Read Between the Lines – Full Solution Guide

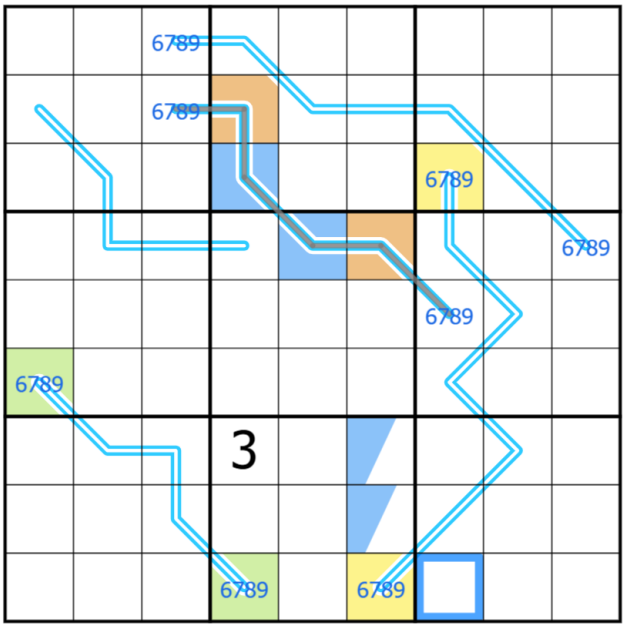
This is a full solution guide to my puzzle *Read Between the Lines*, and so spoilers are ahead.

Rules

- Normal sudoku rules apply: Place the digits 1 to 9 once each in every row, column, and 3x3 box
- Every line in the grid is a region sum line, i.e. box borders divide the line into segments which have the same sum
- In addition, each of the following constraints applies to exactly one line in the grid:
    - *Dutch Whisper*: Adjacent digits must differ by at least 4
    - *Entropic*: Any run of three cells must contain one low (1, 2, 3), one medium (4, 5, 6), and one high (7, 8, 9) digit
    - *Modular*: Any run of three cells must contain three digits with different remainders when divided by 3, i.e. one from (1, 4, 7), one from (2, 5, 8), and one from (3, 6, 9)
    - *Palindrome*: Digits read the same forwards and backwards along the line
    - *Parity*: Adjacent cells must contain one odd and one even digit

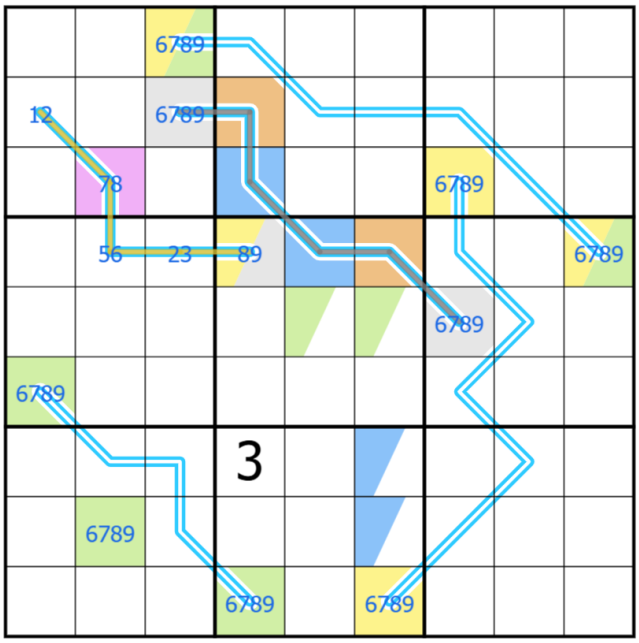
Solve Path

- We can use region sum line logic (1 cell = 3 cells) to show that R1C3, R3C7, R4C9, R6C1, R9C4, R9C6 are from 6789. In addition R2C3 is from 6789 as there are 5 region sum line cells in box 2 which have minimum sum 15
- By considering the lines, only the line at R2C3 is capable of being a palindrome

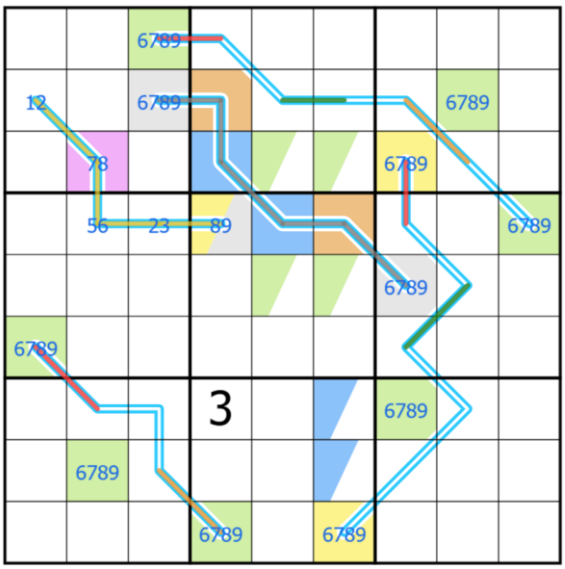


- Green and yellow 6789 are different. We can place green in box 7
- We can roughly place green in box 5, and this means R5C7 is different from yellow and green and we will colour this grey

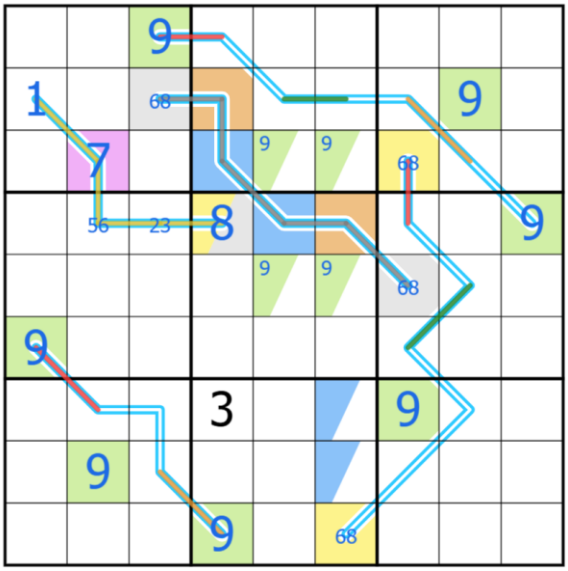
- A 3 cell entropic set has a minimum sum of 12 (1, 4, 7) so the only line capable of being entropic is R4C4, and R4C4 and R3C2 have to be high, and are from 89 and 78 respectively. R2C1 is from 12, so R4C2 and R4C3 are 56 and 23 respectively
- R3C2 is different from green, yellow and grey, so we have now identified four different cells from 6789
- This means that R1C3 must be green or yellow, and R4C4 is either yellow or grey (not pink as pink is on its region sum line)



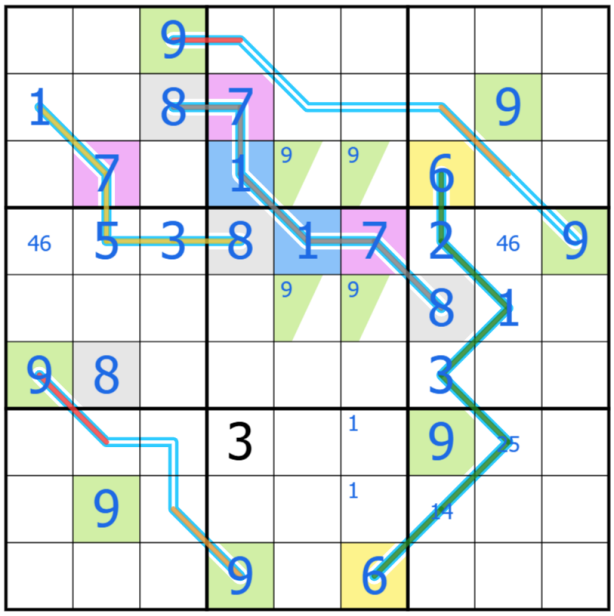
- Can R1C3 can be yellow? If it were then it would be impossible to place yellow in box 2, hence R1C3 is green
- We can place green in box 3
- Considering the lines, R6C1 can't be modular as R9C4 is the same digit but not 3 steps away
- A Dutch whisper has to be a 9 going to 162 (or 261). R3C7 can't be Dutch whisper as we would have three cells from 12 in column 7



- Hence green is on the end of a line which is a Dutch whisper, either R6C1 or R1C3, and so is 9
- This makes R4C4 an 8, R3C2 a 7, R2C1 a 1

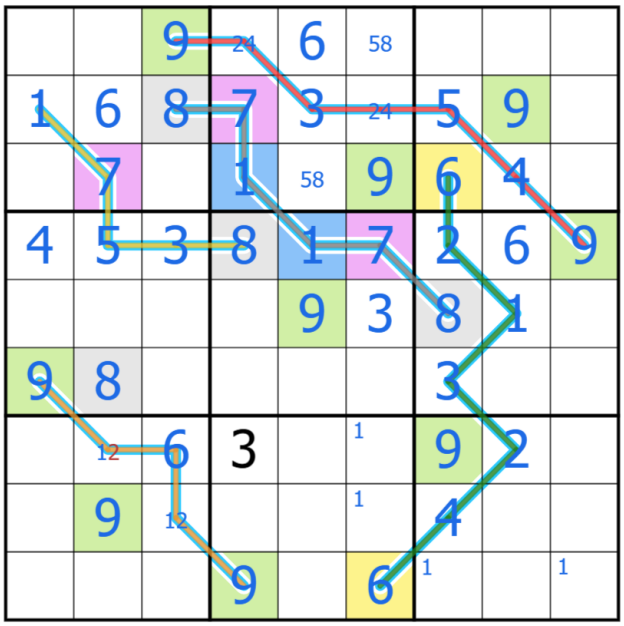


- R3C7 is reduced to just 68. A parity line here is now invalid, as the sum in box 9 would be odd (even + odd), so this line is modular
- The sum of the modular line in box 6 must be 0 mod 3 as summing three different modularities results in a 0 mod 3 sum, hence yellow is 6
- This makes R5C7 an 8
- The R2C3 line can't be 35 by the given 3, and can't be 26 as 6 sees both cells in the palindrome, so it is 17 which only has one orientation



- Now the puzzle really opens up and there are quite a few routes to the finish
- The region sum line in box 2 has to be 234, which makes it a parity line, hence the line in box 7 is a Dutch whisper and is has a 6 in R7C3 with a 12 pair
- 1 in row 9 is in box 9, which resolves the region sum line in box 9

- The region sum line is complete in box 3 as R2C7 is odd and can only be 5
- 3 is placed in box 5, placing the remaining 9s
- 6 is placed in box 2 and then box 1



- 1 and 2 are resolved in box 7, 1 is placed in box 4
- At this point there really is a festival of naked singles so marking the remaining cells should allow this to finish without anything tricky