Happy New Year 2024 Sudoku Contest

Instruction Booklet

Puzzles

1.	Classic	?? Points
2.	Classic	?? Points
3.	Classic	?? Points
4.	Classic	?? Points
5.	Classic	?? Points
6.	Classic	?? Points
7.	Antidiagonal	?? Points
8.	Coded	?? Points
9.	Determinant	?? Points
10.	Distance	?? Points
11.	Distanced Alternating Lines	?? Points
12.	Extra Region	?? Points
13.	Hidden Dihedral Shape	?? Points
14.	Killer	?? Points
15.	Nonconsecutive	?? Points
16.	Samurai	?? Points
17.	Thermo	?? Points
18.	X-Sum and Product	?? Points

Contest Details

Solving Logistics

Every 9x9 grid will have 2 rows/columns to enter, each labelled with a letter. Enter in the digits in those rows/columns starting from the left or top. Online solving via Penpa is available for each puzzle, although no automatic solution verification through the Penpa interface is available. As such, if you solve online, you will still have to enter the labelled rows/columns for each puzzle to receive credit. Links to each puzzle are available directly through the contest portal on LMI.

Submission

You may submit answers at any point during the 150 minutes after you reveal the password, although any submissions recorded after the fact will not be accepted. There is instant grading for each puzzle so that you can immediately tell if your answer is correct or not. You can submit answers multiple times if your first few attempts are wrong, with each incorrect submission reducing the potential points you may receive for a puzzle. More specifically, the first, second, and third incorrect submissions reduce the potential score to 90%, 50%, and 0% respectively.

Bonus & Rankings

Rankings are determined by most total points first, then by earliest final submission time (disregarding incorrect submissions). Bonus points are awarded to those who finish all puzzles correctly before time has elapsed, with 1% of your final score being added for every minute saved.

Acknowledgements

Thank you to Prasanna Seshadri and Logic Masters India for being such a gracious host for this contest! This is my first time arranging an online contest like this, so I appreciate all the guidance along the way.

Thank you to Prasanna Seshadri for test-solving all the contest puzzles and providing feedback on them to finetune for this contest!

Thank you to Becca Chang for test-solving the IB puzzles and providing feedback on the instructions!

Scoring

Point allocation for this contest will be determined by the solvers! The point values for each puzzle will be calculated after the contest period ends, and will also be inversely proportional to the percentage of solvers who correctly solve the puzzle*. To provide some guidance, puzzles are labelled on a general difficulty of Easy (☆), Medium (☆ ☆), and Hard (☆ ☆ ☆), although personal experience may vary. The point allocation procedure is as follows:

- The puzzle with the 3rd-highest percentage of correct solves will be 20 points
- The puzzle with the 3rd-lowest percentage of correct solves will be 80 points
- We will then solve for a logarithmic function that satisfies those two benchmarks: Percentage solved = a * ln(points) + b

For example, let us say that the following set is the associated percentage of correct solves for an arbitrary set of 12 puzzles:

{0.75, 0.67, 0.55, 0.49, 0.82, 0.40, 0.37, 0.33, 0.29, 0.22, 0.24, 0.19}

We now fit the function such that it passes through (20, 0.75) and (80,0.22), giving us

Percentage solved = (-0.382) * ln(points) + 1.8953

with the corresponding point values for each puzzle being:

{15, 20, 29, 36, 12, 48, 53, 60, 68, 80, 85, 94}

For the Samurai, the point total for the entire grid will be determined by percentage of correct submissions for the entire grid, with each subgrid's point values being determined by logarithmic fitting such that the subgrid with the median percentage of correct solves will have the average point value of all subgrids. For example, let the entire samurai grid be 100 points, and the correct solve distribution be

{0.4, 0.3, 0.15, 0.5, 0.2}

The associated function and corresponding point values for each subgrid are

Percentage solved = (-0.51) * ln(points) + 1.710

{11, 13, 16, 19, 21} + 20 points for completion of at least 1 9x9 grid

*Percentage of solvers who have at least 1 correct submission for any of the puzzles or samurai subgrids.

Puzzles 1 – 6: Classic

? + ? + ? + ? + ? + ? Points

Rules: Place the digits 1-9 in each empty cell in the grid such that each row, column, and marked 3x3 box contains each digit exactly once. Online Solving

Example

	2						1	
4		6				7		3
	8			1			5	
			8		2			
		7				3		
			6		4			
	6			5			2	
2		5				4		1
	9						8	

Solution

5	2	3	7	4	9	8	1	6
4	1	6	2	8	5	7	9	3
7	8	9	3	1	6	2	5	4
6	3	1	8	7	2	5	4	9
8	4	7	5	9	1	3	6	2
9	5	2	6	3	4	1	7	8
1	6	8	4	5	3	9	2	7
2	7	5	9	6	8	4	3	1
3	9	4	1	2	7	6	8	5

Puzzle 7: Antidiagonal

? Points

Rules: Classic sudoku rules apply. Each main diagonal contains exactly three distinct digits. Online Solving

Example

		8				2		
	4		1		8		3	
		2				3		
		3				1		
	7		3		5		9	
		6				5		

Solution

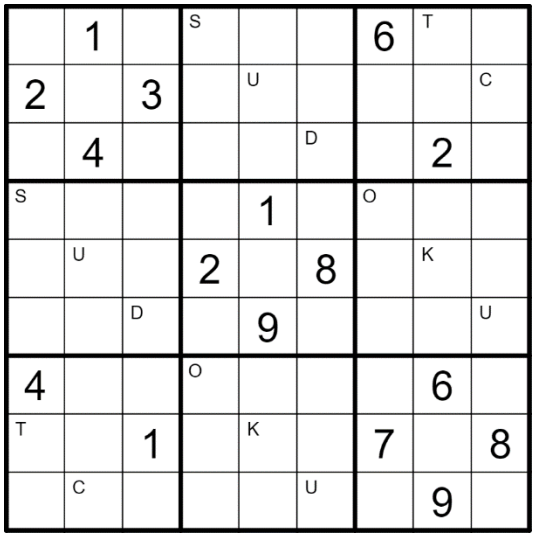
1	2	9	5	3	6	7	4	8
3	6	8	9	7	4	2	1	5
5	4	7	1	2	8	9	3	6
8	1	2	6	4	9	3	5	7
7	5	4	2	1	3	8	6	9
6	9	3	8	5	7	1	2	4
4	7	1	3	8	5	6	9	2
2	8	6	4	9	1	5	7	3
9	3	5	7	6	2	4	8	1

Puzzle 8: Coded

? Points

Rules: Classic sudoku rules apply. Some digits have been substituted by letters. All instances of the same letter must be substituted by the same digit, and different letters must be substituted by different digits. Online Solving

Example



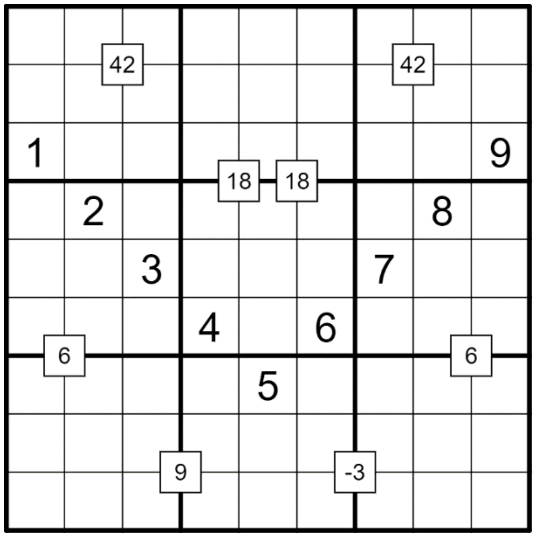
Solution

Puzzle 9: Determinant

? Points

Rules: Classic sudoku rules apply. The determinants of 2x2 matrices are given in the center of four cells, where the determinant of a 2x2 matrix ix a*d – b*c, where a is top left, b is top right, c is bottom left, d is bottom right. Online Solving

Example



Solution

Puzzle 10: Distance

? Points

Rules: Classic sudoku rules apply. Clues outside the grid indicate the distance (in steps) between the digits in the corresponding row or column. Digits must be placed in order of appearance. Note* Due to Penpa formatting constraints, clues for columns will be horizontally oriented at the top of the grid for online solving, and are to be read and understood as seen in the example below. Online Solving

Example

	1-2:2	1-6:5	3-4:2	2-9:5	5-6:2	2-4:4	7-8:2	4-8:5	1-9:7
6-3:5									
2-3:2								5	
2-3:2									
4-5:2									
4-5:2									
6-7:2									
6-7:2									
8-9:2		5							
8-9:2									

Solution

	1-2:2	1-6:5	3-4:2	2-9:5	5-6:2	2-4:4	7-8:2	4-8:5	1-9:7
6-3:5	1	8	5	6	9	7	2	4	3
2-3:2	6	4	7	2	8	3	9	5	1
2-3:2	2	9	3	4	1	5	6	7	8
4-5:2	9	1	8	3	4	6	5	2	7
4-5:2	3	7	4	8	5	2	1	9	6
6-7:2	5	2	6	1	7	9	3	8	4
6-7:2	4	3	2	9	6	8	7	1	5
8-9:2	8	5	9	7	3	1	4	6	2
8-9:2	7	6	1	5	2	4	8	3	9

Puzzle 11: Distanced Alternating Lines

? Points

Rules: Classic sudoku rules apply. Adjacent digits on grey lines must have different parity, and have a difference of at least 3. Online Solving

Example

		8				2		
	3						5	
7								6
				5				
			9	7	1			
				6				
1								2
	2						9	
		4				6		

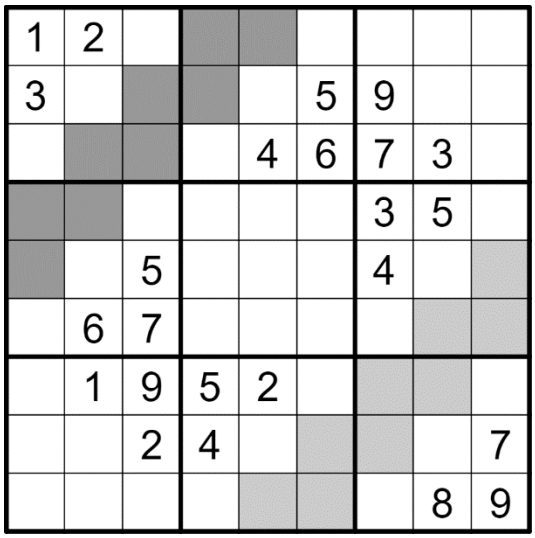
Solution

5	6	8	1	3	7	2	4	9
2	3	9	6	8	4	1	5	7
7	4	1	2	9	5	3	8	6
9	1	6	4	5	2	7	3	8
3	8	2	9	7	1	4	6	5
4	7	5	3	6	8	9	2	1
1	9	3	8	4	6	5	7	2
6	2	7	5	1	3	8	9	4
8	5	4	7	2	9	6	1	3

Puzzle 12: Extra Region — ? Points

Rules: Classic sudoku rules apply. The same-colored shaded cell group(s) contain(s) each digit from 1 to 9. Online Solving

Example



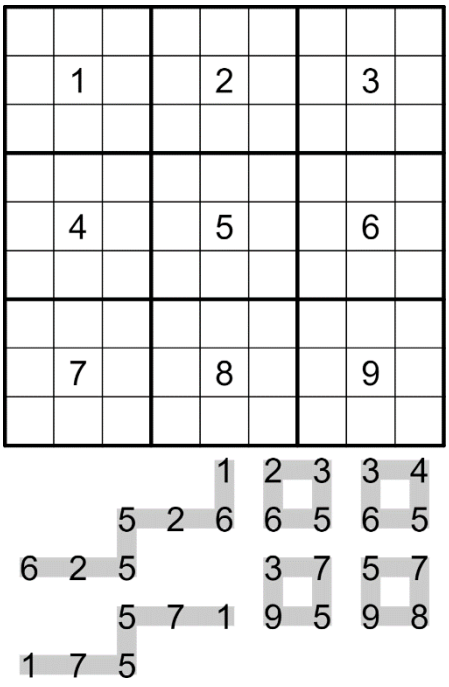
Solution

1	2	4	7	3	9	8	6	5
3	7	6	1	8	5	9	2	4
9	5	8	2	4	6	7	3	1
4	9	1	8	7	2	3	5	6
2	3	5	9	6	1	4	7	8
8	6	7	3	5	4	1	9	2
7	1	9	5	2	8	6	4	3
6	8	2	4	9	3	5	1	7
5	4	3	6	1	7	2	8	9

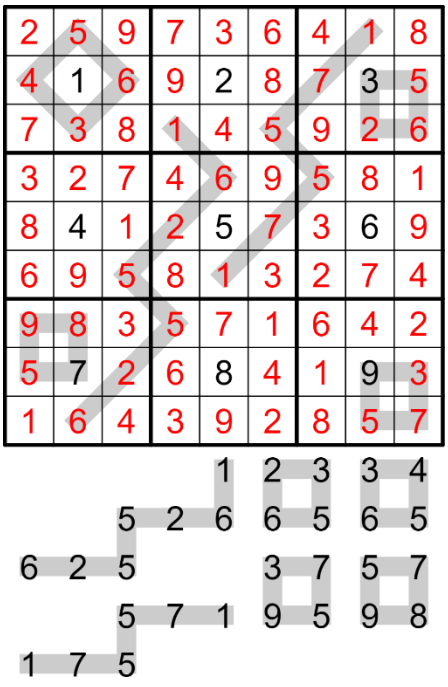
Puzzle 13: Hidden Dihedral Shape — ? Points

Rules: Classic sudoku rules apply. There are some numbered shapes that must be put into the grid. Shapes can be rotated (in 45 degree increments) AND reflected. Different shapes may not intersect each other or share cells. There may be multiple ways to place shapes. Online Solving

Example



Solution

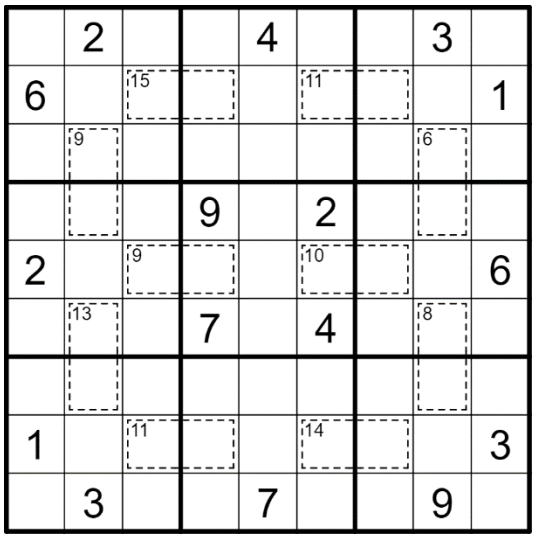


Puzzle 14: Killer

? Points

Rules: Classic sudoku rules apply. The number at the top-left corner of each cage equals the sum of digits inside the cage. Digits do not repeat inside a cage. Online Solving

Example



Solution

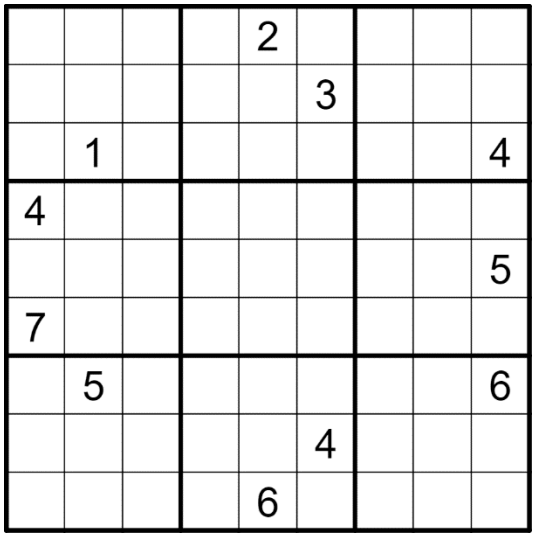
9	2	8	1	4	5	6	3	7
6	5	7	8	3	9	2	4	1
4	1	3	6	2	7	9	5	8
7	8	5	9	6	2	3	1	4
2	9	4	5	1	3	7	8	6
3	6	1	7	8	4	5	2	9
8	7	2	3	9	1	4	6	5
1	4	9	2	5	6	8	7	3
5	3	6	4	7	8	1	9	2

Puzzle 15: Nonconsecutive

? Points

Rules: Classic sudoku rules apply. Any orthogonally adjacent digits must not be consecutive. Online Solving

Example



Solution

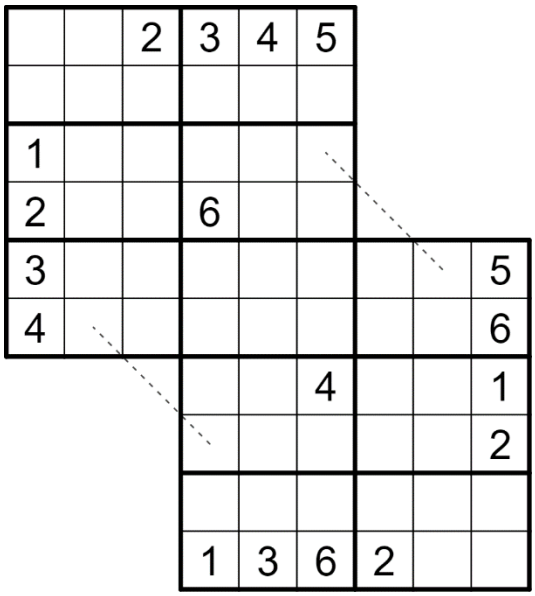
5	7	9	4	2	6	8	3	1
2	4	6	1	8	3	5	9	7
8	1	3	7	5	9	2	6	4
4	9	5	3	7	2	6	1	8
1	6	2	9	4	8	3	7	5
7	3	8	6	1	5	9	4	2
9	5	1	8	3	7	4	2	6
6	2	7	5	9	4	1	8	3
3	8	4	2	6	1	7	5	9

Puzzle 16: Samurai

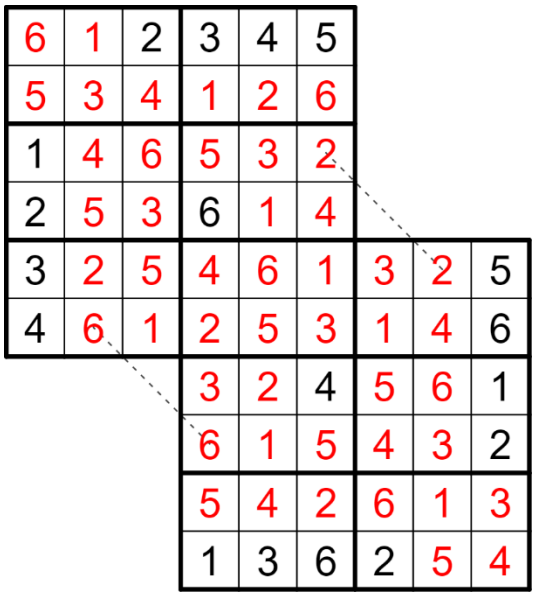
?+?+?+?+?+? Points

Rules: There are 5 overlapping 9x9 sudoku grids. Classic sudoku rules apply for each grid. Cells connected by dashed lines contain the same digit. Each individual grid can be submitted for partial points. Completion of at least 1 9x9 grid will also give 20% of the entire puzzle points (more details in the Scoring section). Online Solving

Example*



Solution



*Example is only representative of aesthetic on the contest, the actual size and layout of the grids will differ

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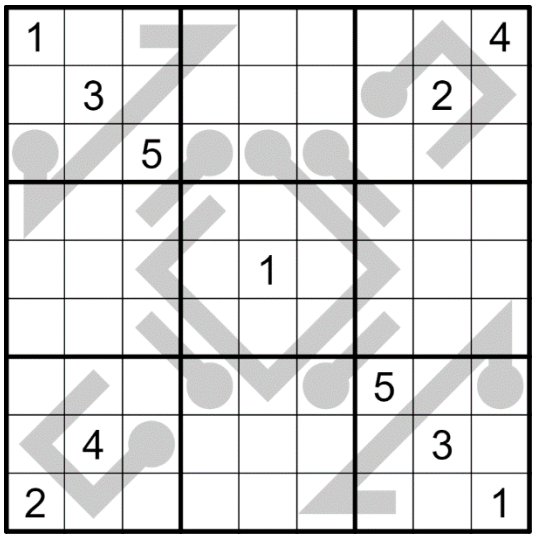
Puzzle 17: Thermo

? Points

Rules: Classic sudoku rules apply. Some thermometer shapes are placed in the grid. Digits are strictly increasing from the round bulb of each thermometer to each flat end. Online Solving

Example

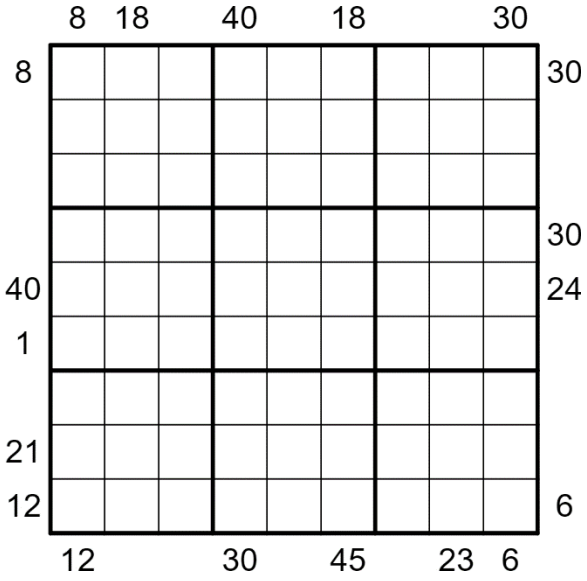


Solution

Puzzle 18: X-Sum and Product ? Points

Rules: Classic sudoku rules apply. Each number outside the grid is the sum OR product (or both) of the first X numbers placed in the corresponding direction, where X is equal to the first number placed in that direction. Online Solving

Example



Solution