

ORIGIN := 1

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SudokuRec(M, r, c) := if (r ≤ 9) ∧ (c ≤ 9)
    if Mr, c ≠ 0
        SudokuRec(M, r, c + 1) if c < 9
        otherwise
            SudokuRec(M, r + 1, 1) if r < 9
            (1 M) otherwise
    otherwise
        (ro co) ← (3 · trunc( $\frac{r-1}{3}$ ) + 1, 3 · trunc( $\frac{c-1}{3}$ ) + 1)
        Ok ← 0
        for N ∈ 1 .. 9
            for k ∈ 1 .. 9
                (rk ck) ← (ro + mod(k - 1, 3), co + trunc( $\frac{k-1}{3}$ ))
                φ ← (Mr, k = N) ∨ (Mk, c = N) ∨ (Mrk, ck = N)
                break if φ = 1
                continue otherwise
            if φ = 0
                Mr, c ← N
                (Ok M) ← SudokuRec(M, r, c)
                break if Ok = 1
                Mr, c ← 0 otherwise
            continue otherwise
        (Ok M)
    (1 M) otherwise

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Sudoku(M) := (Ok M) ← SudokuRec(M, 1, 1)
M if Ok = 1
"Can't solve the puzzle." otherwise

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$$\text{Sudoku} \left(\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 9 & 0 \\ 1 & 9 & 0 & 4 & 7 & 0 & 6 & 0 & 8 \\ 0 & 5 & 2 & 8 & 1 & 9 & 4 & 0 & 7 \\ 2 & 0 & 0 & 0 & 4 & 8 & 0 & 0 & 0 \\ 0 & 0 & 9 & 0 & 0 & 0 & 5 & 0 & 0 \\ 0 & 0 & 0 & 7 & 5 & 0 & 0 & 0 & 9 \\ 9 & 0 & 7 & 3 & 6 & 4 & 1 & 8 & 0 \\ 5 & 0 & 6 & 0 & 8 & 1 & 0 & 7 & 4 \\ 0 & 8 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix} \right) = \begin{pmatrix} 7 & 4 & 8 & 6 & 3 & 5 & 2 & 9 & 1 \\ 1 & 9 & 3 & 4 & 7 & 2 & 6 & 5 & 8 \\ 6 & 5 & 2 & 8 & 1 & 9 & 4 & 3 & 7 \\ 2 & 6 & 5 & 9 & 4 & 8 & 7 & 1 & 3 \\ 8 & 7 & 9 & 1 & 2 & 3 & 5 & 4 & 6 \\ 3 & 1 & 4 & 7 & 5 & 6 & 8 & 2 & 9 \\ 9 & 2 & 7 & 3 & 6 & 4 & 1 & 8 & 5 \\ 5 & 3 & 6 & 2 & 8 & 1 & 9 & 7 & 4 \\ 4 & 8 & 1 & 5 & 9 & 7 & 3 & 6 & 2 \end{pmatrix}$$

$$\text{Sudoku} \left(\begin{pmatrix} 8 & 4 & 0 & 0 & 0 & 0 & 1 & 6 & 0 \\ 0 & 0 & 0 & 0 & 8 & 0 & 0 & 0 & 2 \\ 9 & 2 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 3 & 0 & 1 & 0 & 0 & 8 & 5 \\ 0 & 0 & 0 & 4 & 0 & 3 & 0 & 0 & 0 \\ 7 & 5 & 0 & 0 & 9 & 0 & 4 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 8 & 0 & 4 & 9 \\ 5 & 0 & 0 & 0 & 2 & 0 & 0 & 1 & 0 \\ 0 & 8 & 9 & 0 & 0 & 0 & 0 & 7 & 6 \end{pmatrix} \right) = \begin{pmatrix} 8 & 4 & 5 & 9 & 3 & 2 & 1 & 6 & 7 \\ 1 & 3 & 6 & 7 & 8 & 4 & 9 & 5 & 2 \\ 9 & 2 & 7 & 1 & 6 & 5 & 8 & 3 & 4 \\ 4 & 9 & 3 & 2 & 1 & 7 & 6 & 8 & 5 \\ 2 & 6 & 8 & 4 & 5 & 3 & 7 & 9 & 1 \\ 7 & 5 & 1 & 8 & 9 & 6 & 4 & 2 & 3 \\ 6 & 1 & 2 & 3 & 7 & 8 & 5 & 4 & 9 \\ 5 & 7 & 4 & 6 & 2 & 9 & 3 & 1 & 8 \\ 3 & 8 & 9 & 5 & 4 & 1 & 2 & 7 & 6 \end{pmatrix}$$

$$\text{Sudoku} \left(\begin{pmatrix} 8 & 7 & 6 & 9 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 6 & 0 & 0 & 0 \\ 0 & 4 & 0 & 3 & 0 & 5 & 8 & 0 & 0 \\ 4 & 0 & 0 & 0 & 0 & 0 & 2 & 1 & 0 \\ 0 & 9 & 0 & 5 & 0 & 0 & 0 & 0 & 0 \\ 0 & 5 & 0 & 0 & 4 & 0 & 3 & 0 & 6 \\ 0 & 2 & 9 & 0 & 0 & 0 & 0 & 0 & 8 \\ 0 & 0 & 4 & 6 & 9 & 0 & 1 & 7 & 3 \\ 0 & 8 & 0 & 0 & 0 & 1 & 0 & 0 & 4 \end{pmatrix} \right) = \text{"Can't solve the puzzle."}$$

$$\text{Sudoku} \left(\begin{pmatrix} 9 & 0 & 0 & 0 & 0 & 2 & 0 & 0 & 6 \\ 0 & 8 & 0 & 0 & 0 & 7 & 0 & 5 & 0 \\ 0 & 0 & 7 & 0 & 0 & 8 & 1 & 0 & 0 \\ 0 & 0 & 0 & 6 & 0 & 0 & 7 & 1 & 2 \\ 0 & 0 & 0 & 0 & 5 & 0 & 0 & 0 & 0 \\ 1 & 2 & 3 & 0 & 0 & 4 & 0 & 0 & 0 \\ 0 & 0 & 4 & 8 & 0 & 0 & 3 & 0 & 0 \\ 0 & 3 & 0 & 7 & 0 & 0 & 0 & 2 & 0 \\ 5 & 0 & 0 & 4 & 0 & 0 & 0 & 0 & 1 \end{pmatrix} \right) = \begin{pmatrix} 9 & 5 & 1 & 3 & 4 & 2 & 8 & 7 & 6 \\ 3 & 8 & 6 & 1 & 9 & 7 & 2 & 5 & 4 \\ 2 & 4 & 7 & 5 & 6 & 8 & 1 & 3 & 9 \\ 4 & 9 & 5 & 6 & 8 & 3 & 7 & 1 & 2 \\ 7 & 6 & 8 & 2 & 5 & 1 & 9 & 4 & 3 \\ 1 & 2 & 3 & 9 & 7 & 4 & 5 & 6 & 8 \\ 6 & 1 & 4 & 8 & 2 & 5 & 3 & 9 & 7 \\ 8 & 3 & 9 & 7 & 1 & 6 & 4 & 2 & 5 \\ 5 & 7 & 2 & 4 & 3 & 9 & 6 & 8 & 1 \end{pmatrix}$$

$$\text{Sudoku} \left(\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix} \right) = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 4 & 5 & 6 & 7 & 8 & 9 & 1 & 2 & 3 \\ 7 & 8 & 9 & 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 1 & 4 & 3 & 6 & 5 & 8 & 9 & 7 \\ 3 & 6 & 5 & 8 & 9 & 7 & 2 & 1 & 4 \\ 8 & 9 & 7 & 2 & 1 & 4 & 3 & 6 & 5 \\ 5 & 3 & 1 & 6 & 4 & 2 & 9 & 7 & 8 \\ 6 & 4 & 2 & 9 & 7 & 8 & 5 & 3 & 1 \\ 9 & 7 & 8 & 5 & 3 & 1 & 6 & 4 & 2 \end{pmatrix}$$

Alvaro