APRIL CONTEST

by Riad Khanmagomedov

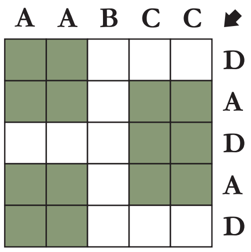
Submissions should be sent with answer page at LMI not later than 24-00 (of Moscow time) April 13 2013

Thanks to Andrey Bogdanov for all-round support

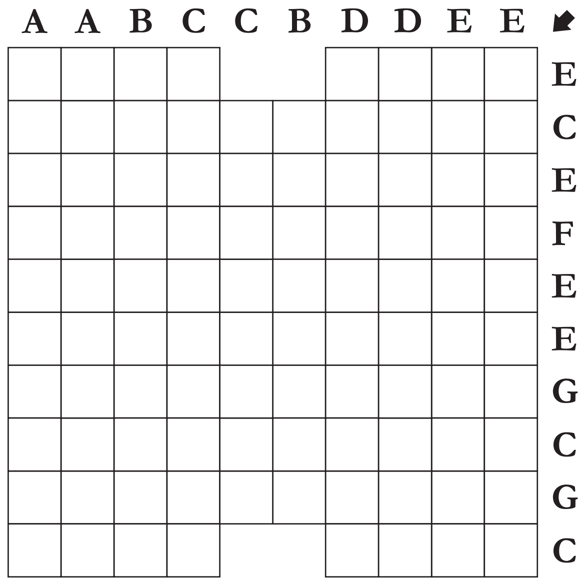
1. Heavy Sky*

Blacken some cells to form a set of clouds. Each cloud is a rectangle (or a square) which has both size greater than 1. Numbers outside, which show the number of cells occupied by clouds in the corresponding row or column , are replaced by letters. Different letters mean different numbers. The given equation must be correct.

Example:



C x F = E + G



Answer format: Write the content of marked diagonal from top right corner to bottom left. Use "X" for dark cells and "-" for white. For the given example the answer would be: -X-XX.

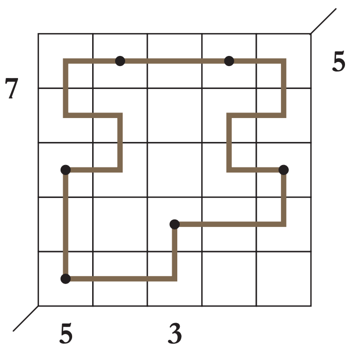
Score: 6 points.

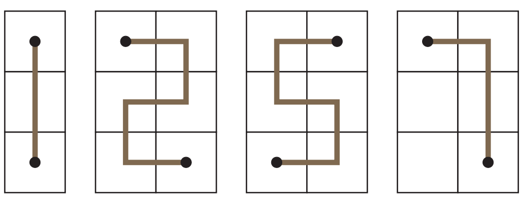
* Devoted to a friend - guitarist of "Alien garden" band

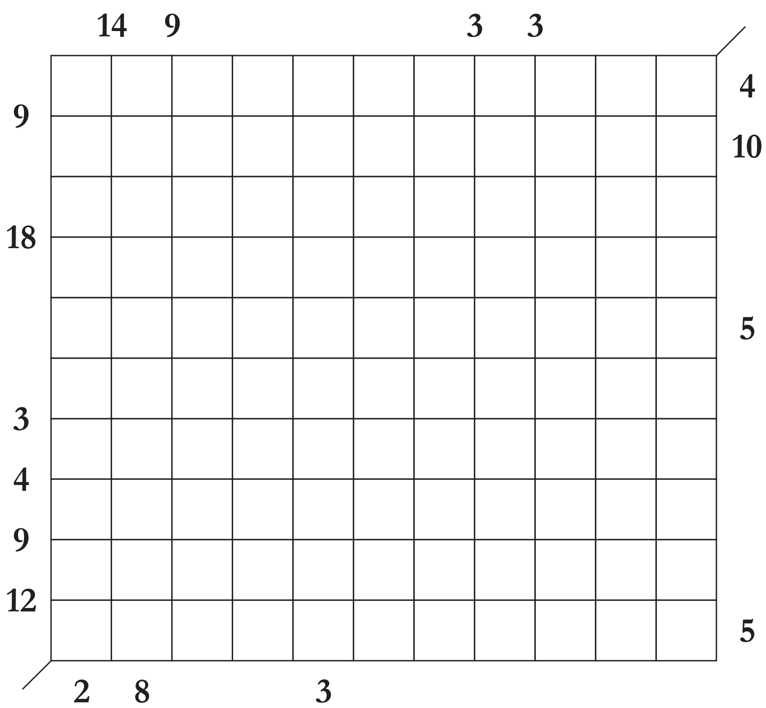
2. Digital Ornament

Place digits 1, 2, 5, 7 of the given shape into the grid. The digits should be connected at dotted ends and form a single closed loop going through centers of cells. Digits could be rotated but not reflected. Numbers in the bottom and at the right show the number of cells occupied by the loop in the corresponding direction, number on the top and at the left - a sum of digits in the corresponding direction.

Example:







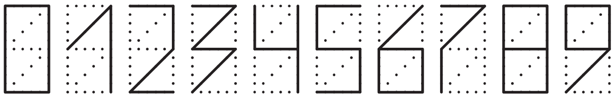
Answer format: Write all digits along the loop going clockwise and starting with the leftmost digit in the top row . For the given example the answer would be: 512771.

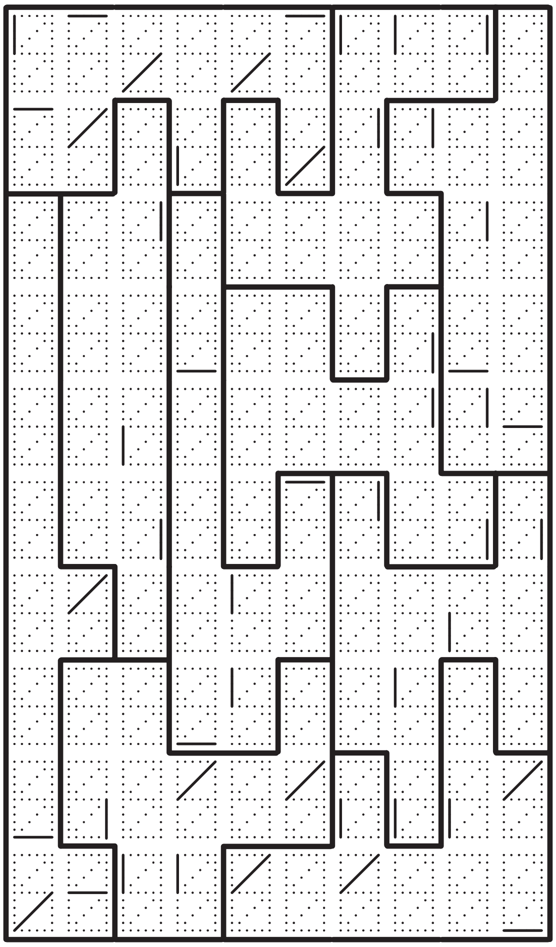
Score: 8 points.

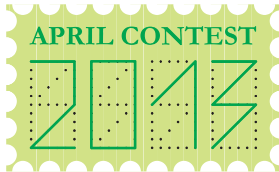
3. Sudoku at Envelope

Put digits 0-9 of the given shape (which is used for writing of zip code on Russian envelopes) into the grid. Each row, column and outlined area should contain each digit exactly once.

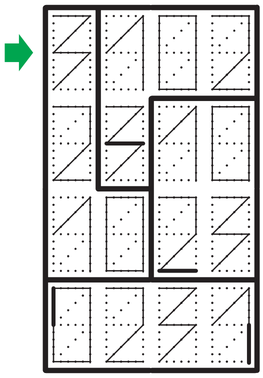
Внимание! Образец для написания цифр индекса:







Example:



Answer format: Write the content of marked row from left to right. For the given example the answer would be: 3102.

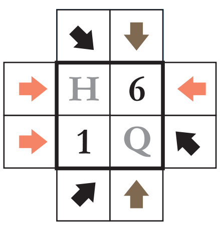
Score: 8 points.

4. Lettered Arrows

Replace letters A-W with digits and solve standard "Arrow s" puzzle. Value of letters cannot decrease, i.e. A<=B<=C<=D...<=W.

Rules for "Arrows" puzzle: Draw an arrow (horizontal, vertical or diagonal) into each empty cell. Each arrow points inside the square. Each digit inside the grid shows the number of arrows pointing to this digit.

Example:



H = 2

Q = 4

Answer format: Write the values of H and Q, then numbers of horizontal and vertical arrows. For the given example the answer would be: 2, 4, 3, 2.

Score: 7 points.

	H	0	S	C	B	
	P	F	K	G	1	
	U	T	N	M	Q	
	I	D	R	E	A	
	V	L	W	O	J	

A =	I =	Q =
B =	J =	R =
C =	K =	S =
D =	L =	T =
E =	M =	U =
F =	N =	V =
G =	O =	W =
H =	P =	

5. Borderless Minesweeper

Outline the 13 x 13 area inside the given 16 x 16 grid and solve standard "Minesweeper" puzzle inside this area.
Rules for "Minesweeper" puzzle: Place 36 mines into the grid (no more than 1 mine per cell). Mine cannot be in a cell with a digit. Each digit shows the number of mines into 8 neighboring cells.

Example
(the 3 x 3 area, 4 mines):

	●	2	
	3	●	
	2	●	●

36 mines

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

Answer format: Write the content (inside the outlined area) of marked column from top to bottom. Use "X" for cell with mine and "-" for empty cell. For the given example the answer would be: X32.
Score: 7 points.

6. Magitori

Blacken some cells in the grid. Black cells cannot share an edge. White area should be orthogonally connected. Replace the given letters with numbers from 0 to 15. Numbers in white cells cannot repeat in rows and columns and sum of this numbers should be the same for all rows and columns.

Example
with numbers from 1 to 6:

1	4	A	2	3
6	6	6	4	2
B	4	4	5	C
3	2	1	1	6
6	1	D	1	3

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

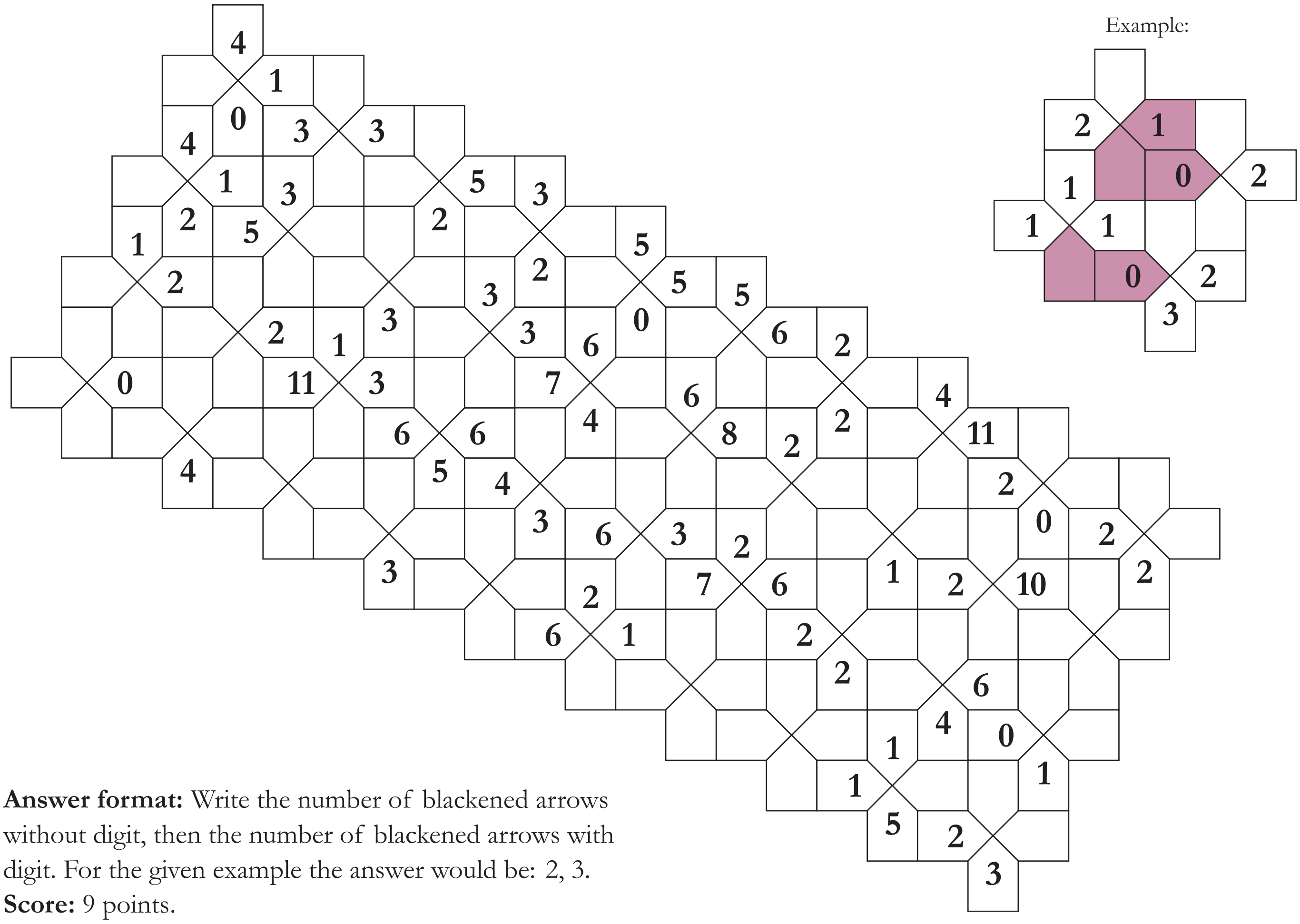
9	0	11	0	4	6	A	B	5	6
3	8	3	5	0	1	1	11	10	9
C	12	10	D	3	2	11	4	6	8
2	3	E	F	6	7	9	7	0	2
10	5	6	11	8	7	G	1	8	0
1	10	3	H	4	I	12	J	K	11
8	10	L	10	4	M	N	5	3	4
6	9	15	2	15	14	O	P	8	Q
9	1	9	5	2	8	3	R	7	3
7	0	1	3	S	9	T	13	2	U

A =
B =
C =
D =
E =
F =
G =
H =
I =
J =
K =
L =
M =
N =
O =
P =
Q =
R =
S =
T =
U =

Answer format: Write the values of all letters in alphabetic order. For the given example the answer would be: 5, 2, 1, 2.
Score: 7 points.

7. Visibility

Blacken some arrows. Each arrow with number shows the number of blackened arrows in their direction.

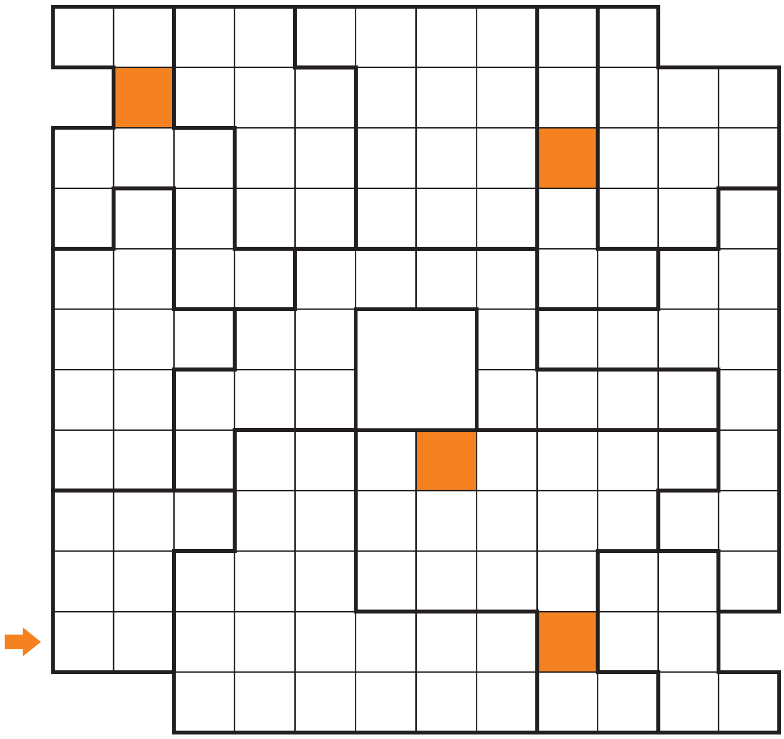


Example:

Answer format: Write the number of blackened arrows without digit, then the number of blackened arrows with digit. For the given example the answer would be: 2, 3.
Score: 9 points.

8. Star belt

Put 24 stars into the grid: each row, column and outlined area should contain exactly 2 stars. Stars cannot touch each other even diagonally. Draw a belt (a chain of cells which cannot touch itself) of length 66. There should be exactly 12 stars inside this belt - one star of each outlined area. Four cells belonging to the belt are shown.

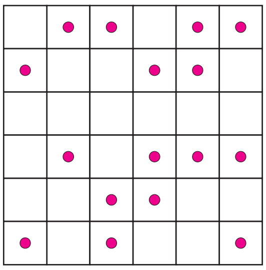


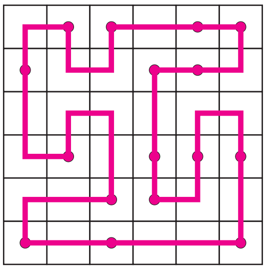
Answer format: Write the content of marked row from left to right. Use "S" for cell with star, "L" for cell of belt and "-" for empty cell.
Score: 8 points.

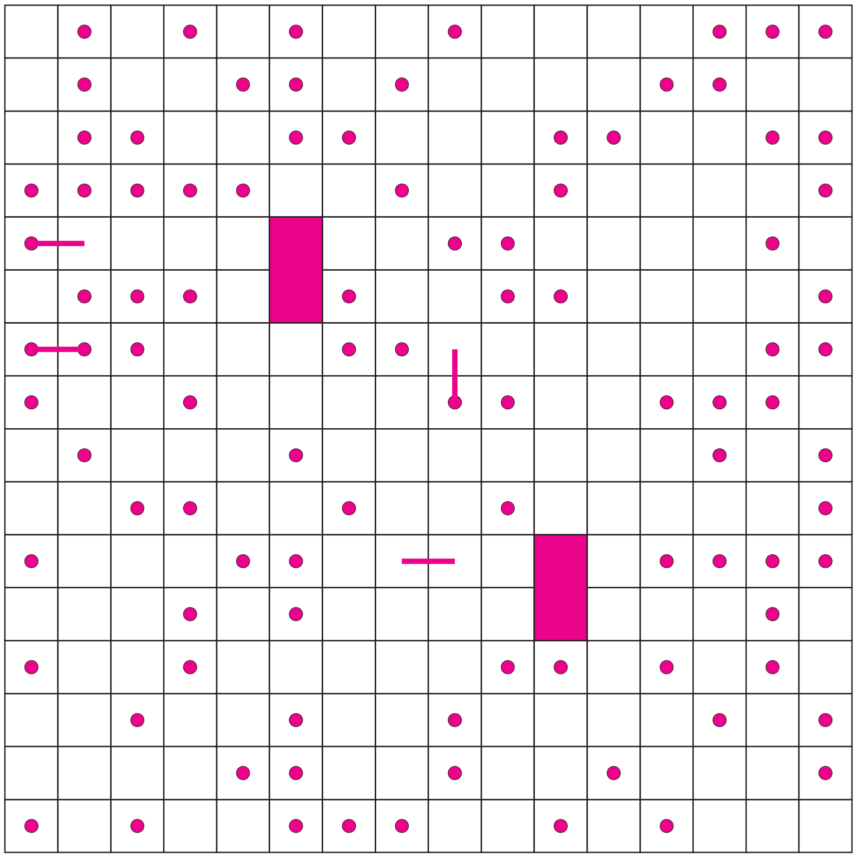
9. Dotted loop

Draw a single closed loop through all cells of the grid. Loop consists of horizontal and vertical lines. Given dots divide the loop into segments. Lengths of two neighboring segments must be differ by exactly 1. Four part of loop are shown.

Example:





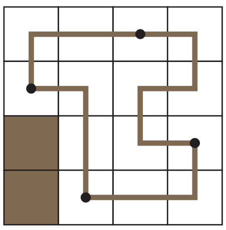


Answer format: Write the number of turns of the loop. For the given example the answer would be: 20.
Score: 9 points.

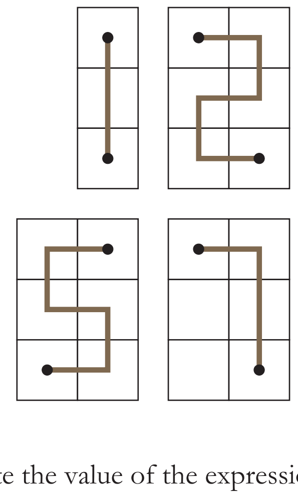
10. Optimal Digital Ornament

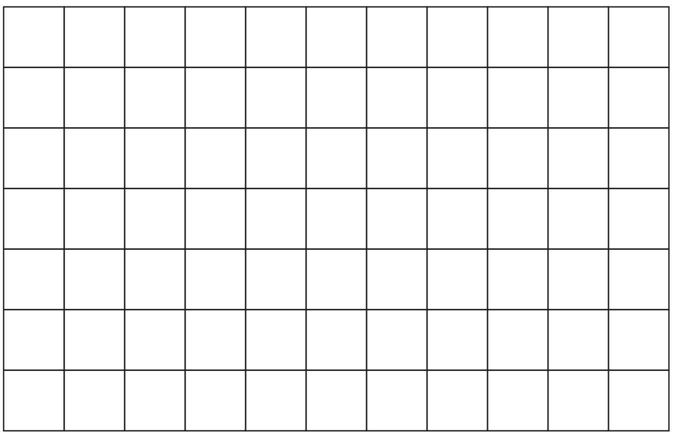
Place digits 1, 2, 5, 7 of the given shape into the 11 x 7 grid. The digits should be connected at dotted ends and form a single closed loop going through centers of cells. Digits could be rotated but not reflected. Maximize the value S - 3*B, where S is a sum of all digits and B is the number of unused cells.

Mini-example:



S = 7 + 7+ 7+ 2
B = 2
S - 3B = 17



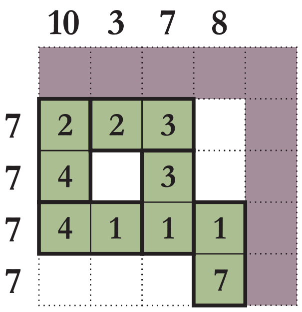


Answer format: First write the value of the expression, then content of field row by row from left to right and from top to bottom. Use digit for cell occupied by one digit, two digits in parentheses for cell with dot and "-" for empty cell. For the given example the answer would be: 17, 77(72)2, (77)722, -72(27), -(77)77.
Score: 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 points for ten best solutions.

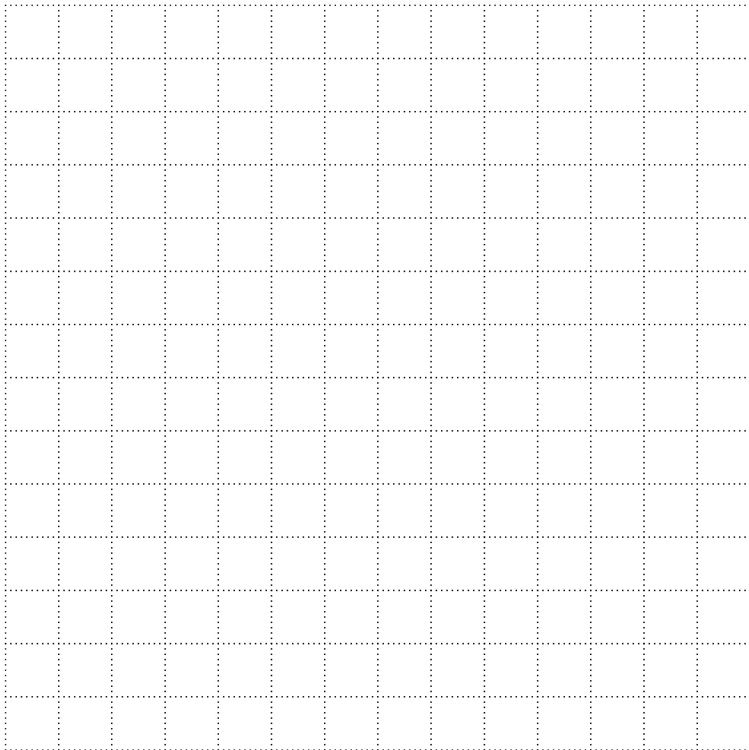
11. Domino castle

Using all dominoes (from 1-1 to 7-7 set) build a "castle" - connected figure - into the 14 x 14 grid. Two halves having the common edge should have the same value. Count the sum of values in all rows, let R is the maximum and r is the minimum. Also C is the maximum of sums for columns, c is the minimum. Minimize the value (R - r)^2 + (C - c)^2.

Mini-example
(5 x 5 grid):



R = 7,
r = 7,
C = 10,
c = 3



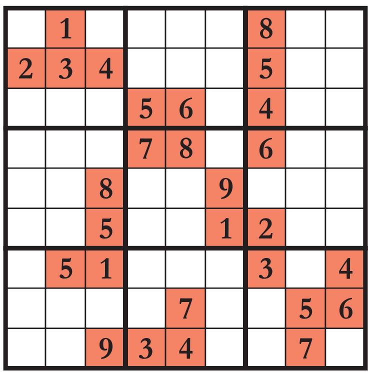
Answer format: First write the value of the expression, then content of the grid row by row from left to right and from top to bottom. Use parentheses for horizontal dominoes and "-" for empty cell. For the given example the answer would be: 49, 2(23)-, 4-3-, (41)11, ---7.

Score: 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 points for ten best solutions.

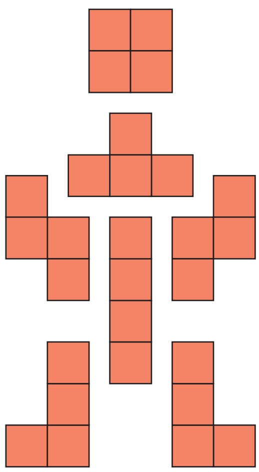
12. Tetrasudoku

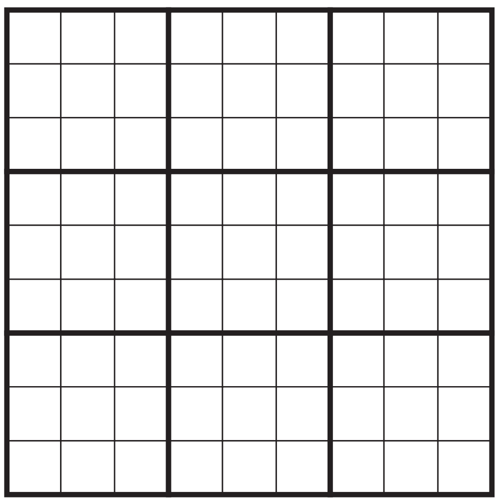
Put the given 7 elements of tetramino or some of them into the grid. You could rotate them, but cannot reflect. Elements cannot share an edge. Then write a digit (from 1 to 9) into each cell occupied by tetramino and solve standard "Sudoku" puzzle: Fill in digits 1-9 into each cells. Each row, column and outlined 3 x 3 square should have each digit exactly once. Minimize the value S + K*K, where S is a sum of digits in the tetraminoes and K is a number of different solutions for Sudoku.

Example:



S = 138, K = 12





Answer format: First write the value of the expression, then the content of the grid row by row from left to right and from top to bottom. Use digits for cells with tetramino and "-" for empty cells. For the given example the answer would be: 282, -1----8--, 234---5--, ---56-4--, ---78-6--, --8--9---, --5--12--, -51---3-4, ----7--56, --934--7-.

Score: 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 points for ten best solutions.