

## The hardest sudokus (new thread)

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### Re: The hardest sudokus (new thread)

📅 by mith • Fri Mar 19, 2021 8:08 pm

Denis, do you happen to have a list of your known B6B and B7B puzzles?

QUOTE

mith

Posts: 862

Joined: 14 July 2020

### Re: The hardest sudokus (new thread)

📅 by denis\_bertlier • Sat Mar 20, 2021 3:42 am

🗨️ mith wrote:

Denis, do you happen to have a list of your known B6B and B7B puzzles?

QUOTE

denis\_bertlier

2019 Supporter

Posts: 3334

Joined: 19 June 2007

Location: Paris

Hi Mith,  
See sections 11.4.2 and 11.4.3 of [PBCS2]. The list is not in the form you want, but all the B6B and B7B puzzles known at the time of publication are in it.  
For more recent puzzles, every time a new SER >= 11.7 was proposed in this thread (which has been quite rare), I have only checked that it was in B7B or lower. No new one has been found in B7B. The chances of finding a puzzle not in T&E(2) seem very close to 0. But who knows what can happen if some radically new smart way of searching - other than proximity search - is discovered?  
As a result, my B7B list of 3 puzzles is up-to-date; but the B6B list may not be.

### Re: The hardest sudokus (new thread)

📅 by jco • Tue Mar 23, 2021 2:30 pm

Hi,

Yesterday I used YZF\_Sudoku to generate some puzzles in which SK-loops appear (I wanted to see it that move shows up in many puzzles with very high ER).

(Content deleted)

Edit: I removed the content of this post (see next message of mith to jco: thanks mith)

Last edited by jco on Wed Oct 06, 2021 9:27 pm, edited 2 times in total.

JCO

QUOTE

jco

Posts: 396

Joined: 09 June 2020

### Re: The hardest sudokus (new thread)

📅 by 999\_Springs • Wed Mar 24, 2021 1:06 am

CODE: SELECT ALL

59.86.7...  
.8...5.96  
.467.9.8  
6.59..8.7  
8...76.5  
7...5861.  
92.68..7.  
.5..9..68  
..685.79... SE 11.1, skfr 11.1, 42 clues

QUOTE

999\_Springs

Posts: 685

Joined: 27 January 2007

Location: In the toilet, flushing down springs, one by one.

## MWAHAHAHAHAHA EAT THAT MAURICIO, AFTER 14 YEARS, A NEW RECORD HOLDER FOR THE MOST CLUES FOR AN 11+ RATED SUDOKU PUZZLE IS IN TOWN

I'm doing the method that i wrote about in my [most recent post](#) in the maximum clues per se rating thread - i'm still not done generating/rating puzzles but this is by far the hardest one i've found so far. I will post an update in that thread once i'm done looking through them. champagne, this is hard enough for your database, isn't it, and no other puzzle in your database has this many clues, right?

the puzzle also comes with these 3 others by replacing the 56789 5-template with another one, the solution grids of these puzzles are not isomorphic, but the complements of the puzzle are all identical

CODE: SELECT ALL

59.86.7...8...5.96.467.9.8.6.59..8.78...76.5..7...5861.92.68..7..5..9...68.685.79..  
59.86.7...8...5.96.467.9.8.6.59..6.76...78.5..7...5861.92.68..7..5..9...68.685.79..  
59.86.7...6...5.96.487.9.6.6.59..8.78...76.5..7...5861.92.68..7..5..9...86.865.79..  
59.86.7...6...5.96.487.9.6.6.59..6.76...78.5..7...5861.92.68..7..5..9...86.865.79..  
..685.79... SE 11.1, skfr 11.1, 42 clues

edit: here are three more requiring nested multiple forcing chains in SE. all three appear to come from the same seed puzzle but the one above does not

CODE: SELECT ALL

...6..8..  
5..59..97  
.8..7...5  
921..58.7.  
5...6.89  
..68.9.5..  
8..9.57..  
96..7..58  
...86.94.. SE 11.1, skfr 10.9, 37 clues  
  
7.96..8..  
8.379...56  
6..8...9  
9.1..58.6.  
...7.98  
8796..5  
5.28.69..  
7...9.85  
9857.6... SE 11.0, skfr 10.8, 40 clues  
  
..96..8..  
61.87..59  
8...67  
82...6879  
...7.86  
6789..5  
54.7..6.8  
..6..8.75  
..866.9... SE 10.9, skfr 10.9, 39 clues

no other puzzle shows up if you swap out the 5-template in any of these

### Re: The hardest sudokus (new thread)

📅 by champagne • Wed Mar 24, 2021 7:54 am

🗨️ 999\_Springs wrote:

champagne, this is hard enough for your database, isn't it, and no other puzzle in your database has this many clues, right?

Hi "999\_Springs",

Basically, the potential hardest data base is supposed to store minimal puzzles. I kept the 32 clues puzzle as an oddity, why not these ones.

In the next days, I'll collect the last games and what has been published here. If anybody has something to supply, it's time to do it;

### Re: The hardest sudokus (new thread)

📅 by mith • Wed Mar 24, 2021 2:21 pm

I guess that means it's time to dump my update to a file...

[edit]I'll run SE on some more puzzles recently generated, and then export them tonight or tomorrow.[/edit]

QUOTE

mith

Posts: 862

Joined: 14 July 2020

### Re: The hardest sudokus (new thread)

📅 by jco • Wed Mar 24, 2021 4:54 pm

Hello,

(Content removed)

Edit: content removed (see next message of mith to jco: thanks mith)

Last edited by jco on Wed Oct 06, 2021 9:26 pm, edited 1 time in total.

JCO

QUOTE

jco

Posts: 396

Joined: 09 June 2020

### Re: The hardest sudokus (new thread)

📅 by mith • Wed Mar 24, 2021 5:16 pm

jco, I believe these are all morphs of known puzzles.

I did some searching for SK loops (and MSLs and Exocets) on my puzzles a while back; I found a few SK loops, though none as high as 11.7 (and all still requiring brute force from YZF's solver). I think the highest SE I had was this 11.4:

CODE: SELECT ALL

.....12.....34.5..4...63...1..53...2..7...8..9.....5..6.4..9..8...7..2..... ED=11.4/11.4/11.2

where the SK loop reduces it to 10.5.

And here's a morph of it, relating it to the classic form of phistomefel's-theorem-t38410.html

CODE: SELECT ALL

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

\*I mention the relationship between SK loops and Phistomefel in that thread; I think I would correct that to say that SK loops are a proper subset of Phistomefel, not equivalent to Phistomefel. That said, I'm not actually aware of a classic that simplifies using this pattern that isn't an SK loop... I'll have to do a systematic search sometime. (Phistomefel is, in turn, a proper subset of MSLs/[SET](#).)

Last edited by mith on Wed Mar 24, 2021 5:40 pm, edited 2 times in total.

### Re: The hardest sudokus (new thread)

📅 by jco • Wed Mar 24, 2021 5:35 pm

Hello mith,

🗨️ mith wrote:

jco, I believe these are all morphs of known puzzles.

I did some searching for SK loops (and MSLs and Exocets) on my puzzles a while back; I found a few SK loops, though none as high as 11.7 (and all still requiring brute force from YZF's solver). I think the highest SE I had was this 11.4:

CODE: SELECT ALL

.....12.....34.5..4...63...1..53...2..7...8..9.....5..6.4..9..8...7..2..... ED=11.4/11.4/11.2

where the SK loop reduces it to 10.5.

Many thanks for letting me know! I had no means to check this (both in knowledge and software).  
I was doing some practice with SK-Loops (to identify the pattern, as a manual solver) and then became curious. For some reason I really like SK-loops!  
Regards,  
jco

JCO

QUOTE

jco

Posts: 396

Joined: 09 June 2020

### Re: The hardest sudokus (new thread)

📅 by mith • Wed Mar 24, 2021 5:46 pm

No worries. 🙏 I have a copy of champagne's database which additionally has a column for the minlex form of the puzzle (found using gsf's solver: <http://gsf.cococlyde.org/download/sudoku>), so it's quick to check.

If I ever get around to doing a write-up on SET, I'll let you know. I find it to be a very intuitive way to spot MSLs patterns (SK-loops included). The general idea is to find partitions of the grid such that each set has to contain the same digits (in the Phistomefel example, the corner 2x2s must have the same digits as the ring of cells around the central box), or the same digits modulo complete sets of 1-9, and to do so in such a way that the two sets have mostly different givens/filled values.

### Re: The hardest sudokus (new thread)

📅 by champagne • Wed Mar 24, 2021 6:59 pm

Not highly reliable, but an old analysis of the data base  
the highest ratings having a SK loop should be here

CODE: SELECT ALL

2.....6.5..8..1...4.5.6...7.6.8...7...3.1.....82.....7.5.3...9...4...8..1..5.6.....2 10 tax tarek-ultra-0200  
1.....2..94...5...6...7...89...4...3.6...8.4...2...1..7.....6..5.8..3. 12 tax gsf-2807-05-24-093 64879  
6.....2.9.4...5...1...7...5..84.....2.....3.5.4.2...6...3...9.8...7...1 13 tax coloin-04-10  
1.....2.9.4...5...6...7...5.3.4...6.....58.4...2...6...3...9.8.7...1 14 tax coloin-04-10  
1.....2.3.4...5...6...7...5.8.4...29.....3...9...7...1.9...8.4.2...6.. 17 Hp54 4  
1.....2..1.345...1..462..3..7...4...1.8.5...2.6.9...1...653...11.611.612.6  
1.....2..3.4..56...4.....4..5.7.6..7.3...685..7.8...96..9.5.6..3...11.611.211.2  
8.....9.2.1...7...8...3...4.6.....5.....8..9...2..7.1..3...8...6...4..2.9.....5 22 tax m\_d\_metcalf

### Re: The hardest sudokus (new thread)

📅 by mith • Wed Mar 24, 2021 7:54 pm

jco's list includes morphs of all but the first from that list. The other 11.8 is:

CODE: SELECT ALL

1.....6.5.7...8...3...4.....5.8.9.....3.....8.92...6.....3...7...5.2...4.....1;11.89;11.89;3.46;col;H3;24;21;

champagne, is your code for checking for SK loops, MSLs, and Exocets available somewhere?

QUOTE

mith

Posts: 862

Joined: 14 July 2020

### Re: The hardest sudokus (new thread)

📅 by mith • Thu Mar 25, 2021 3:41 am

champagne, here's my update:

[puzzles-mith-20210324](#)

This is a total of 103234 puzzles with ER>=10.2 (of these, 23386 are 11+). Highest ER for each clue count in this set:

CODE: SELECT ALL

19c - 10.5 (1)  
28c - 11.1 (8)  
21c - 11.8 (1)  
22c - 11.7 (2)  
23c - 11.7 (1)  
24c - 11.7 (1)

I think I've posted all of the SE 11.6+ puzzles in this thread previously, but in case I missed any here they are again:

CODE: SELECT ALL

.....9.....8..7..6.5.....4..3..5..2...1...76..71..5.2..2...1...98...3;11.8;1.2;1.2  
.....1.....2.3...4.5.6...7.6.8...6.....9238.....857...5.8.4..1...98...3;11.7;11.7;10.5  
.....1.....2.34.4.3.5...5.1..4..6.2..7..8..9...7.2...552...8...9.6.....11.7;11.7;11.7;2.8  
.....1.....2.3...435.6...2.7..6..6.....8.56.3...43...9.58...6..48.5...11.7;1.2;1.2  
  
.....1.....23.....4.5.3...16..7...3..4...8.6.....9..97..8...2..4..5.6.....11.6;11.6;9.8  
.....1.....2.3..4.5..6..1...7..4.6.8...5.9...4..2...3...6.5...8...6.9...11.6;11.6;2.6  
.....1.....2.3...1.4.5..2..3...4..6.7..6..8...9...89.....6.5...771...5...11.6;11.6;7.8  
.....1.....2.3...4.5.6...7..2.8...1..9..8.5...467...89..3...5...6.4...11.6;11.6;3.4  
.....1.....23.4...45.16...7...8..428..4...86...5.7..3...5...9...11.6;11.6;2.6  
.....1.....2...1.345...1..462..3..7...4...1.8.5...2.6.9...1...653...11.6;11.6;2.6  
.....1.....1.23...24.5...26.7...8..5...9...8...7..6.3.4.3...168...8...11.6;11.6;2.6  
.....1.....2.....34...5..67.3...8..2...37..6..12...7...45.7...8..9...9...8...11.6;11.6;2.6  
.....1.....2.....3.4..5...6.5...54.7...6.3...7...6.7.84.8...99.4.3..6...11.6;1.2;1.2  
.....1.....2..3...4..5.26...7..42...8...787.5...4...5..9.56...2...6..4...11.6;1.2;1.2  
.....1.....2..3...4..5.26...5..7.56...2...6..4...8.42.4..9...858..5...11.6;1.2;1.2  
.....1.....23...45...2..26...7...67.54.8..29...7.5...2...6.46...7...11.6;1.2;1.2  
.....1.....1.23...45...2..26...7...7.56...2...6..4...7...11.6;1.2;1.2  
.....1.....2.....3.4..56...4...4...5.7.6..7.3...586..7.8...96..9...5...11.6;1.2;1.2  
.....1.....2.....3.4.56...38.27...6.5...8..3.65...5.48..38.69..5.54...6...11.6;1.2;1.2  
.....1.....1.2..3.4.56...27..6.5...8..3.65...5.48..38.69..5.54...6...11.6;1.2;1.2  
.....1.....2.3...4.516...1.....1.754..89..2...26...6..4...7.5..7...62...11.6;1.2;1.2

### Re: The hardest sudokus (new thread)

📅 by champagne • Thu Mar 25, 2021 4:10 am

🗨️ mith wrote:

champagne, is your code for checking for SK loops, MSLs, and Exocets available somewhere?

Yes and no; an old version of such tasks are included in the package [skmpg2](#) in a github repository

Unhappily, I had to reduce temporarily but drastically the time dedicated to sudoku since last spring. I postponed all the work on my new solver at this moment keeping only a small activity in the ongoing 17 clues search.

The search is good IMO for SK loops, exocets, classical multi floors patterns, but relatively basic for MSLs.

The tasks included are typically analyzing files published out of the data base.

I can tell you more (may be pm) if you want.

QUOTE

champagne

2017 Supporter

Posts: 7269

Joined: 02 August 2007

Location: France Brittany

As I assume that this is not a minimal puzzle, it would be interesting to have the corresponding list of minimal. Do you have it? They normally all have a SE ER 11.1 (can be more but nor less)

POSTREPLY

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