

X	X	X				X	X	X
X	X	X				X	X	X
X	X	X				X	X	X
X								X
X				X				X
X								X
X	X	X				X	X	X
X	X	X				X	X	X
X	X	X	X	X	X	X	X	X

A range of clue positions insufficient for a proper sudoku

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

Sudoku with 30 cell empty rectangle

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

Sudoku with 9 empty groups

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

Minimal clues

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

Minimal clues symmetric

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

Candidate Elimination and Naked Singles

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

Locked Candidates

1	² 7	^{2 3} 4	5	³ 4 6	8	9	² 7	^{2 3} 4 6
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A Naked Pair

5	¹ 7	2	¹ 4 8	^{1 3} 4 8	9	6	^{3 1} 7	³
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A Naked Triple

^{1 2} 4 6	³ 9	² 6	5	^{1 3} 8 8	⁴	² 7	² 7 9	³ 6
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A Hidden Triple

1	2	3						
			1	2		3		
			3			1	2	

Tuleja's Theorem

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

Application of Tuleja's Theorem

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

Example of Tuleja's Theorem

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

Example of Tuleja's Theorem (2)

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

Example fo Tuleja's Theorem (3)

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

X-wing

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

Swordfish

	XY			YZ	
	XZ			*	

XY-Wing

	XY			XZ	
YZ			*	*	*

+

*	XY	*		XZ	
YZ					

*	XY	*		XZ	
YZ			*	*	*

XY-Wing

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

A Very Hard Puzzle

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

Super Sudoku