Tatami

Text courtesy of nonzero,
translated by Puzzler.
www.nonzero.it

The aim of the game is to complete the grid, filling the empty squares, so that:

- each line and column has the same number of 1s, 2s and 3s (and of 4s and 5s in the extra large versions);
- in each 1x3 Tatami or rectangle (1x4 and 1x5 in the big grids) each number is present only once;
- equal numbers may only be adjacent diagonally.

Nothing can illustrate how to solve the puzzle better than a practical example. Below, we have solved a 1x4 puzzle step by step, so as to illustrate both the simpler techniques, typical of 1x3 Tatamis, and the more advanced ones of the bigger Tatamis.

For guidance purposes, whole Tatamis of one line or column take the name of the line or column of which they are a part (when there are two Tatamis in a line/column, for example in line I on the chart used below, we will call them – from the left or from above - Tatami I1 and Tatami I2).

1. Let's begin by assessing what we definitely have available: the whole horizontal Tatamis N and O and the vertical Tatami A can easily be completed. The whole Tatami N includes the numbers 1 and 4 (rule 2: each number is present only once in each Tatami), therefore to complete it you must insert the missing numbers 2 and 3. The 3 cannot go in square BN because it is already present in the adjacent square BM (rule 3: equal numbers may only be adjacent diagonally), therefore the 2 has to go there. Consequently a 3 will have to go in DN, the last free square of Tatami N. Similarly in Tatami O, the square EO can only contain a 2 (the 1 and the 3 present in the Tatami and the 4 in the adjacent square EN rule out any other possibility). By a process of elimination a 4 should therefore go in BO.

	A	B	C	D	E	F	G	H
I	2			3			4	
L								
M	4	3						
N	1	2	1	3	4	3		
O		4	3	1	2	1		3
P							1	2
Q								
R		1			4			3

2. Line O still needs two numbers, 2 and 4 (both the 3 and the 1 are already present twice in the line). The 4 cannot go in AO because it is already present in Tatami A of which the square is a part (besides the fact that the adjacent square BO contains a 4), and the 2 therefore goes there, whilst the 4 goes in GO. Once the 2 has been placed in AO, we know that only a 3 can go in the remaining empty square AL (the other numbers are already present in the Tatami).

	A	B	C	D	E	F	G	H
I	2			3			4	
L	3							
M	4	3						
N	1	2	1	3	4	3		
O	2	4	3	1	2	1	4	3
P							1	2
Q								
R		1			4			3

3. Let's look at column H: this is made up of a whole vertical Tatami and by parts or squares of four horizontal Tatamis. Tatami H contains all four numbers once and in the remaining squares (HI and HQ) we still need to put a 1 and a 4 (2 and 3 are already present in HP and HR). The 4 cannot go in HI because it is already present in a square (GI) of Tatami I2. HI therefore has to have a 1, whilst the 4 goes in HQ. Similarly, we can assess the situation of column G, in which, apart from the whole Tatami G, there is already a 4 (in GI) and a 1 (in GP). The 2 and 3, still to be placed, go respectively in GR and GQ (the 3 cannot go in GR, because there is already one in the horizontal Tatami R2).

	A	B	C	D	E	F	G	H
I	2			3			4	1
L	3							
M	4	3						
N	1	2	1	3	4	3	2	4
O	2	4	3	1	2	1	4	3
P							1	2
Q							3	4
R		1			4	1	2	3

4. In the horizontal Tatami I2 we still need to put a 2 and a 3. The 3 cannot go in EI (it would be adjacent to the 3 in DI), so that's where the 2 can go, whilst the 3 goes in FI. Let's now assess column E: both the 2 and the 4 already appear twice and therefore in the four remaining squares we can definitely put alternating 1s and 3s. In squares EP and EQ we will have to put a 1 and a 3: since the 1 cannot go in EP, because it is already present in the horizontal Tatami P2, we can definitely put it in EQ, whilst the 3 will go in EP. At this point the remaining squares of the horizontal Tatamis P2 and Q2 will need a 4 and a 2 respectively.

	A	B	C	D	E	F	G	H
I	2			3	2	3	4	1
L	3							
M	4	3						
N	1	2	1	3	4	3	2	4
O	2	4	3	1	2	1	4	3
P					3	4	1	2
Q					1	2	3	4
R		1			4	1	2	3

5 Let's complete the right half of the chart. We already know, from the previous point, that in EL and EM we should put a 1 and a 3. The 3 cannot go in EM, because it is already present in Tatami M of which it is a part, and therefore goes in EL; in EM we can put a 1. In each of columns F, G and H we still need to insert two numbers: respectively 2 and 4, 1 and 3, and 1 and 2. In order to decide which, between the 2 and the 4, should go in FM, let's consider that line M contains the horizontal Tatami M, which will contain all four numbers within it. Given that there is a 4 in AM, there cannot be a third one in FM. This square will therefore have a 2 in it, whilst the 4 goes in FL. Now, like a chain reaction, the 2 cannot go in HM, and must go in HL, whilst the 1 goes in HM. And finally the 1 cannot go in GM, and must instead go in GL, whilst we can enter the 3 in GM.

	A	B	C	D	E	F	G	H
I	2			3	2	3	4	1
L	3				3	4	1	2
M	4	3			1	2	3	1
N	1	2	1	3	4	3	2	4
O	2	4	3	1	2	1	4	3
P					3	4	1	2
Q					1	2	3	4
R		1			4	1	2	3

Let's now tackle the left half of the chart, starting from the square DR. We cannot enter the 1 here, because it is already present in Tatami R1, nor the 4, because it is present in an adjacent square. We cannot even enter a 3, because it is already present twice in the column, so we are just left with the 2. Now we can establish that the 4 goes in DQ, given that the 1 or the 2 cannot go (adjacent) nor can the 3 (present twice in the column). In square DP on the other hand we can enter the 2, because the other three numbers are all in adjacent squares. Now we still need to put a 1 and a 4 in column D: the 1 cannot go in DM and so goes in DL. In DM we can enter a 4, thus completing the horizontal Tatami M with a 2 in CM.

	A	B	C	D	E	F	G	H
I	2			3	2	3	4	1
L	3			1	3	4	1	2
M	4	3	2	4	1	2	3	1
N	1	2	1	3	4	3	2	4
O	2	4	3	1	2	1	4	3
P				2	3	4	1	2
Q				4	1	2	3	4
R		1		2	4	1	2	3

The horizontal Tatami L is completed by placing a 2 in BL (not in CL because there is a 2 in the adjacent square CM) and the 4 in CL; consequently, in the horizontal Tatami I1 we can enter the 4 in BI (not in CI because it is already present in the adjacent square CL) and the 1 in CI. Let's now see how to complete column B: we need a 1 and a 3. The 1 cannot be entered adjacent to another 1 and therefore goes in BP, whilst the last free square, BQ, will contain the 3.

	A	B	C	D	E	F	G	H
I	2	4	1	3	2	3	4	1
L	3	2	4	1	3	4	1	2
M	4	3	2	4	1	2	3	1
N	1	2	1	3	4	3	2	4
O	2	4	3	1	2	1	4	3
P		1		2	3	4	1	2
Q		3		4	1	2	3	4
R		1		2	4	1	2	3

In Tatami P1 we still need to put a 3 and a 4. The 3 is already present in CO, adjacent to empty square CP, where the 4 will go, whilst the 3 will go in AP. In Tatami R1 finally, we still need a 3 and a 4. To find out where to insert them, all we need to do is invert the positions of those just placed, putting the 4 in AR and the 3 in CR. Now that we only have two squares left to fill, we just need to check which numbers are still missing in columns A and C and then insert the missing 1 in AQ and the 2 in CQ. The chart is now complete.

	A	B	C	D	E	F	G	H
I	2	4	1	3	2	3	4	1
L	3	2	4	1	3	4	1	2
M	4	3	2	4	1	2	3	1
N	1	2	1	3	4	3	2	4
O	2	4	3	1	2	1	4	3
P	3	1	4	2	3	4	1	2
Q	1	3	2	4	1	2	3	4
R	4	1	3	2	4	1	2	3