

## The hardest sudokus (new thread)

POSTREPLY

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

by mith » Sun Mar 13, 2022 2:57 pm

Denis, the original discussion for this took place on discord, with a follow-up by rangsk (David Clamage) as part of our youtube discussion series here: <https://youtu.be/V7RC1hJ8vZ8>

I am working on more formal write-ups for this, my hard-puzzle search, and some other topics (such as the minimal anti-knight search), will link as I have drafts available.

QUOTE

**mith**  
Posts: 862  
Joined: 14 July 2020

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

by denis\_berthier » Mon Mar 14, 2022 6:28 am

mith wrote:

Denis, the original discussion for this took place on discord, with a follow-up by rangsk (David Clamage) as part of our youtube discussion series here: <https://youtu.be/V7RC1hJ8vZ8>  
I am working on more formal write-ups for this, my hard-puzzle search, and some other topics (such as the minimal anti-knight search), will link as I have drafts available.

QUOTE

**denis\_berthier**  
2010 Supporter  
Posts: 3334  
Joined: 19 June 2007  
Location: Paris

Hi mith  
Thanks for the reference. I watched the 1st 5 mins yesterday evening, but it's so slow and boring that I literally fell asleep on it.  
I'm surprised that he chose such a trivial example: a puzzle with SER = 7.3, solvable in BC3.

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

by denis\_berthier » Mon Mar 14, 2022 9:25 am

eleven wrote:

CODE: SELECT ALL

```

+---+---+---+
| . | . | . |
| . | X | . |
| . | . | . |
+---+---+---+
| . | . | . |
| . | X | . |
| . | . | . |
+---+---+---+
| . | . | . |
| . | . | . |
| . | . | . |
+---+---+---+
```

For this pattern I showed [here](#), that the 3 digits only are not possible.  
This means, that if a puzzle has a solution, at least one other digit in these cells must be true (= the 3 digits must be false in at least one of the cells), wherever one is possible in a given candidates grid.

But this pattern covers only 1 case in 3.  
As I proved here: <http://forum.enjoysudoku.com/the-tridagon-rule-139859.html>, the pattern in the 4th block may be any of the following and they are not equivalent:

CODE: SELECT ALL

```

+---+---+---+
| . | . | . |
| . | . | . |
| . | . | . |
+---+---+---+
| . | . | . |
| . | . | . |
| . | . | . |
+---+---+---+
```

```

+---+---+---+
| . | . | . |
| . | . | . |
| . | . | . |
+---+---+---+
| . | . | . |
| . | . | . |
| . | . | . |
+---+---+---+
```

```

+---+---+---+
| . | . | . |
| . | . | . |
| . | . | . |
+---+---+---+
| . | . | . |
| . | . | . |
| . | . | . |
+---+---+---+
```

I also proved that the other 3 cases allow no conclusion.

Coding the rule in CSP-Rules based on my definition was straightforward (it took me 2 hrs). I haven't tried to do it based on your rectangles, so I can't say which is simpler to code.

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

by 999\_Springs » Mon Mar 14, 2022 1:14 pm

denis\_berthier wrote:

the pattern in the 4th block may be any of the following and they are not equivalent:

the 3 patterns are isomorphic.

starting from this:

CODE: SELECT ALL

```

+---+---+---+
| X | . | X |
| . | X | . |
| . | . | X |
+---+---+---+
| . | . | X |
| . | X | . |
| . | . | . |
+---+---+---+
| X | . | X |
| . | X | . |
| . | . | X |
+---+---+---+
```

swap c1 with c2, swap r1 with r2, swap c4 with c5, swap r4 with r5, get this:

CODE: SELECT ALL

```

+---+---+---+
| X | . | X |
| . | . | X |
| . | X | . |
+---+---+---+
| . | . | X |
| . | X | . |
| . | . | . |
+---+---+---+
| X | . | X |
| . | X | . |
| . | . | X |
+---+---+---+
```

also from the same starting point, swap c2 with c3, swap r2 with r3, swap c5 with c6, swap r5 with r6, get this:

CODE: SELECT ALL

```

+---+---+---+
| X | . | X |
| . | . | X |
| . | X | . |
+---+---+---+
| . | . | X |
| . | X | . |
| . | . | . |
+---+---+---+
| X | . | X |
| . | X | . |
| . | . | X |
+---+---+---+
```

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

by denis\_berthier » Mon Mar 14, 2022 2:09 pm

999\_Springs wrote:

denis\_berthier wrote:

the pattern in the 4th block may be any of the following and they are not equivalent:

the 3 patterns are isomorphic.

starting from this:

CODE: SELECT ALL

```

+---+---+---+
| X | . | X |
| . | . | X |
| . | X | . |
+---+---+---+
| . | . | X |
| . | X | . |
| . | . | . |
+---+---+---+
| X | . | X |
| . | X | . |
| . | . | X |
+---+---+---+
```

swap c1 with c2, swap r1 with r2, swap c4 with c5, swap r4 with r5, get this:

CODE: SELECT ALL

```

+---+---+---+
| X | . | X |
| . | . | X |
| . | X | . |
+---+---+---+
| . | . | X |
| . | X | . |
| . | . | . |
+---+---+---+
| X | . | X |
| . | X | . |
| . | . | X |
+---+---+---+
```

I didn't write the patterns are not isomorphic. I wrote they are not equivalent. You should read the whole conditions for being equivalent. Cell r1c1, the target cell, is fixed.

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

by coloin » Mon Mar 14, 2022 7:18 pm

On page 55 of this thread

There are 6 ways to fill in the 4th box (B5)

3 ways are possible to use the 3 clues

3 ways it is not possible to use all 3 clues the diagonal pattern is equivalent ... but not in the context of the other 3 boxes (B1B2B4)

The 3 ways that are impossible would have the hammer pattern with the handle ( albeit offset in 2 of the 3 cases)

QUOTE

**coloin**  
Posts: 2225  
Joined: 05 May 2005  
Location: Devon

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

by mith » Mon Mar 14, 2022 9:09 pm

CODE: SELECT ALL

```

.....1.....2.....3..45...1.23.....2671.8...73.6.81...8.....2.3.86...761...7.... ED=11.9/1.2/1.2
.....1.....2.....3..45..6.....71.8...32..67..8.6..23.....837...1..7.281.6... ED=11.9/1.2/1.2
.....1.....2.....3..45..6.....1.257...267.18...5.68.1...87.....5.2.68...761...7.... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....78.6...8.53...3.72.6...72.....65...78...8.3.257.6... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....1.25...267.18...75.68.1...8.....5.2.68...761...7.... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....71.8...81..8...25..67..8.7..25.....856...1..6.28.17... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....1.256...56.1...627.18...8...257...7.....52...68...76.1...7.... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....1.243.6.4.31..2.....6.....4.....5.7.8...5.... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....1.256.7.3678...5.2..8..675...2.8.37...5.3.62... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....2.356.7.3678.2...5.2..8...675...28...7...5.3.62... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....6.78.5...823...37.6.5...67.....5.2...78...83...67.5... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....2.56.7.3678...5.2..8.3.675...228.37...5.3.62... ED=11.8/1.2/1.2
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.....1.....2.....3..45..6.....2.56.7.3678.2...5.2..8.3.675...28.37...5.3.62... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....1.25...267.18...75.68.1...87.....5.2.67...861... ED=11.8/1.2/1.2
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.....1.....2.....3..45..6.....1.243.6.4.31..2.....6.....4.....5.7.8...5.... ED=11.8/1.2/1.2
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.....1.....2.....3..45..6.....2.356.7.3678...5.2..8...675...25.2...78...83...67.5... ED=11.8/1.2/1.2
.....1.....2.....3..45..6.....1.256...56.1...627.18...8...257...7.....52...68...76.1...7.... ED=11.8/1.2/1.2
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