Fake Moustache and Glasses – Full Solution Guide

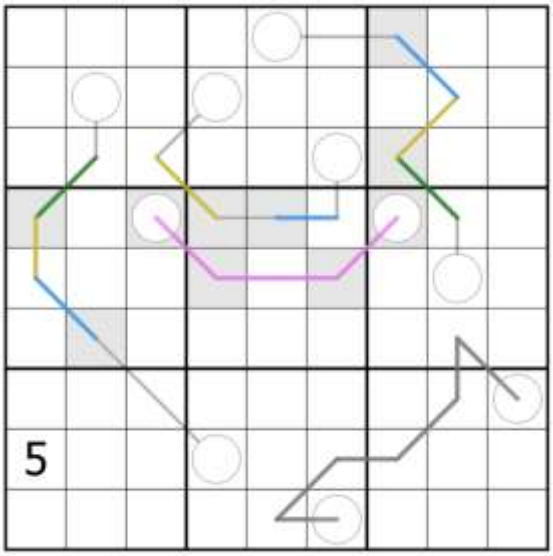
This is a full solution guide to my puzzle *Fake Moustache and Glasses*, and so spoilers are ahead.

Rules

- Normal sudoku rules apply: Place the digits 1 to 9 once each in every row, column, and 3x3 box
- **Double Arrows**: Digits along a grey line sum to the same as the sum of the two connected circles
- In addition, each of the following constraints applies to exactly one double arrow in the grid, including its circles:
    - *Entropic*: A run of 3 digits must contain one low (1, 2, 3), one medium (4, 5 6), and one high (7, 8, 9) digit
    - *German Whisper*: Adjacent digits differ by at least 5
    - *Modular*: A run of 3 digits must all contain 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
    - *Renban*: Contains a non-repeating set of consecutive digits in any order

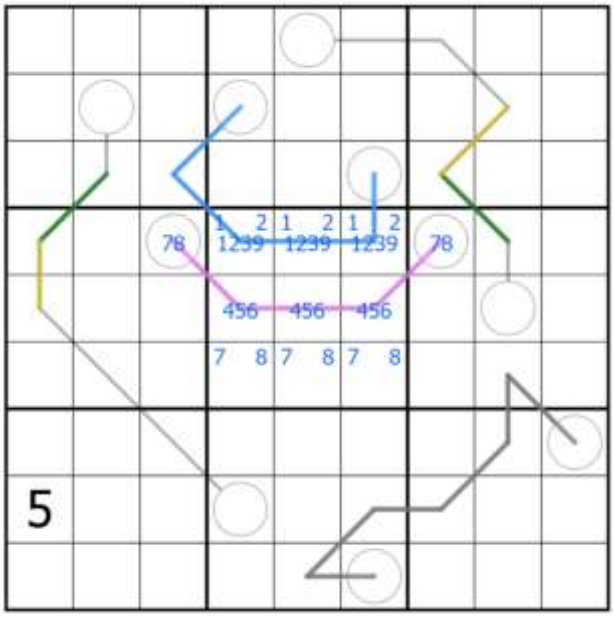
Solve Path

- One double arrow is a palindrome, and all of them have cells which see each other except for the double arrow covering R9C6
- One of the double arrows is a renban. Considering the possibilities, a 6 cell line that is a renban would have an odd total (e.g. 1-6 summing to 21) which could not be split into a 2/4 set to make a valid double arrow. A 7-cell set can't be split into a 5/2 set with the same sum. Hence the only 5 cell line must be the renban
- We can also rule out the line from R2C4 from being a German Whisper by available digits

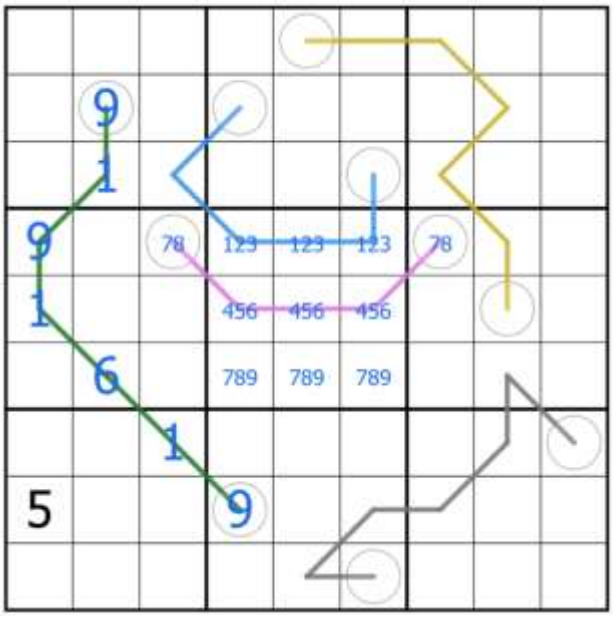


- The renban must have a set of digits which sum to an even number, which can only be 2-6 or 4-8. These would be split as 46 = 235 or 78 = 456
- Either of these options uses all of 456, so the line covering R4C456 is not entropic

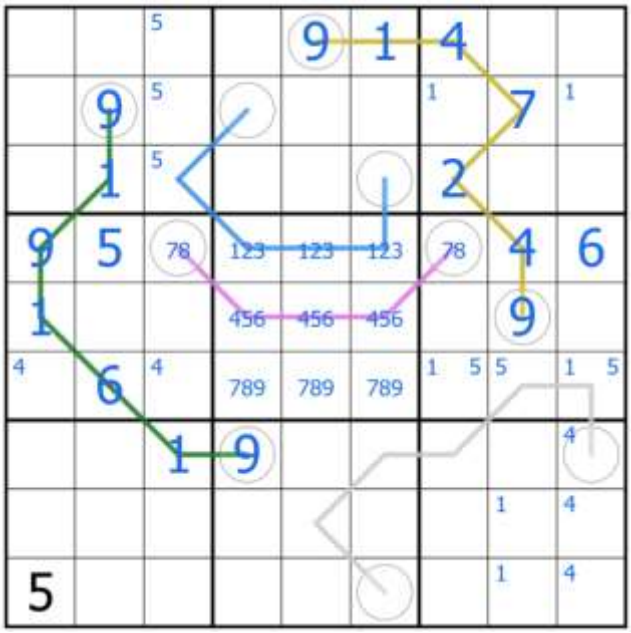
- If the renban were 46 = 235 this only leaves 1789 to go on the line in R4C456, and there is no way to validly satisfy a double arrow and modular line with these digits available, hence the renban is 78 = 456
- By renban logic we can also roughly place 78 in box 5

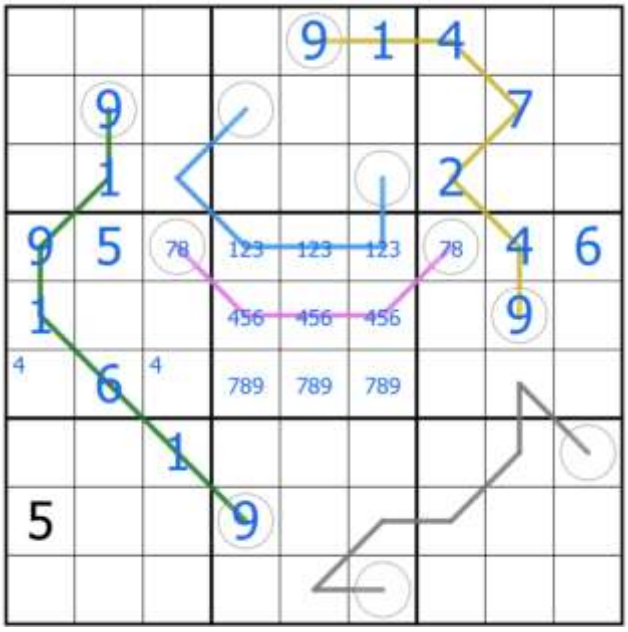


- 1 and 2 look at R4C8. If the R5C8 line were a German Whisper then the digits on the line would be minimum 38161 which sums to 19, hence this must be entropic, and the line at R2C2 is the German Whisper
- By the pointing 78s, the line at R2C2 is completely forced to be 19161 = 9+9
- Gives 123 triple in R4, 789 triple in R6

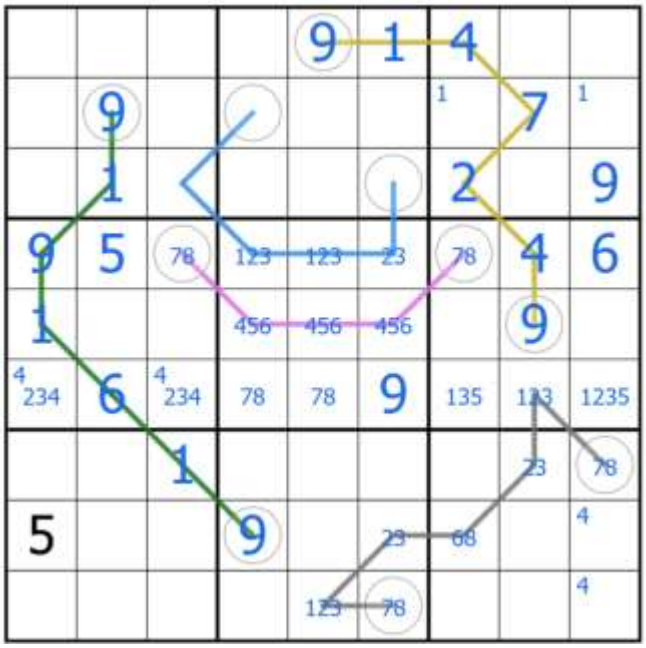


- Entropic line can only have one high digit which must be in R2C8
- 123 triple tells us that R4C8 is a medium digit
- 1 looking at R3C7 eats up our one degree of freedom and forces 42741 = 9+9

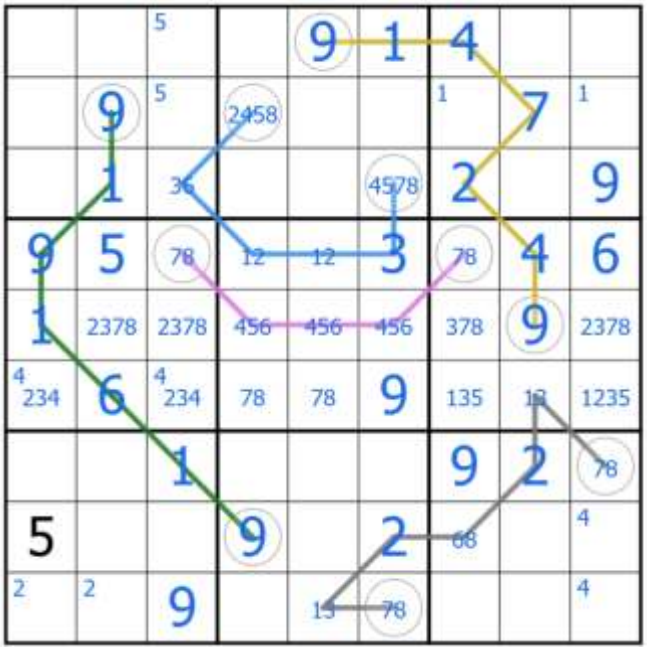




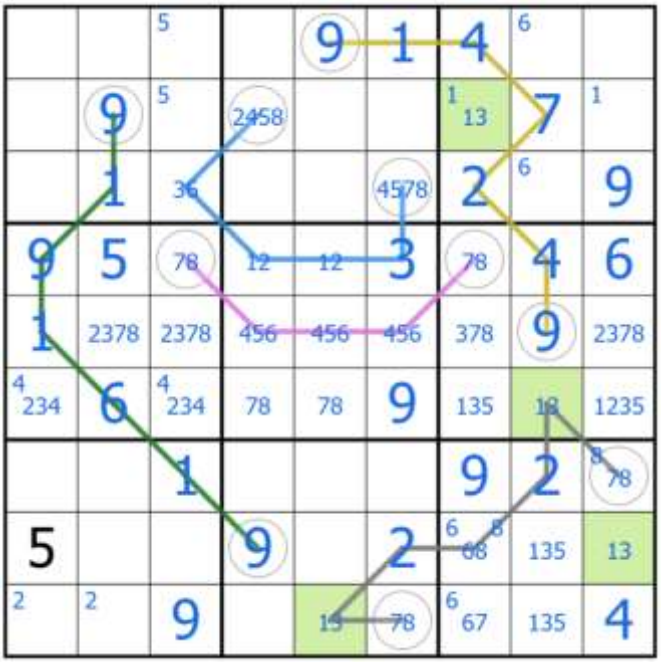
- Centre digit of the palindrome must be an even digit, and sees 2 and 4. The end points also see 6 and 9, reducing the options
- Considering options for the other palindrome digits, R6C8+R7C8 sum to no more than 6, giving a 23 pair in C6



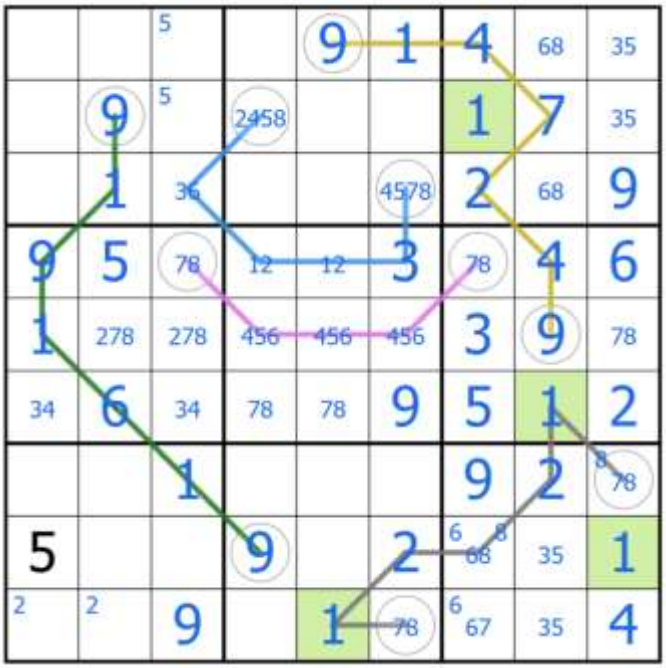
- By modulo arithmetic the end points of the modular line are not from the 369 set, hence R4C6 is a 3 and R3C3 is from 36
- Places 2 on the palindrome



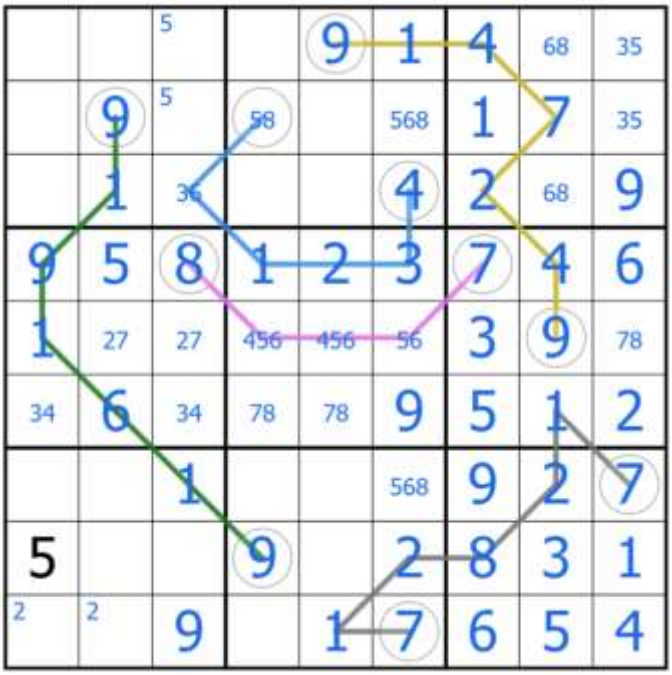
- R9C5 in box 9 is R8C9, and in box 3 is R2C7
- Considering the palindrome, we have either 7+7 = 1+2+8+2+1, or 8+8 = 3+2+6+2+3, either way 8 in box 9 is in either R7C9 or R8C7
- Creates a 135 triple in box 9, and a 678 triple in column 7



- 3 is placed in column 7, then 5, 2 in box 6, and the palindrome is resolved



- 1 is placed on the modular line, which makes R3C6 a 4 and reduce the remaining digits



- 5s are pencilmarked in box 1 and 3, so 5 in row 3 is in box 2, making R2C4 an 8
- Remainder resolves via sudoku