Last update May 4, 2022

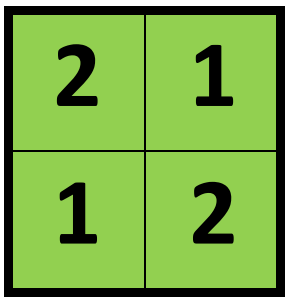
PROBLEM SNAKE NUMBERS IN SQUARES:

Which are the longest snakes that can be placed on each NxN board?

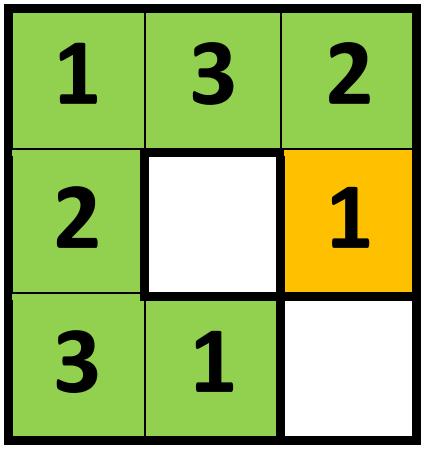
https://oeis.org/A353259

1x1 = 1 by R.K.

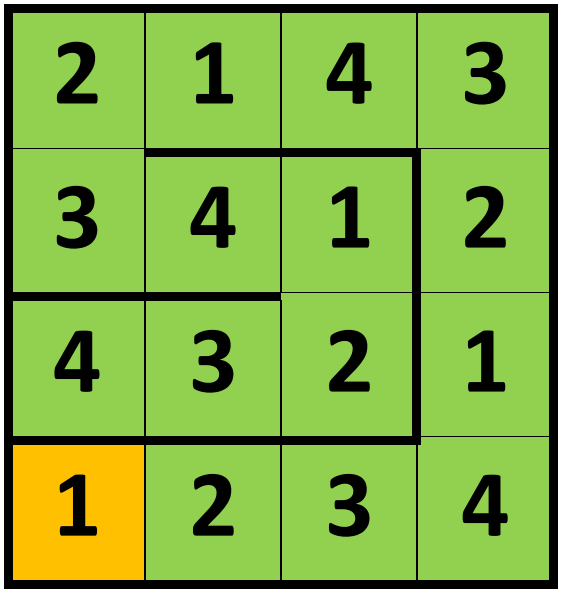
2x2 = 4 by R.K.



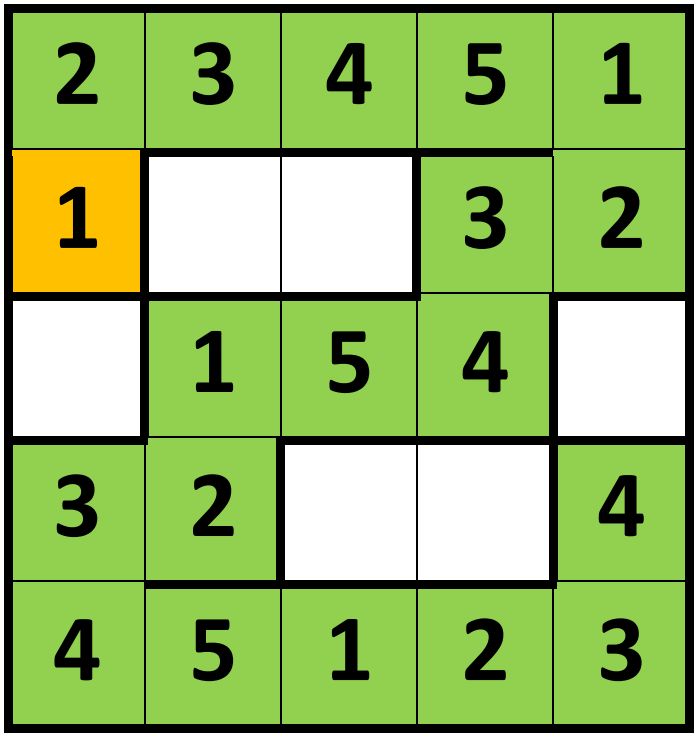
3x3 = 7 by R.K.



4x4 = 16 by R.K.



5x5 = 19 by Giorgio Vechhi



6x6 = 36 by R.K.

4	3	2	1	6	5
5	6	1	2	3	4
2	1	6	5	4	3
3	4	5	6	1	2
6	5	4	3	2	1
1	2	3	4	5	6

7x7 = 39 by Giorgio Vechhi

1	2			5	4	3
	3		7	6	1	2
5	4	2	1		7	6
6	7	3	4	1	2	5
2	1		6	7	3	4
3	6	7	5	4		
4	5	1	2	3		

8x8 = 64 by R.K.

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

9x9 = 67 by Giorgio Vechhi

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

10x10 = 100 by R.K.

8	7	6	5	4	3	2	1	10	9
9	10	1	2	3	4	5	6	7	8
6	5	4	3	2	1	10	9	8	7
7	8	9	10	1	2	3	4	5	6
4	3	2	1	10	9	8	7	6	5
5	6	7	8	9	10	1	2	3	4
2	1	10	9	8	7	6	5	4	3
3	4	5	6	7	8	9	10	1	2
10	9	8	7	6	5	4	3	2	1
1	2	3	4	5	6	7	8	9	10

<u>This patron works for N = even</u>

Is this a new method to cover even Latin Squares?

It is best solution for N = odd (n-1)^2 +3

PROBLEM SNAKE NUMBERS WITH KNIGHTS MOVES IN SQUARES:

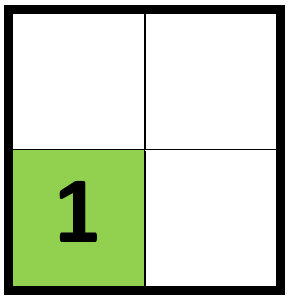
https://oeis.org/A353060

As problem 1 but with knights moves.

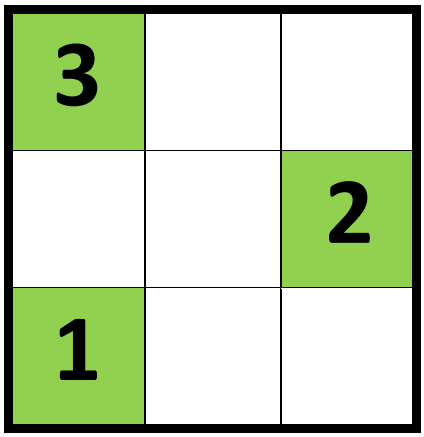
Which are the longest snakes that can be placed on each NxN board?

1x1 = 1 by R.K.

2x2 = 1 by R.K.



3x3 = 3 by R.K.



4x4 = 13 by R.K.

	12	21	
14	23	02	11
31	04	13	22
	01	24	03

5x5 = 15 by R.K

	04	12		
			05	13
03	11	14	22	25
15	23		01	
	02	21	24	

6x6 = 36 by Giorgio Vecchi

01	22	55	06	03	44
16	11	02	43	54	05
23	56	21	04	45	42
12	15	34	51	26	53
35	24	13	32	41	46
14	33	36	25	52	31

7x7 = 39 by Giorgio Vecchi

01	33	05		54		12
06	47	02	34	11		53
32	04	07	51		13	36
44		46	03	35	52	17
25	31	43	22	16	37	14
	45	24	27	42	21	
	26			23	15	41

8x8 = 64 by Giorgio Vecchi

01	36	47	44	03	28	75	72
48	45	02	37	76	73	04	31
35	38	43	46	27	32	71	74
42	51	24	33	68	77	26	05
23	34	41	52	25	06	67	78
56	53	18	15	64	61	12	07
17	22	55	58	11	14	63	66
54	57	16	21	62	65	08	13

PROBLEM SNAKE IN INFINITE FIELD:

https://oeis.org/A353176

We start with an infinite snake, and 4 possible directions: up, right, down, left.

If on its turn the snake cannot execute an order because that square is occupied, it goes to the next order, and so on.

How many instructions and in what order must be given so that the snake cannot move as soon as possible?

Example:

4 instructions

1) DOWN, 2) LEFT, 3) UP, 4) RIGHT

			32	33			
		30	31	34	35		
	28	29	8	9	36	37	
26	27	6	7	10	11	38	39
25	24	5	4	1	12	13	40
	23	22	3	2	15	14	
		21	20	17	16		
			19	18			

With the number 40 a nice rhombus is formed, but in this case it gives the feeling that it never gets stuck.

Which are all the finite cases with 5 instructions?

There are 5 cases:

5 instructions = 19

1) UP, 2) UP, 3) RIGHT, 4) DOWN, 5) LEFT

17	18	3	4	
16	19	2	5	6
15	14	1	8	7
	13	10	9	
	12	11		

5 instructions = 21

1) UP, 2) RIGHT, 3) DOWN, 4) LEFT, 5) LEFT

	19	20			
17	18	21	2	3	
16	15	14	1	4	5
	12	13	8	7	6
	11	10	9		

5 instructions = 24

1) UP, 2) RIGHT, 3) RIGHT, 4) DOWN, 5) LEFT

		20	21	22
17	18	19	24	23
16	15	2	3	4
13	14	1	6	5
12	11	8	7	
	10	9		

5 instructions = 26 by Giorgio Vecchi

1) UP, 2) RIGHT, 3) DOWN, 4) LEFT, 5) UP

		21	22	
16	17	20	23	24
15	18	19	26	25
14	13	2	3	
	12	1	4	5
	11	10	7	6
		9	8	

5 instructions = 30

1) UP, 2) RIGHT, 3) DOWN, 4) DOWN, 5) LEFT

		20	21		
	18	19	22	23	
16	17	2	3	24	
15	14	1	4	25	26
12	13	6	5	30	27
11	10	7		29	28
	9	8			

From 6 instructions on, there's always at least one sequence that ends up in the block of 8 as you have shown.

5: Total: 5, max: 30, longest URDDL

6: Total: 21, max: 79 longest UURDLL

7: Total: 127, max: 152, longest URULLDD

8: Total: 618, max: 450, longest URURUULD

9: Total: 2934, max: 241, longest URRRRDLRR

10: Total: 13542, max: 257, longest URRLDLRRUR

11: Total: 61803, max: 1098, longest URUURUUULLD

12: Total: 276650, max: 1448, longest URUULLDUDDDD

13: Total: 1219508, max: 9520, longest URRRLLDLRRULL

14: Total: 5309179, max: 8804, longest URRURRRLDLRULL

15: Solutions = 22868295 max: 8338 UDDRULUUUULLULD

16: solutions = 97663066 max: 11348 URRURRRLDDLRUULL

17: solutions = 414156142 max: 25316 URRRDLULUUUUULURL

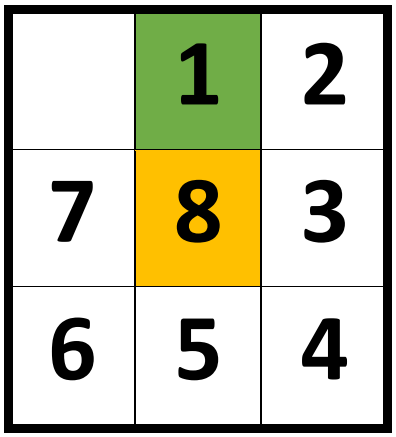
18: solutions = 1746438478 max: 18823 UDDDRULULLULLUULDU

Interesting to note that some cases with smaller instructions have longest sequence than others with more instructions.

6 instructions = 21 cases (8, 10, 14, 15, 15, 16, 20, 22, 23, 25, 25, 30, 31, 34, 34, 35, 35, 36, 36, 47, 79)

6 instructions minimum = 8

1) RIGHT, 2) DOWN, 3) DOWN, 4) LEFT, 5) LEFT 6) UP




```
URRDDL: 8
02 03 04
01 08 05
-- 07 06
```

```
URRRDL: 10
02 03 04 05
01 10 07 06
-- 09 08 -
```

URULLD: 14

-- -- 06 05 04

09 08 07 02 03

10 11 14 01 --

-- 12 13 -- --

URDDLL: 15

-- 13 14 -- --

11 12 15 02 03

10 09 08 01 04

-- -- 07 06 05

URDLLU: 15

-- -- 02 03 --

13 14 01 04 05

12 15 08 07 06

11 10 09 -- --

URDDLU: 16

14 15 02 03

13 16 01 04

12 11 06 05

-- 10 07 --

-- 09 08 --

UURDUL: 20

18 19 -- -- --

17 20 03 04 --

16 15 02 05 06

-- 14 01 08 07

-- 13 10 09 --

-- 12 11 -- --

UURDDL: 22

-- -- 03 04 --

20 21 02 05 --

19 22 01 06 07

18 17 12 11 08

-- 16 13 10 09

-- 15 14 -- --

URRDLL: 23

-- -- -- -- 19 20 21

-- -- 16 17 18 23 22

13 14 15 02 03 04 --

12 11 10 01 06 05 --

-- -- 09 08 07 -- --

UURRDL: = 25

23 24 03 04 05 --

22 25 02 07 06 --

21 20 01 08 09 10

-- 19 16 15 12 11

-- 18 17 14 13 -

URRDLR: 25

-- -- -- 21 22 23

17 18 19 20 25 24

16 15 02 03 04 --

13 14 01 06 05 --

12 11 08 07 -- --

-- 10 09 -- -- --

URLDLU: 30

```
-- -- -- 25 26 --
-- 20 21 24 27 28
-- 19 22 23 30 29
17 18 -- 02 03 --
16 13 12 01 04 05
15 14 11 08 07 06
-- -- 10 09 -- --
```

UURLDL: 31

```
-- 26 27 -- -- --
-- 25 28 29 -- --
23 24 31 30 -- --
22 19 18 03 04 --
21 20 17 02 05 06
-- 15 16 01 08 07
-- 14 11 10 09 --
-- 13 12 -- -- --
```

URRDLU: 34

```
-- -- 19 20 21 -- -- --
-- -- 18 23 22 -- -- --
15 16 17 24 25 26 -- --
14 -- 02 03 04 27 28 29
13 12 01 06 05 34 31 30
-- 11 08 07 -- 33 32 --
-- 10 09 -- -- -- -- --
```

URDULU: 34

```
-- -- -- 25 26 --
17 18 -- 24 27 28
16 19 20 23 30 29
15 14 21 22 31 32
-- 13 02 03 34 33
-- 12 01 04 05 --
-- 11 10 07 06 --
-- -- 09 08 -- --
```

URDDLR: 35

```
-- -- -- 21 22 -- --
-- 18 19 20 23 26 27
16 17 02 03 24 25 28
15 14 01 04 35 30 29
12 13 06 05 34 31 --
11 10 07 -- 33 32 --
-- 09 08 -- -- -- --
```

UDRDDL: 35

```
-- -- 24 25 -- --
-- 22 23 26 27 --
20 21  2  3 28 --
19 18  1  4 29 --
16 17  6  5 30 31
15 14  7  8 35 32
-- 13 12  9 34 33
-- -- 11 10 -- --
```

URRDUL: 36

```
-- -- -- 26 27 28 -- --
18 19 20 25 24 29 30 31
17 16 21 22 23 36 33 32
14 15 02 03 04 35 34 --
13 12 01 06 05 -- -- --
-- 11 08 07 -- -- -- --
-- 10 09 -- -- -- -- --
```

URLDLL: 36

```
-- 23 24 27 28 31 32 --
21 22 25 26 29 30 33 34
20 19 18 17 02 03 36 35
-- -- 15 16 01 04 05 --
-- 13 14 09 08 07 06 --
-- 12 11 10 -- -- -- --
```

UDRDLL: 47

```
-- 20 21 24 25 -- -- --
18 19 22 23 26 27 -- --
17 16 15  2  3 28 -- --
-- 13 14  1  4 29 30 --
-- 12 11 10  5  6 31 --
-- -- --  9  8  7 32 33
-- -- 45 46 47 36 35 34
-- -- 44 43 42 37 38 --
-- -- -- -- 41 40 39 --
```

UURDLL: 79

```
-- -- -- -- -- -- -- 74 75 -- --
-- -- -- -- -- 69 70 73 76 77 --
-- -- -- 64 65 68 71 72 79 78 --
-- -- -- 63 66 67 -- 27 28 -- --
-- -- 61 62 -- 22 23 26 29 30 --
56 57 60 17 18 21 24 25 32 31 --
55 58 59 16 19 20 03 04 33 34 --
54 53 52 15 14 13 02 05 06 35 36
-- -- 51 -- -- 12 01 08 07 38 37
-- -- 50 49 48 11 10 09 40 39 --
-- -- -- -- 47 -- 43 42 41 -- --
-- -- -- -- 46 45 44 -- -- -- --
```

2 SNAKES

We have 2 snakes with same instruction that born in the same square.

Example

4 INSTRUCTIONS

URDL: 32

```
---  30  31 --- --- ---
 25  26  32   7   8 ---
 24  20   2   3   9  13
 17  18   1   4  15  14
 16  12   6   5  19  21
---  11  10  29  23  22
--- --- ---  28  27 ---
```

1)Both snakes start in square 1.

2)First snake go U = 2, second snake can´t go Up.

3) First snake goes R = 3.

4) Second snake goes R = 4.

5) First snake cannot go D, so second snake D = 5.

6) First snake cannot go L, so second snake goes L = 6

7) First snake can go U = 7, and second cannot go U.

8) First snake can go R = 8, second snake cannot go R.

9) First snake can go D = 9, second snake can go D = 10.

10) First snake cannot go L, second snake can go L = 11.

11) First snake cannot go U, second snake can go U = 12.

12) First snake can go R = 13, second snake cannot go R.

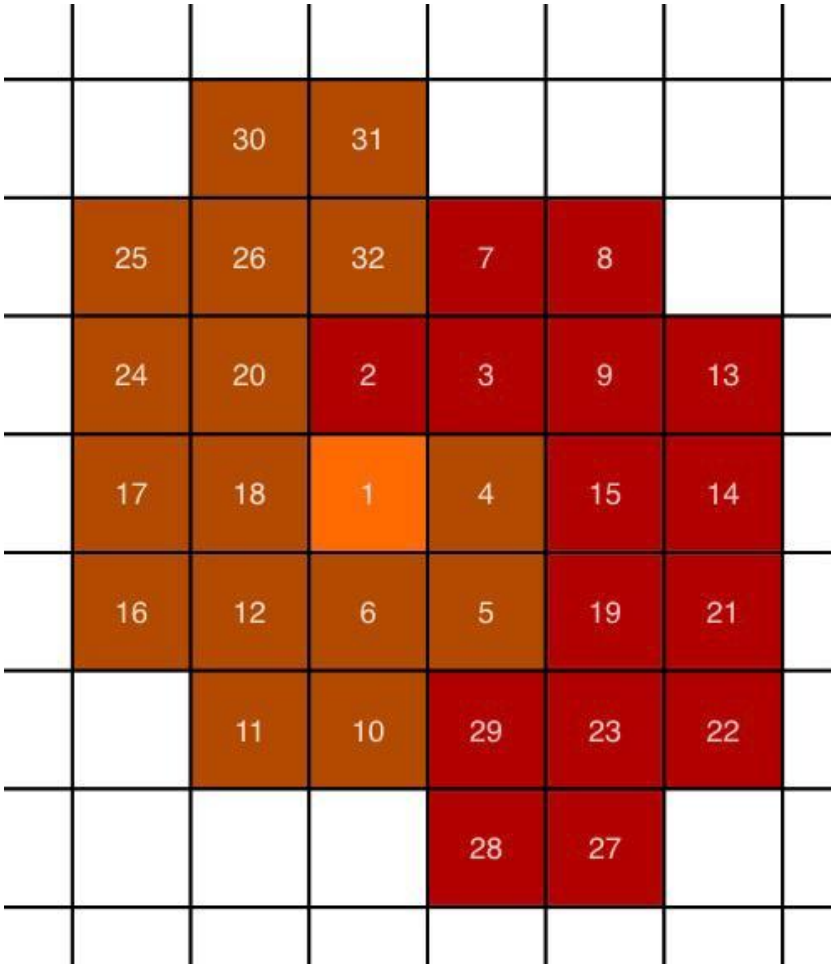
13) First snake can go D = 14, second snake cannot go D.

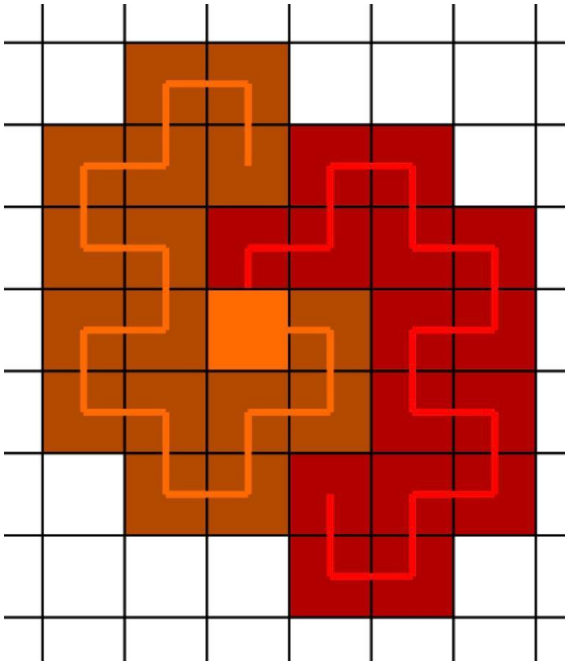
14) First snake can go L = 15, second snake can go L = 16.

And so on

4: max: URDL: 32

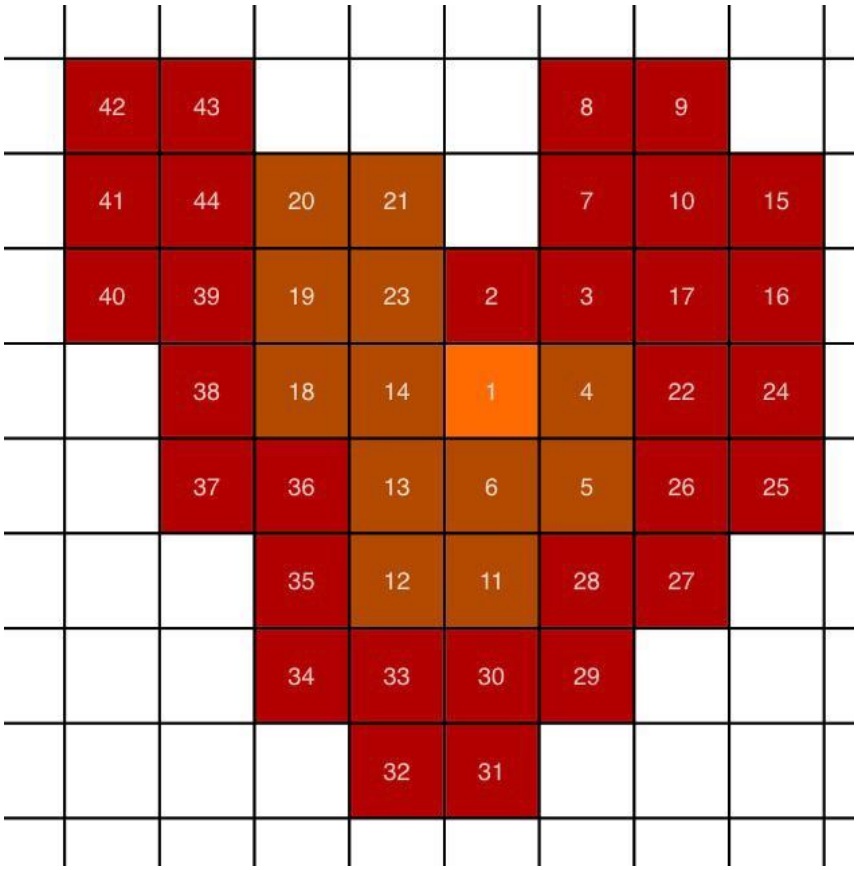
http://snake.puzzlefun.online/?q=URDL%200

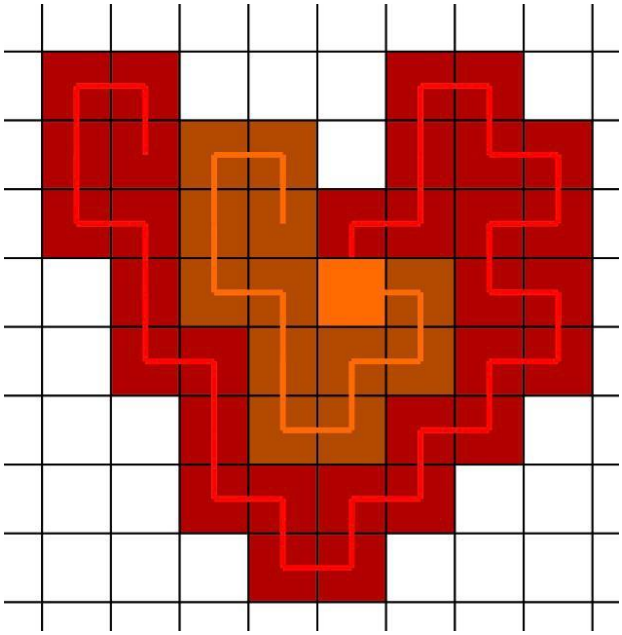




5: max: URDLU: 44

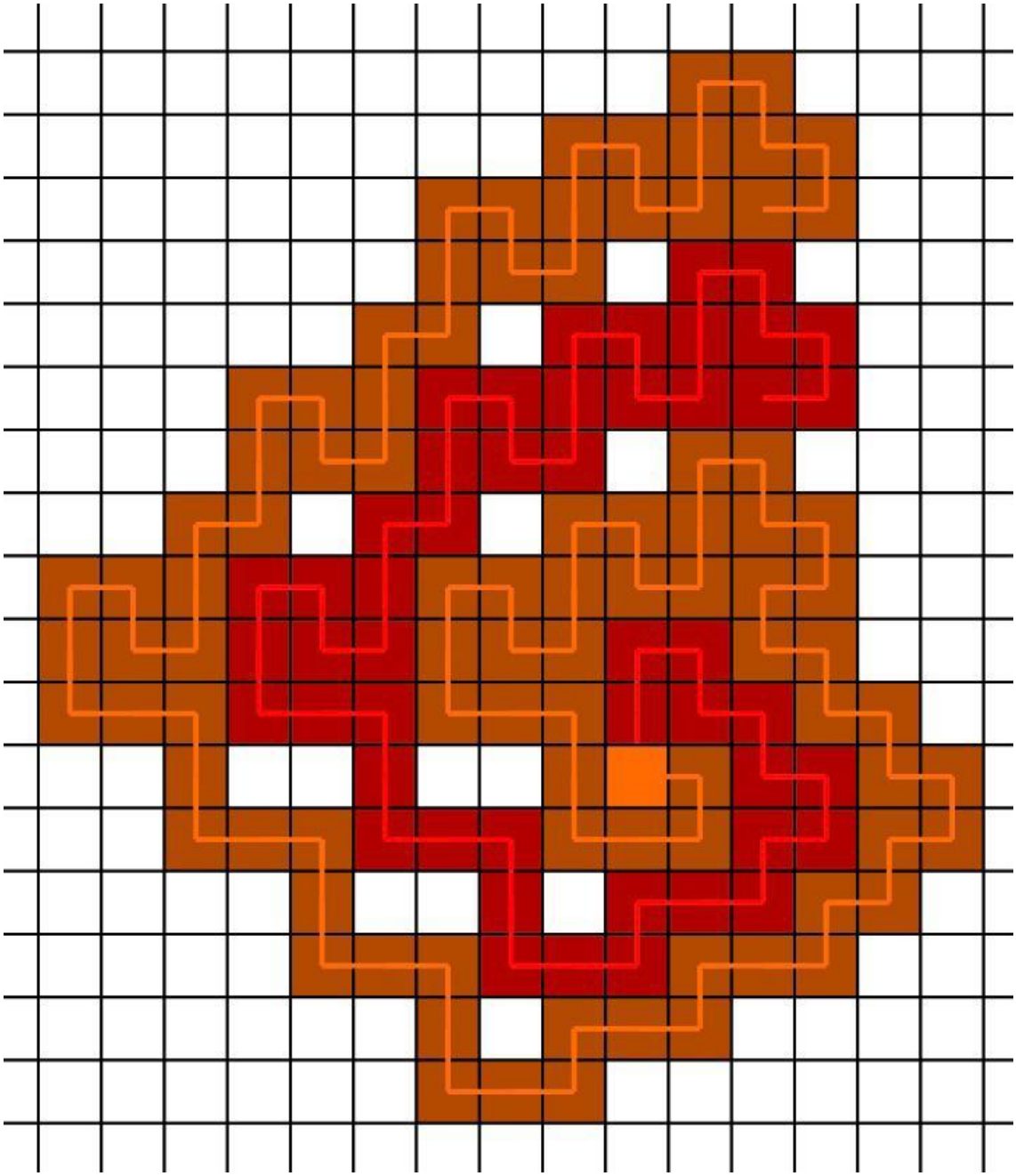
http://snake.puzzlefun.online/?q=URDLU%200





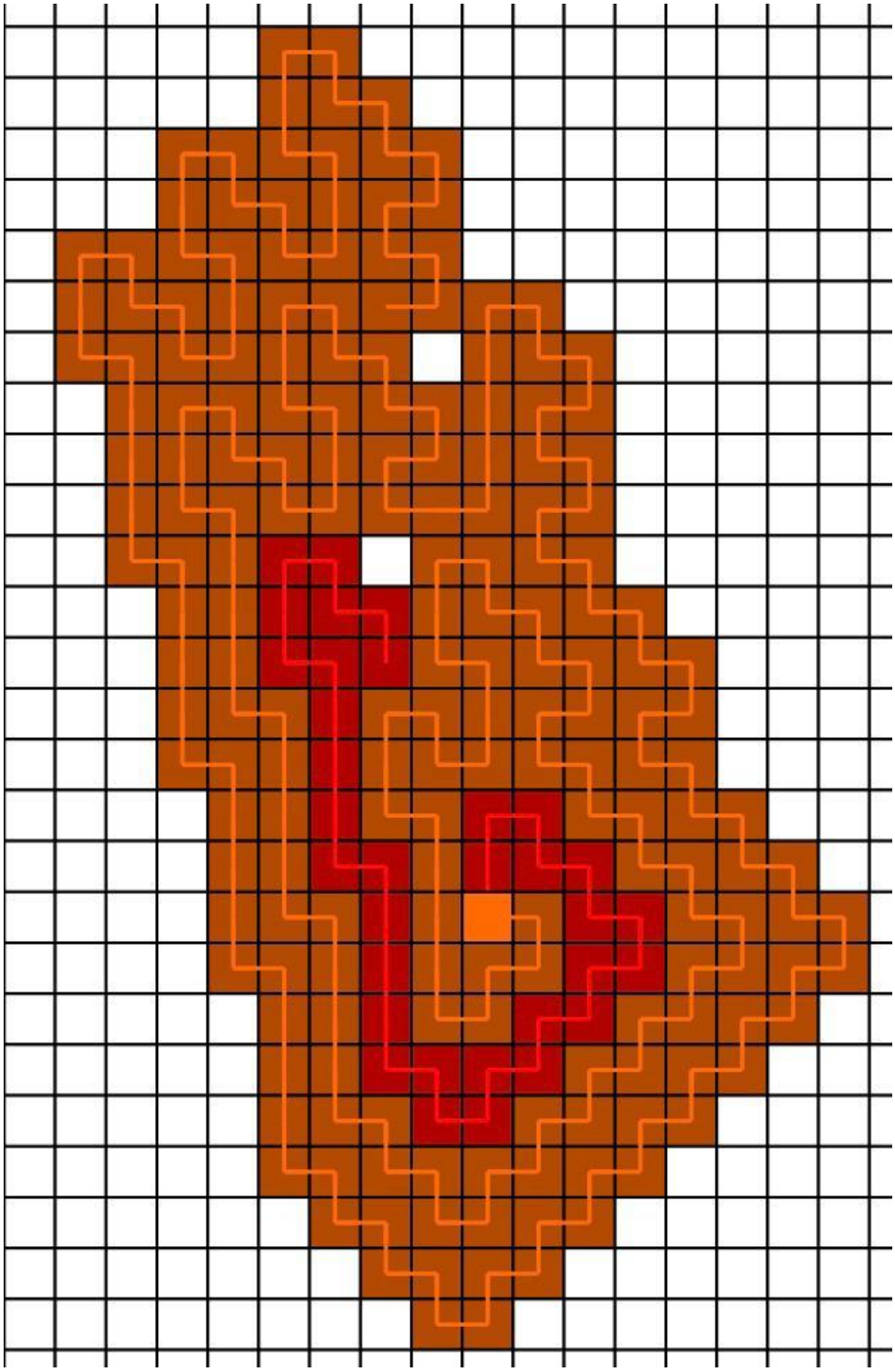
6: max: UURDLL: 138

http://snake.puzzlefun.online/?q=UURDLL%200



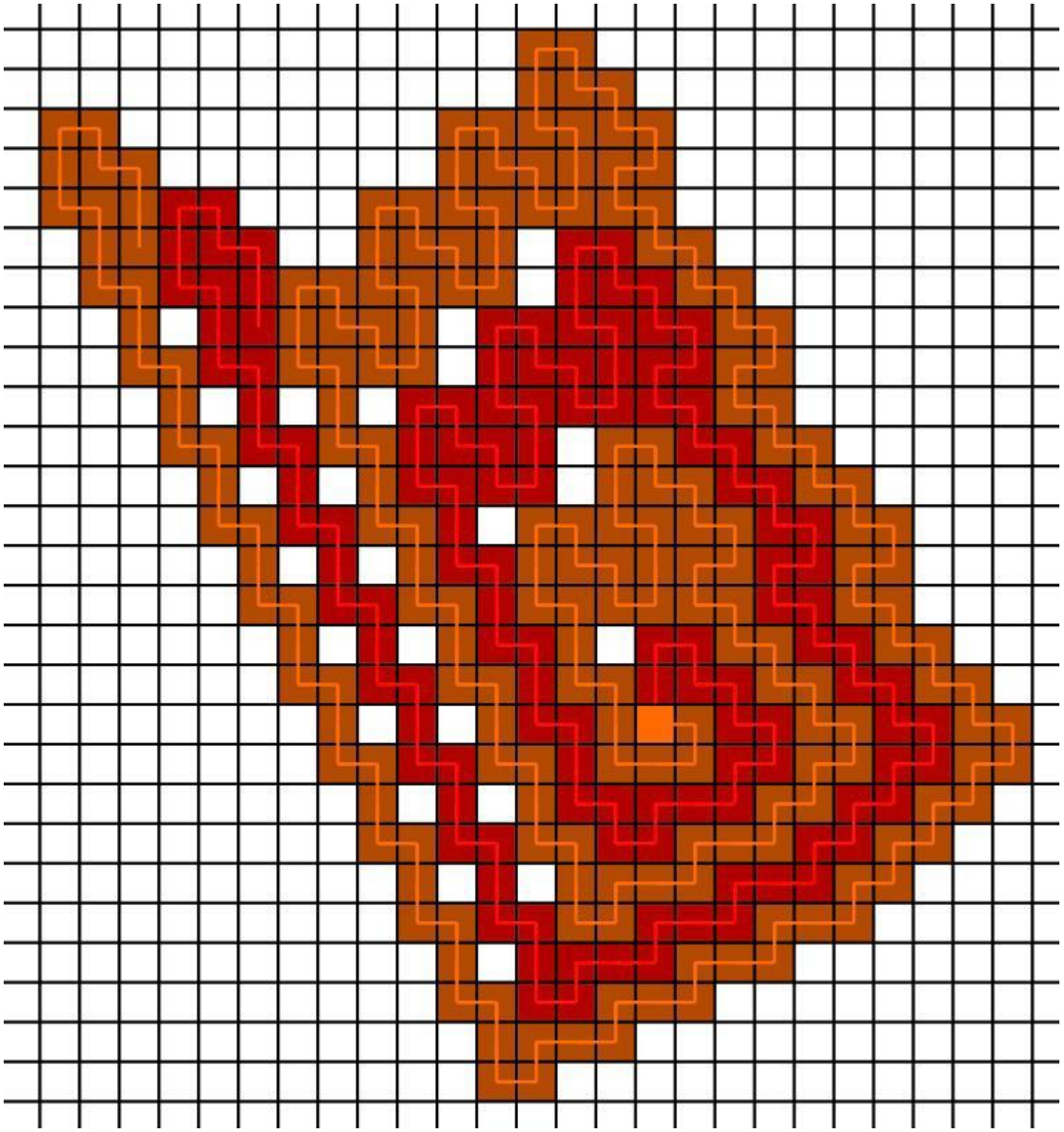
7: max: UURDUUL: 226

http://snake.puzzlefun.online/?q=UURDUUL%200



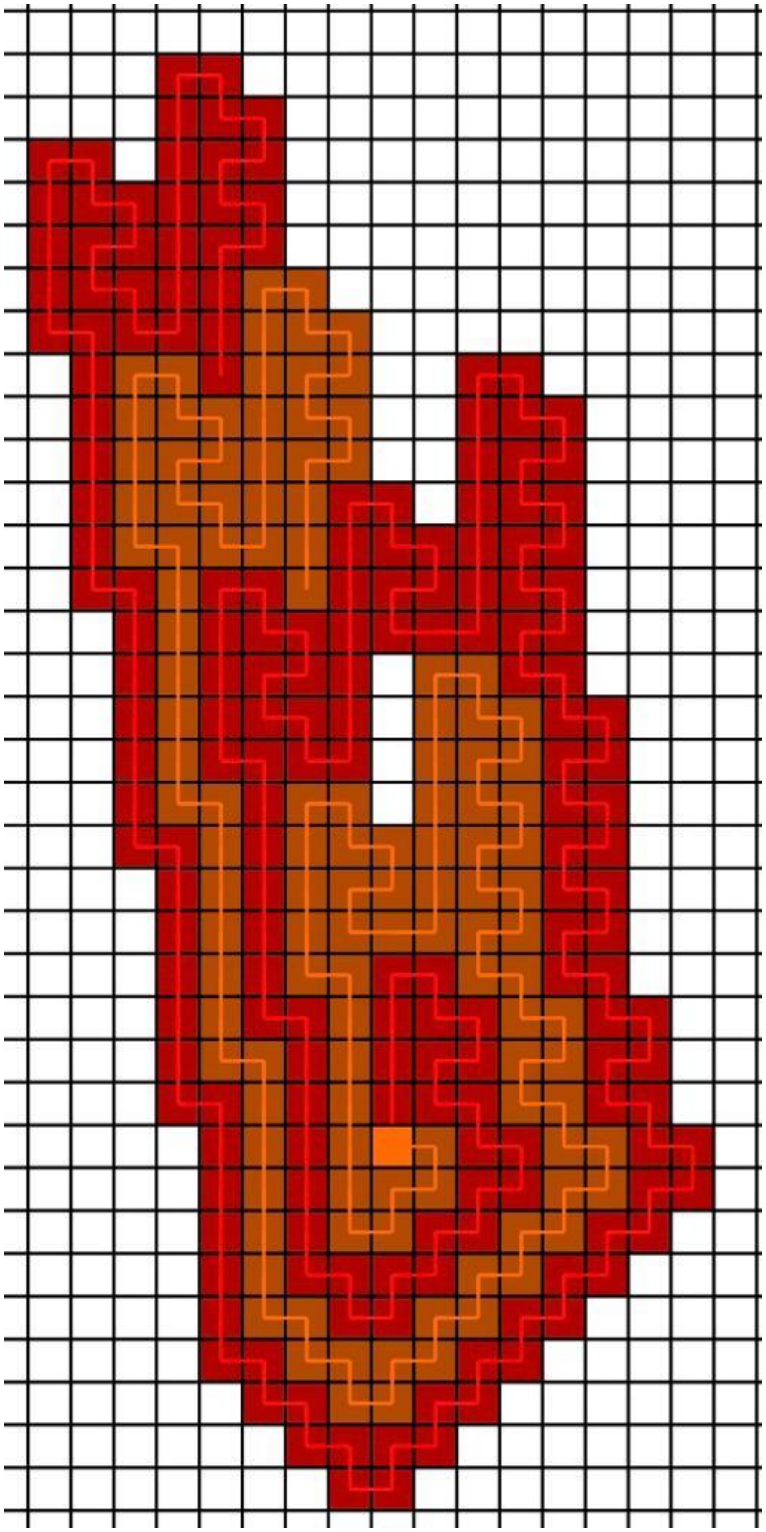
8: max: UURDLUUL: 326

http://snake.puzzlefun.online/?q=UURDLUUL%200



9: max: UUUURDUUL: 310

http://snake.puzzlefun.online/?q=UUUURDUUL%200



10: max: URUDLLDURR: 409

http://snake.puzzlefun.online/?q=URUDLLDURR%200

11: max: UDDRDDRDUDL: 1138

http://snake.puzzlefun.online/?q=UDDRDDRDUDL%200