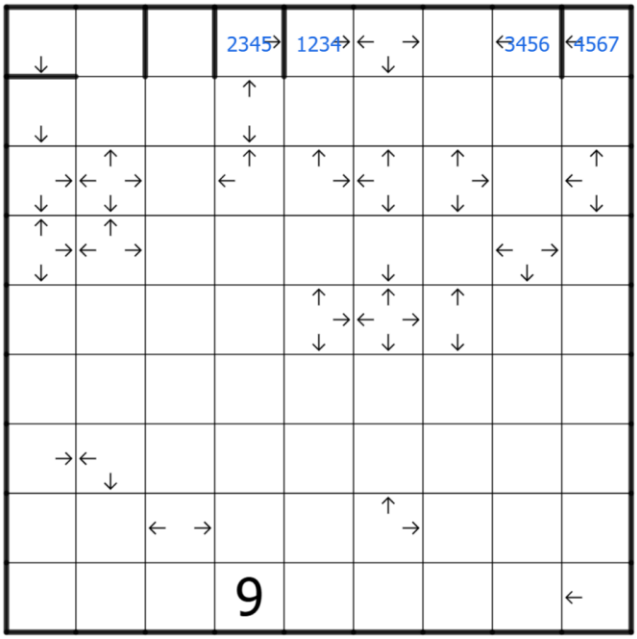
Chaotic Choice (Region Borders) – Solve Path

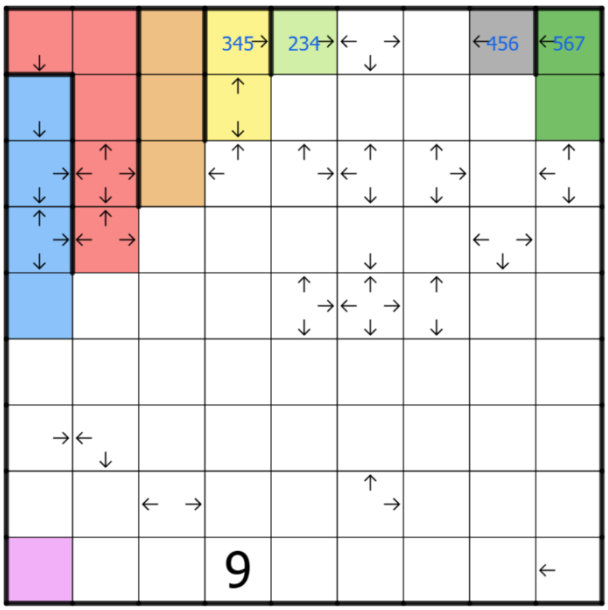
By MantaRay

1. The first thing to note in this version is that there must be a border between two orthogonally adjacent cells that both contain a single arrow, which both point in the same direction (e.g. R12C1) – otherwise the two cells would contain the same digit.



2. If there were no borders to the left of R1C4, then R1C4 and R1C9 would have the same value. If there was only one border, then R1C4 and R1C8 would have the same value. Therefore, there must be two borders – one between R1C23 and the other between R1C34 (so as not to block in R1C1).

3. None of the cells in row 1 that are separated by at least one border can be from the same region (as this would create a region that must encompass another region on the top row, which would require more than nine cells to do). Therefore, several of the regions can be started.

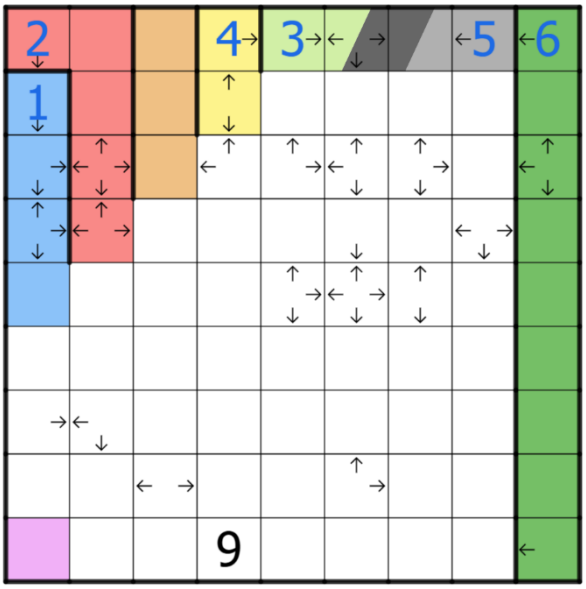


4. Currently there are five regions that touch row 1, along with a sixth region in R2C1. R9C1 must be part of a new region, as there must be a region border somewhere below R2C1. Note that none of the regions that touch row 1 can also touch column 1 (excluding R1C1), as there would not be enough space remaining to fill the regions that they would enclose.

5. The digits in R1C4589 form a consecutive sequence of digits. If R1C6 was a 1, then the minimum value of R1C1 would be 5. This would then place five regions in column 1 (not including R1C1), meaning the puzzle would have at least ten regions.

6. R1C5 and R1C8 are now in different regions, meaning that eight regions have been discovered. This means that R1C1 can see either two or three borders (and R2C1 at most two). R1C5 can no longer be 2, as then R1C1 would have no value.

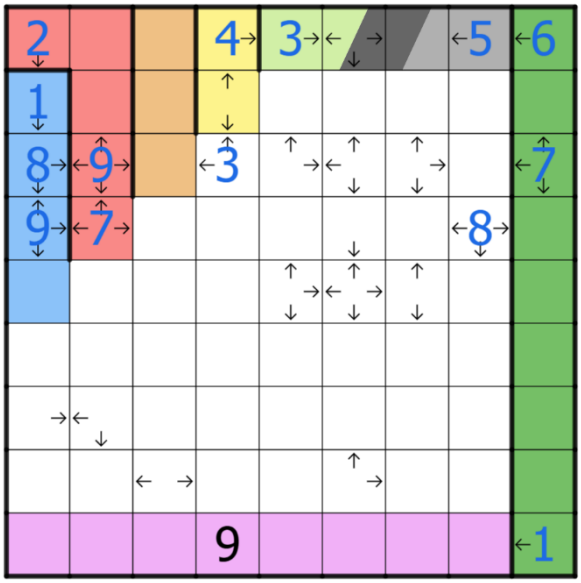
7. Now that R1C5 is at least 3, there must be a minimum of seven regions that touch row 1. But given that no region that touches row 1 can also touch column 1 (excluding R1C1), all nine regions have now been located. R1C1 must therefore be a 2 and R2C1 is a 1. Likewise, R1C4589 can all be filled in (noting that R1C5 can no longer be 4).



8. Only the regions in R9C1 and R1C9 can touch R9C9. However, the arrow in R9C9 means that it cannot be part of the pink region in R9C1, as it would see no region borders.

9. R3C4 currently sees two borders to its left, so is either 2 or 3. If it was 2, then there would be no region borders between R3C34 and R23C4 – making orange and yellow the same region. R3C4 is therefore a 3 – but it could be part of either yellow or orange.

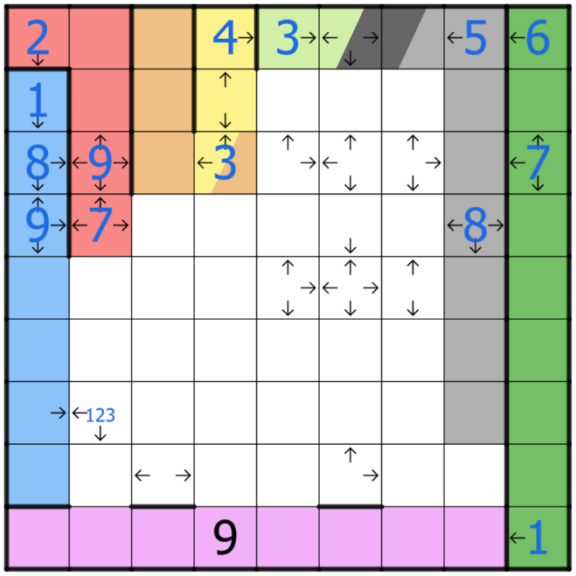
10. There is no way for any region that touches row 1 to exist without entering at least row 4. This, coupled with the border that separates the red and blue regions, means that there are at least seven vertical region borders in each of rows 2-4. There are three cells in row 3 that see across the entirety of the row – these must form a 7-8-9 triple. The 7 must live in R3C9, while the 8 must live in R3C1 (as it sees one region border when looking downwards) and then 9 in R3C2.



11. Similarly, there are three cells in row 4 that see the entire row. R4C2 sees no region borders above it so must be a 7. R4C1 sees two borders in column 1 so must be 9, leaving R4C8 as an 8.

12. As was the case with R9C9, the only regions that can touch R9C8 are grey and pink. But if grey took it, then there would be no region border below R4C8 – but the 8 in R4C8 must see at least one border beneath it. R9C9 is now a 1.

13. The pink region now contains eight cells, so can only take one more – and this final cell will contain a 1. This means that pink does not take R8C1, R8C3 or R8C6. The grey region must extend to at least R7C8 and the blue region must reach down to R8C1.



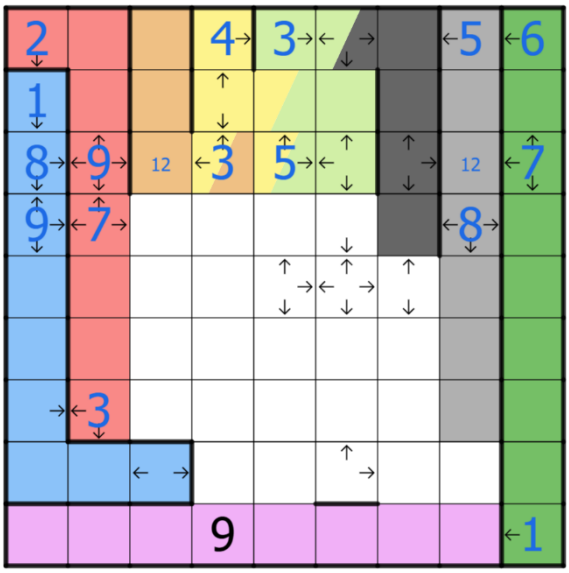
14. R7C2 can see a maximum of three borders but must see at least one below it (as the pink region cannot reach it). If R7C2 was a 1 then it must be part of the blue region – which already contains a 1.

15. If R7C2 was a 2, then it could be part of the blue region. But then no region could reach R8C2 to create two region borders in column 2, apart from orange (which would cut off the red region in the process). If it wasn't blue, then it would need to be orange or yellow (as red already contains a 2) – but this would cut red (or orange) off as well.

16. R7C2 must therefore be 3, and see all possible region borders to its left and below. The 9 in R3C2 now sees all region borders in column 2 – so must extend to R7C2. The blue region now extends into R8C3, where it is completed.

17. R23C5 must be either green or yellow, R23C6 must be green or black and R23C7 must be black or grey – any other colours for these cells would close off at least one region from extending into row 4.

18. R3C5 must see at least three region borders to its right, but can see a maximum of six. If it was 6, then it would be green to see two borders in column 5 – but could not then see the required four borders in row 3.



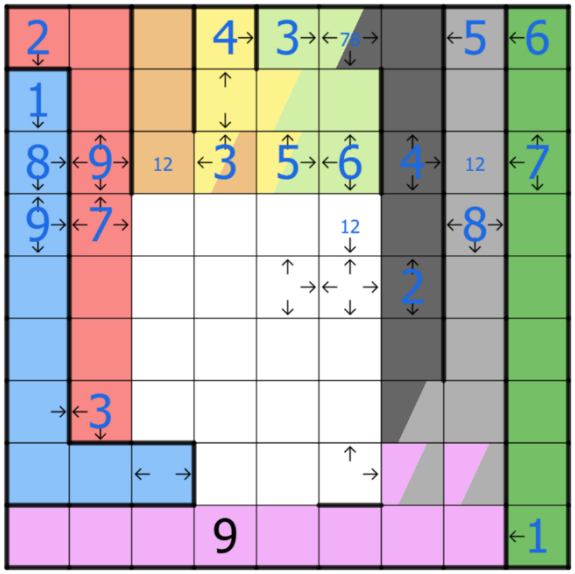
19. Likewise, if R3C5 was 4 then it would be in the green region (as yellow already has a 4) and see three borders looking right. But it could not see exactly one border when looking up (it would either see none or two). R3C5 is therefore 5, but could still be green or yellow.

20. There must be at least one region border above R3C5, so the green region cannot escape down column 5, meaning that it must take both of R23C6. This forces the black region to take R1-4C7.

21. R1C6 must be from 7-8-9, meaning that there is a maximum of three borders in column 6. R4C6 is therefore from 1-2-3. R3C6 sees at least four borders to its left but also sees all borders in column 6 – so must be a 6, making R3C7 a 4.

22. R3C6 can now see a maximum of two borders in column 6, limiting R1C6 to 7-8 and R4C6 to 1-2. R3C7 must see two borders in column 7, making R5C7 a 2.

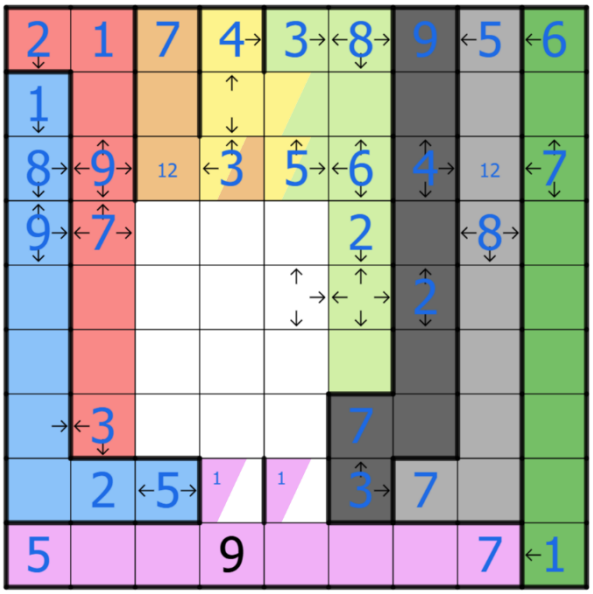
23. The grey region must breach column 7, meaning that one region border seen by R5C7 (and R3C7) must separate the black and grey regions, and the other separates the grey and pink regions. As at least one of R8C78 must now be grey, the black region extends to R6C7.



24. R4C6 must be green, as the only other region it could be part of is black – which would force it to have a value of 1, thereby extending the black region to R8C6 and making it at least ten cells.

25. The 2 in the blue region must live in R8C23, which means R8C6 must be either 3 or 4 (as it can see a maximum of three region borders to its left and one border above it). If it was 4, then it must be part of the black region (which is the only region other than green that could reach R8C6). But black already has a 4 in it, meaning that R8C6 is a 3.

26. As green already has a 3 in it, R8C6 must be in the black region. R4C6 must now be 2, and R1C6 is 8 and must be part of the green region. R1C2 is a 1 by sudoku.

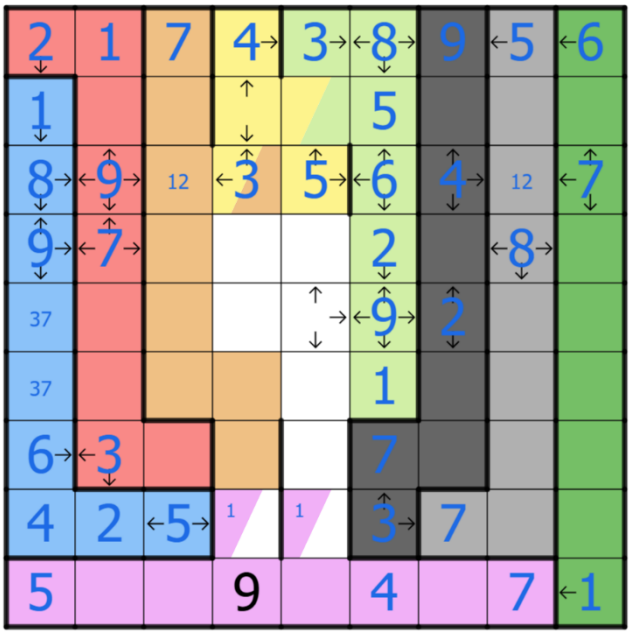


27. Both of R8C78 must be grey, as only two region borders can exist to the right of R8C6. This places the final black region cell in R7C6. Now, the digit in R9C8 must also exist in R8C7 and R7C6. By sudoku, this digit must be 7. 7 and 9 can be placed in row 1.

28. The green region must extend into R6C6, to prevent a third region border in column 6. There must be a region border between R8C45, as exactly one of these cells is the final pink cell. R8C3 is therefore a 5, as is R9C1. R8C2 is a 2.

29. The orange and yellow regions must both reach at least row 5. This means that there will be seven region borders in row 5, meaning that R5C6 must be a 9. The 5 in column 6 must be in the green region – meaning that R3C5 is in the yellow region.

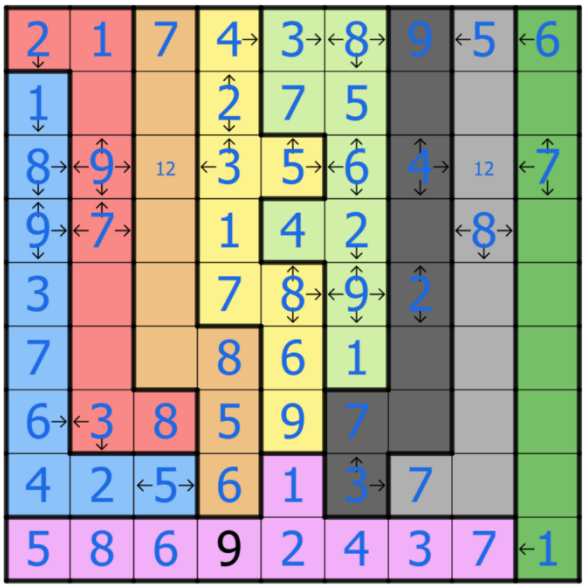
30. The 1 in column 6 must also be in the green region, creating a 1-5 pair which is disambiguated by R2C1. This makes R9C6 a 4. R56C1 is a 3-7 pair, and R78C1 is a 4-6 pair. R7C1 currently sees five region borders, which sorts the 4-6 pair and places a region border between R7C45.



31. R7C4 must be part of the orange region, as if it was yellow then there would be no way to populate the orange and green regions with nine cells. The orange region must now take all cells adjacent to the red region.

32. R2C4 cannot be a 7, as it cannot see seven region borders in column 4. Therefore, the only place that 7 can exist in column 4 is R5C4 – which must be in the yellow region. This sorts the 3-7 pair in column 1, leaving R2C5 as the final 7, which must be in the green region.

33. The green region now contains eight cells, meaning it cannot reach R7C5 – which must now be in the yellow region. The ninth green region cell is now R4C5 (and is a 4) and the yellow region must connect through R4C4. The pink region now takes R8C5, and the final orange region cell is R8C4.



34. All nine regions have now been discovered. R2C4 must be a 2, and R5C5 is an 8. R8C5 is a 1, which places the yellow 1 in R4C4. R67C5 is a 6-9 pair, which is disambiguated by the 6 in R7C1. R9C5 is a 2.

35. R9C2 and R7C3 must be the same digit, which by sudoku is an 8. R678C4 is a 5-6-8 triple – which can be solved to place a 6 in R8C4 and an 8 in R6C4. The 6 in column 3 must go in R9C3, leaving a 3 in R9C7.

36. Row 4 is missing a 3-5-6 triple, the 3 of which must live in R4C3 and the 6 in R4C7. The black region is missing a 1-5-8 triple – the 1 must live in R7C7 and the 8 goes in R2C7. The rest of the digits in the red region can now be placed. The 8-9 pair in row 8 can be sorted, as can the 1-4-6 triple in row 5.

37. The 4 in R5C9 sorts the 2-4 pair in row 7, and the 1 in R5C4 finally finishes the 1-2 pair in row 3. The orange region is missing a 4-9 pair which can be placed. The remaining 3-9 pair in row 2 is disambiguated by the 9 in R8C8, which in turn places the final digits in R6C89.

The Final Solution to Chaotic Choice (Region Borders) is shown below: