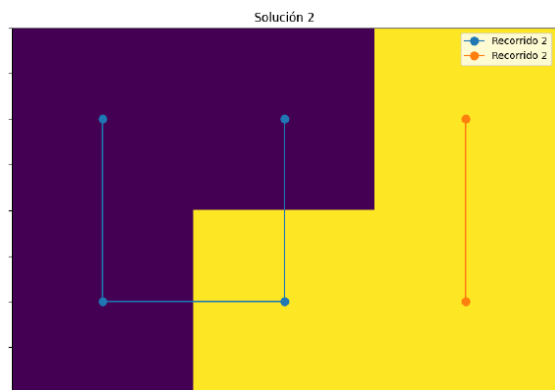
1	2
1	2

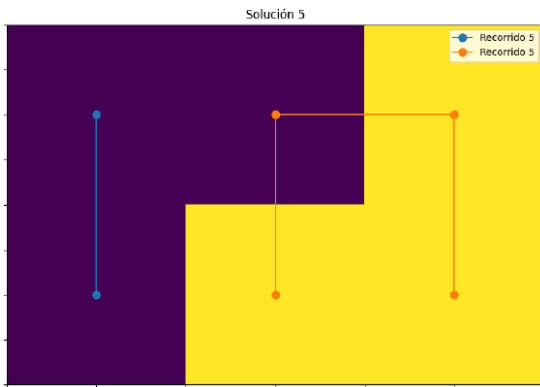


$$2 \times 3 = 5$$

1	1	2
1	2	2

Example of the 5 solutions:





Another $2 \times 3 = 5$ solution:

$$2 \times 3 = 5$$

1	2	2
1	2	2

$$2 \times 4 = 22$$

1	1	2	2
1	1	2	2

$$2 \times 5 = 54$$

1	1	1	2	2
1	1	2	2	2

$$2 \times 5 = 54$$

1	1	2	2	2
1	1	2	2	2

$$2 \times 6 = 134$$

1	1	1	2	2	2
1	1	1	2	2	2

$$2 \times 7 = 269 \text{ (Giorgio Vecchi)}$$

1	1	1	1	2	2	2
1	1	1	2	2	2	2

$$2 \times 8 = 534 \text{ (Giorgio Vecchi)}$$

1	1	1	1	2	2	2	2
1	1	1	1	2	2	2	2

2x9 = 934 (Giorgio Vecchi)

1	1	1	1	1	2	2	2	2
1	1	1	1	2	2	2	2	2

2x10 = 1618 (Giorgio Vecchi)

1	1	1	1	1	2	2	2	2	2
1	1	1	1	1	2	2	2	2	2

2x11 = 2573 (Giorgio Vecchi)

1	1	1	1	1	1	2	2	2	2	2
1	1	1	1	1	2	2	2	2	2	2

2x12 = 4062 (Giorgio Vecchi)

1	1	1	1	1	1	2	2	2	2	2	2
1	1	1	1	1	1	2	2	2	2	2	2

$2 \times 13 = 6030$ (Giorgio Vecchi)

1	1	1	1	1	1	1	2	2	2	2	2	2
1	1	1	1	1	1	2	2	2	2	2	2	2

$2 \times 14 = 8902$ (Giorgio Vecchi)

1	1	1	1	1	1	1	2	2	2	2	2	2
1	1	1	1	1	1	1	2	2	2	2	2	2

$2 \times 15 = 12549$ (Giorgio Vecchi)

1	1	1	1	1	1	1	1	2	2	2	2	2	2
1	1	1	1	1	1	1	2	2	2	2	2	2	2

$2 \times 16 = 17614$ (Giorgio Vecchi)

1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
1	1	1	1	1	1	1	1	2	2	2	2	2	2	2

2x17 = 23854 (Giorgio Vecchi)

1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2

2x18 = 32194 (Giorgio Vecchi)

1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2

2x19 = 42229 (Giorgio Vecchi)

1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2

2x20 = 55238 (Giorgio Vecchi)

1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2

OEIS 3 x M: 1, 6, 72, 277, 1910, 8657, 27442, 97132,
295752, 967914, 2922814

<https://oeis.org/A379393>

$$3 \times 2 = 1$$

1	1
2	2
3	3

$$3 \times 3 = 6$$

1	3	3
1	2	2
1	2	2

$$3 \times 4 = 72$$

1	1	3	3
1	1	3	3
2	2	2	2

3x5 = 277 (Giorgio Vecchi)

1	1	3	3	3
1	1	3	3	3
2	2	2	2	2

3x6 = 1910

1	1	2	2	3	3
1	1	2	2	3	3
1	1	2	2	3	3

3x7 = 8657 (Giorgio Vecchi)

1	1	2	2	2	3	3
1	1	2	2	2	3	3
1	1	2	2	2	3	3

3x8 = 27442 (Giorgio Vecchi)

1	1	1	2	2	2	3	3
1	1	1	2	2	2	3	3
1	1	1	2	2	2	3	3

3x9 = 97132 (Giorgio Vecchi)

1	1	1	2	2	2	3	3	3
1	1	1	2	2	2	3	3	3
1	1	1	2	2	2	3	3	3

3x10 = 295752 (Giorgio Vecchi)

1	1	1	2	2	2	2	3	3	3
1	1	1	2	2	2	2	3	3	3
1	1	1	2	2	2	2	3	3	3

3x11 = 967914 (Giorgio Vecchi)

1	1	1	1	2	2	2	2	3	3	3
1	1	1	1	2	2	2	2	3	3	3
1	1	1	1	2	2	2	2	3	3	3

3x12 = 2922814 (Giorgio Vecchi)

1	1	1	1	2	2	2	2	3	3	3	3
1	1	1	1	2	2	2	2	3	3	3	3
1	1	1	1	2	2	2	2	3	3	3	3

OEIS 4 x M: 1, 31?, 800, 6466, 60778, 441492,
3216584, 18693320

4x2: 1

1	1
2	2
3	3
4	4

Example of growing 4 x 3

4x3: 16

1	2	2
1	4	4
3	4	4
3	4	4

4x3: 25

1	2	2
1	4	2
3	4	4
3	4	4

4x3: 27

1	2	2
1	2	2
3	3	4
3	3	4

4x3: 28

1	1	2
1	2	2
3	4	4
3	4	4

4x3: 29

1	1	2
1	2	2
3	4	4
3	3	4

4x3: 29

1	1	2
1	2	2
3	3	4
3	4	4

4x3: 31

1	2	2
1	2	2
3	4	4
3	4	4

4x4: 800

1	1	2	2
1	1	2	2
3	3	4	4
3	3	4	4

4x5: 6466 (by Giorgio Vecchi)

1	1	2	2	2
1	1	2	2	2
3	3	4	4	4
3	3	4	4	4

4x6: 60778 (by Giorgio Vecchi)

1	1	1	2	2	2
1	1	1	2	2	2
3	3	3	4	4	4
3	3	3	4	4	4

4x7: 441492 (by Giorgio Vecchi)

1	1	1	2	2	2	2
1	1	1	2	2	2	2
3	3	3	4	4	4	4
3	3	3	4	4	4	4

4x8: 3216584 (by Giorgio Vecchi)

1	1	1	1	2	2	2	2
1	1	1	1	2	2	2	2
3	3	3	3	4	4	4	4
3	3	3	3	4	4	4	4

4x9: 18693320

1	1	1	1	2	2	2	2	2
1	1	1	1	2	2	2	2	2
3	3	3	3	4	4	4	4	4
3	3	3	3	4	4	4	4	4

OEIS 5 x M: 1, 37, 3416, 42554, 1215834.

5x2: 1

1	1
2	2
3	3
4	4
5	5

5x3: 37

1	2	2
1	2	2
3	4	4
3	4	4
5	5	5

5x4: 3416 (by Giorgio Vecchi)

1	1	2	2
1	1	2	2
3	3	3	3
4	4	5	5
4	4	5	5

5x5: 42554 (by Giorgio Vecchi)

1	1	2	2	2
1	1	2	2	2
3	3	3	3	3
4	4	5	5	5
4	4	5	5	5

5x6: 1215834 (by Giorgio Vecchi)

1	1	1	2	2	2
1	1	1	2	2	2
3	3	4	4	5	5
3	3	4	4	5	5
3	4	4	4	5	5

OEIS 6 x M: 1, 193, 28972, 776521, 27796910.

6x2: 1

1	1
2	2
3	3
4	4
5	5
6	6

6x3: 193

1	2	2
1	2	2
3	4	4
3	4	4
5	6	6
5	6	6

6x4: 28972

1	1	2	2
1	1	2	2
3	3	4	4
3	3	4	4
5	5	6	6
5	5	6	6

6x5: 776521

1	1	2	2	2
1	1	2	2	2
3	3	4	4	4
3	3	4	4	4
5	5	6	6	6
5	5	6	6	6

6x6: 27796910 (by Giorgio Vecchi)

1	1	1	2	2	2
1	1	1	2	2	2
3	3	3	4	4	4
3	3	3	4	4	4
5	5	5	6	6	6
5	5	5	6	6	6

