

## Barvni sudoku

V  $n \times n$  kvadratkov moraš vpisati začetna naravna števila od 1 do  $n$ , tako da bo v vsaki vrstici, v vsakem stolpcu in v kvadratih iste barve nastopalo vseh  $n$  števil.

	2	1	4
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## Latinski kvadrati

V  $n \times n$  kvadratkov moraš vpisati začetna naravna števila od 1 do  $n$ , tako da bo v vsaki vrstici, v vsakem stolpcu nastopalo vseh  $n$  števil.

3			
4			3
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# Sudoku s črkami

V  $n \times n$  kvadratkov moraš vpisati začetna naravna števila od 1 do  $n$ , tako da bo v vsaki vrstici, v vsakem stolpcu in v kvadratih z isto črko nastopalo vseh  $n$  števil.

B	B	B	D <sup>2</sup>
D	C <sup>2</sup>	A	A
B	D	A	D
C <sup>3</sup>	C	A	C <sup>1</sup>

B	C	C	B
C	D	A	D <sup>2</sup>
A	D <sup>3</sup>	C	B
D	B	A	A <sup>1</sup>

D	D	B <sup>4</sup>	C
A	C	B	A
D <sup>2</sup>	D	C	A
B <sup>3</sup>	A	B	C

B	D <sup>1</sup>	D <sup>2</sup>	D
C	A	A	A
B	B	D <sup>4</sup>	B
C	A	C	C

C	B	B	B
D	D	C	A <sup>3</sup>
C	A	B	A
D	C <sup>2</sup>	D	A <sup>1</sup>

C	A <sup>3</sup>	A	A
D	B <sup>2</sup>	C	B
C <sup>1</sup>	C	A	B
D	D	B	D

B	D	A	D
A	C	C	D
C <sup>2</sup>	B	D	A
B <sup>3</sup>	B	C <sup>4</sup>	A

C	D	D	B
A <sup>4</sup>	D	A	C
A <sup>1</sup>	C	C	D
A <sup>2</sup>	B	B	B

D	D	B	D <sup>4</sup>
B	A	A <sup>1</sup>	A
C <sup>3</sup>	A	C	C
B	D	C	B

A	D <sup>3</sup>	C <sup>2</sup>	A
C	A	B	D
C	C	D	B
D	B <sup>1</sup>	B	A

C	C	C	D
B <sup>1</sup>	C	D	B
D <sup>2</sup>	A	B	A
A <sup>3</sup>	D	A	B

C	D <sup>2</sup>	A <sup>3</sup>	C
A <sup>1</sup>	B	B	A
D	B	B <sup>4</sup>	A
C	D	D	C

# Futoshiki

V  $n \times n$  kvadratkov moraš vpisati zgetna naravna števila od 1 do  $n$ , tako da bo v vsaki vrstici in v vsakem stolpcu nastopalo vseh  $n$  števil ter, da bodo izpolnjene vse relacije.

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## Rdeči kvadrati

Naloga reševalca je, da poišče vse skrite rdeče kvadratke in jih označi z R. Pri tem veljata naslednji pravili: a) Vsako število v preglednici pove, koliko sosednih kvadratkov je rdečih. Kvadrateg je soseden kvadratu, če imata skupno stranico ali oglišče. b) Kvadrati s številkami niso rdeči.

	0		
	1	3	2
1			
		2	

0		0	
	2		1
		2	
	2		

1	2	2	
	1	3	

	1		
		2	1
	1		
			1

			1
	1		1
		2	
	0		

	1		
			2
2		2	
		2	0

	0		1
1		0	

			2
	2		
	1		
1	1		1

		1	
	0		
			2
	0		

1			
	2	1	
1		0	

	0	1	
	1		2
0		1	

0		0	
1			
	2	2	1



## Križne vsote

Naloga reševalca je, da izpolni bele kvadratke s števkami od 1 do 9, tako, da je vsota števk v zaporednih belih kvadratih po vrsticah in stolpcih enaka številu, ki je zapisano v rdečem kvadratu na začetku vrstice (stolpca) nad (pod) diagonalo. Pri tem pa morajo biti vse številke v posamezni vrstici (stolpcu) različne.

		4	16	
3				4
12				
		9		

		14	17	
6				8
18				
		15		

	14	9					
8						8	12
9			3		16	24	
		7		7	11		
			13				
				13			

		11	3		
3				14	
17					12
			7		
			13		

	6	13			
12			7		
12				17	
		3			14
			17		
			13		

	15	13					
7						7	8
12			9		17	4	
	12			5	17		
		10					
			12				

	13	18					
16					15	6	
12			13		17	14	
		7		4	14		
			12				
				11			

		7	12		
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			14		

		7	9		
3				18	
18					6
			14		
			5		

		14	15		
16				12	
15					14
			8		
			16		

		7	6			
3				15		
18					16	
			16			4
				5		
				6		

		4	8				
7						8	6
4				11		14	9
		4			7		
			12				
				12			

# Križni produkti

Naloga reševalca je, da izpolni bele kvadratke s števkami od 1 do 9, tako, da bo zmnožek števk v zaporednih belih kvadratih po vrsticah in stolpcih enaka številu, ki je zapisano v sivem kvadratu na začetku vrstice (stolpca) nad (pod) diagonalo. Pri tem pa morajo biti vse številke v posamezni vrstici (stolpcu) različne.

	40	24		
32				
60			54	
				15
		27		
				15

		32	44		32	840	
	24				20		18
	32				216		
		48			324		
16		72	672	84		8	
72				28			
	504			72			
	54						

	45	1080		5040	15
27				30	
20				24	
	80			16	
					63
	630				
7					
63				21	

	20	189					
35					6	27	
12			48		80		
	72			30			
		270		35			
				28			

	35	54					
63				8			
60					48		
			12				27
					18		
						24	

	6	216		72	80		
	18			45			35
	12			112			
	24	12		20		15	
12				210			
40				27			
	24			14			
	14						

		16	18	32
192				
48				

	36	56					
63				15			
96					135		
			45				21
				15			
					21		

		28	20	72
160				
252				

	12	21			
6					
378			360		
				12	
			20		
			24		

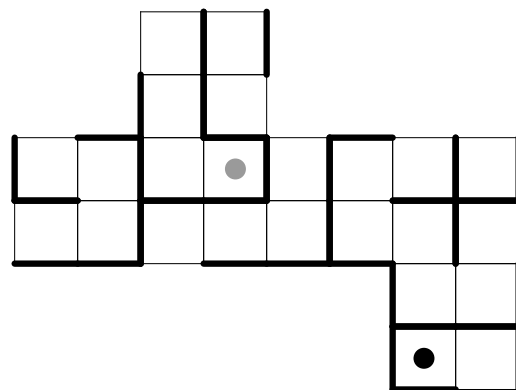
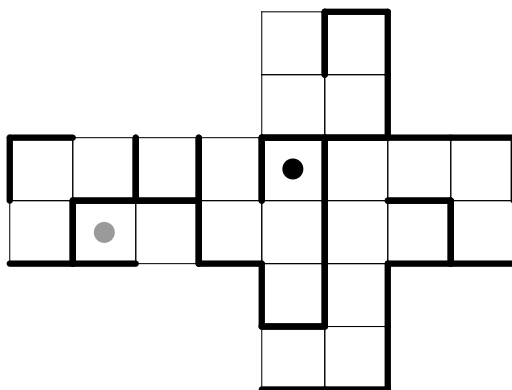
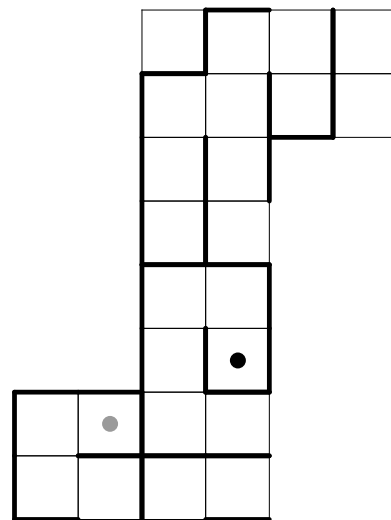
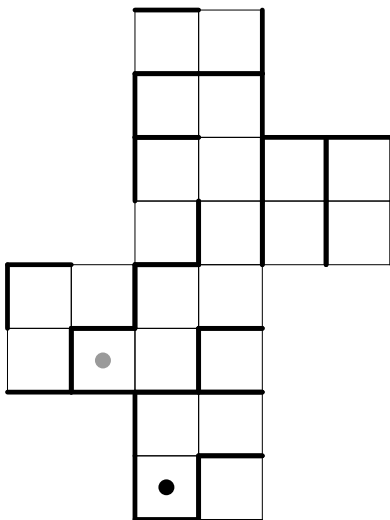
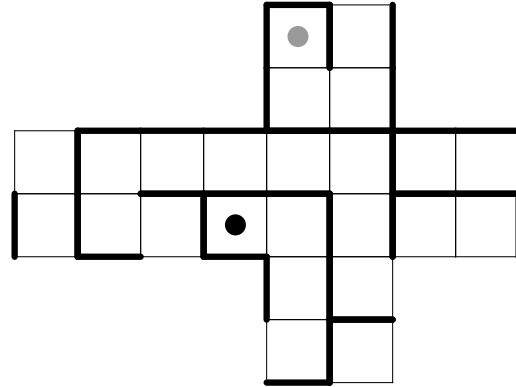
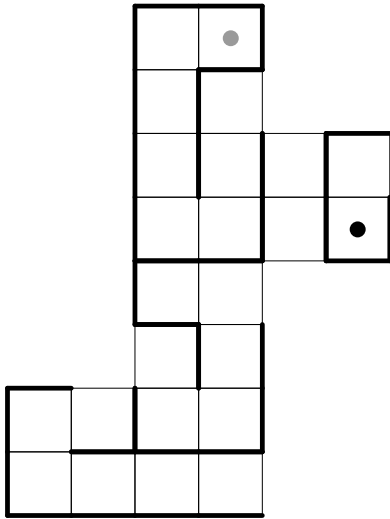
		27	8	28
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				120			
			96				
				27			



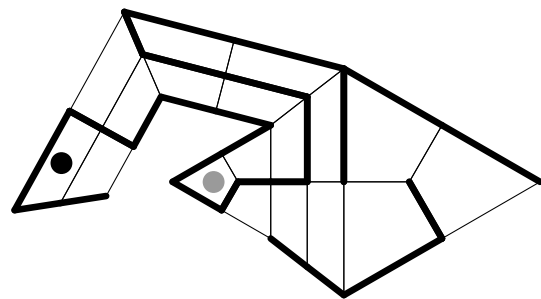
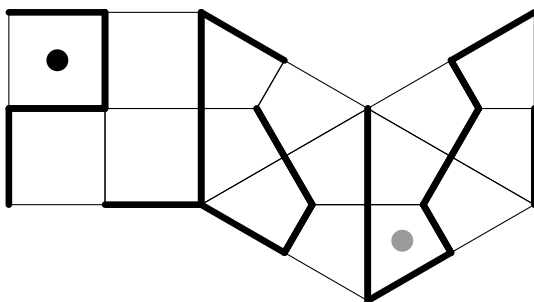
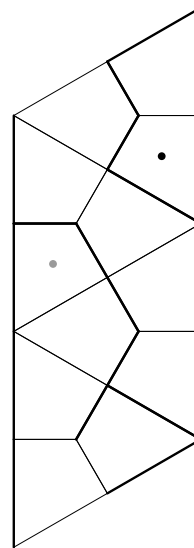
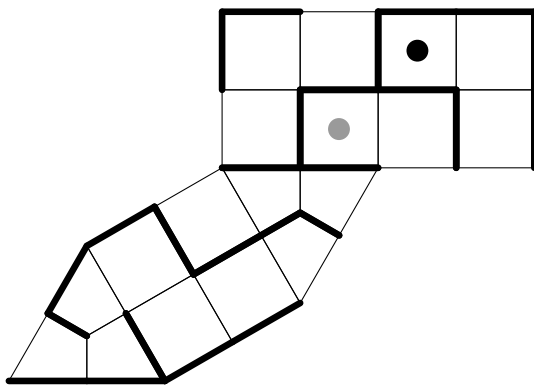
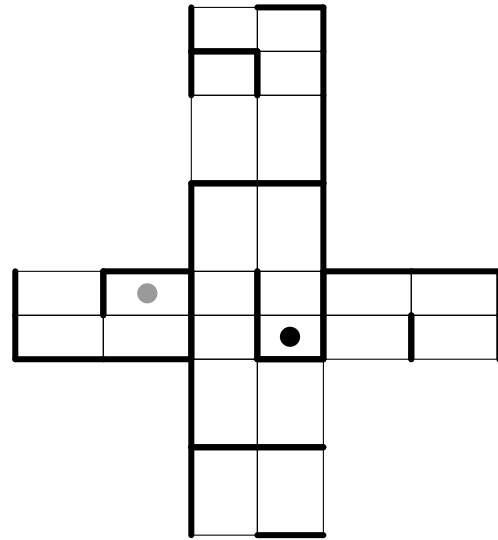
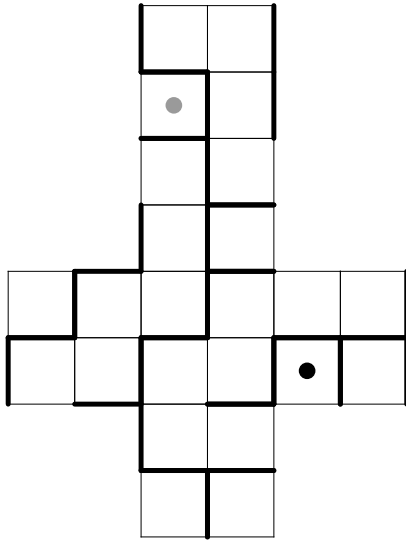
# Labirint na kocki

Poveži točki na kocki:

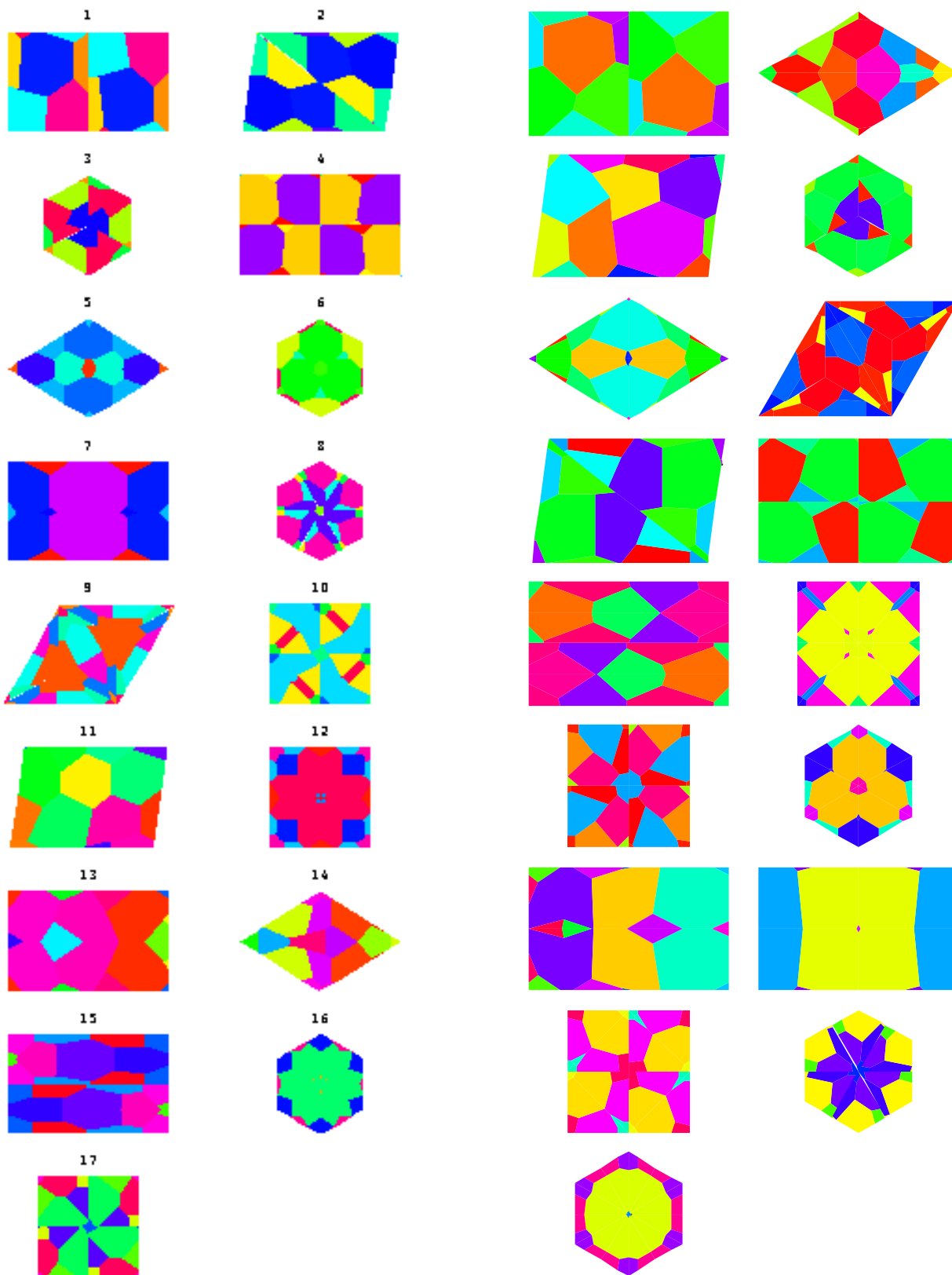


# Labirinti na enostavnih poliedrih

Poveži točki na poliedru:

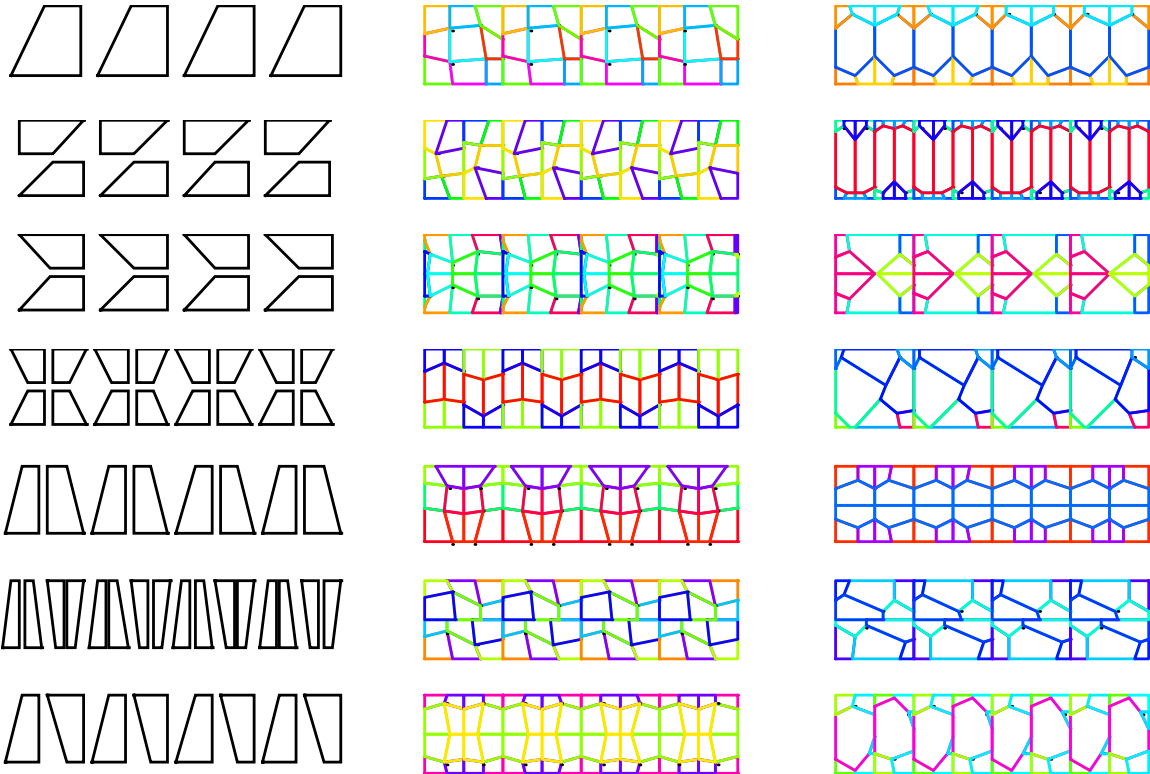


# Poveži sličici, ki pripadata isti grupi

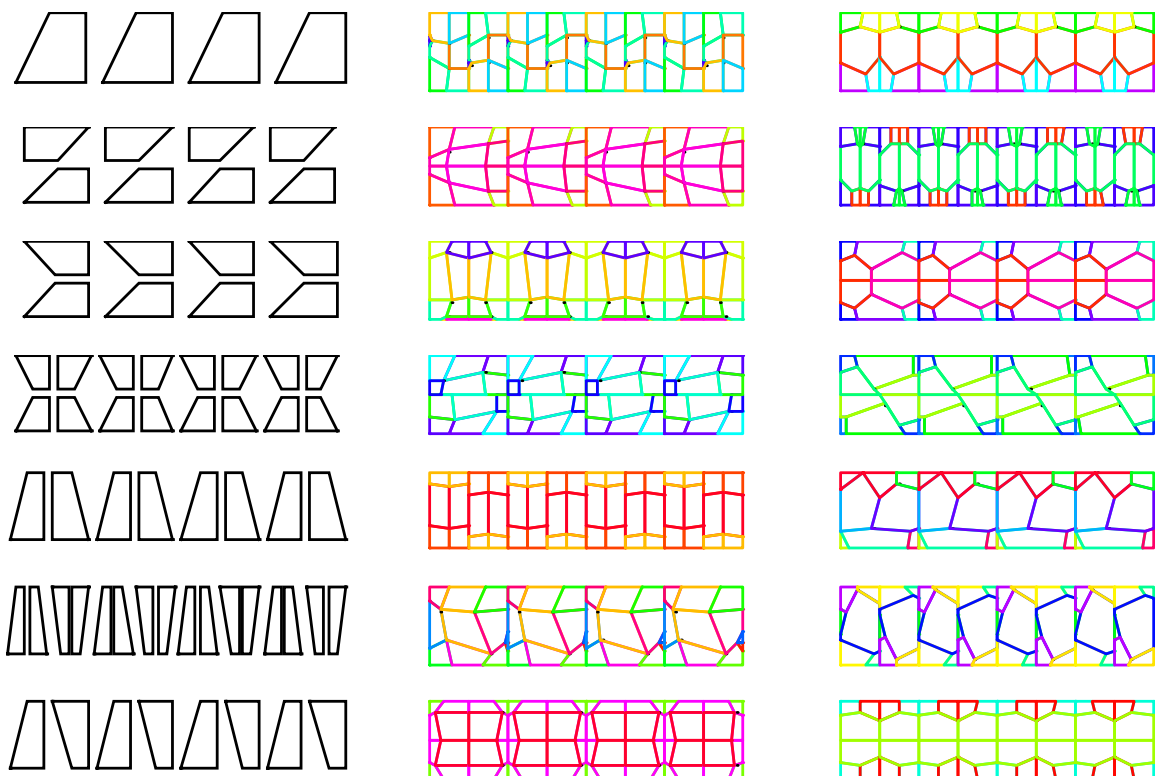


## Poveži sličici, ki pripadata isti grupi

a)

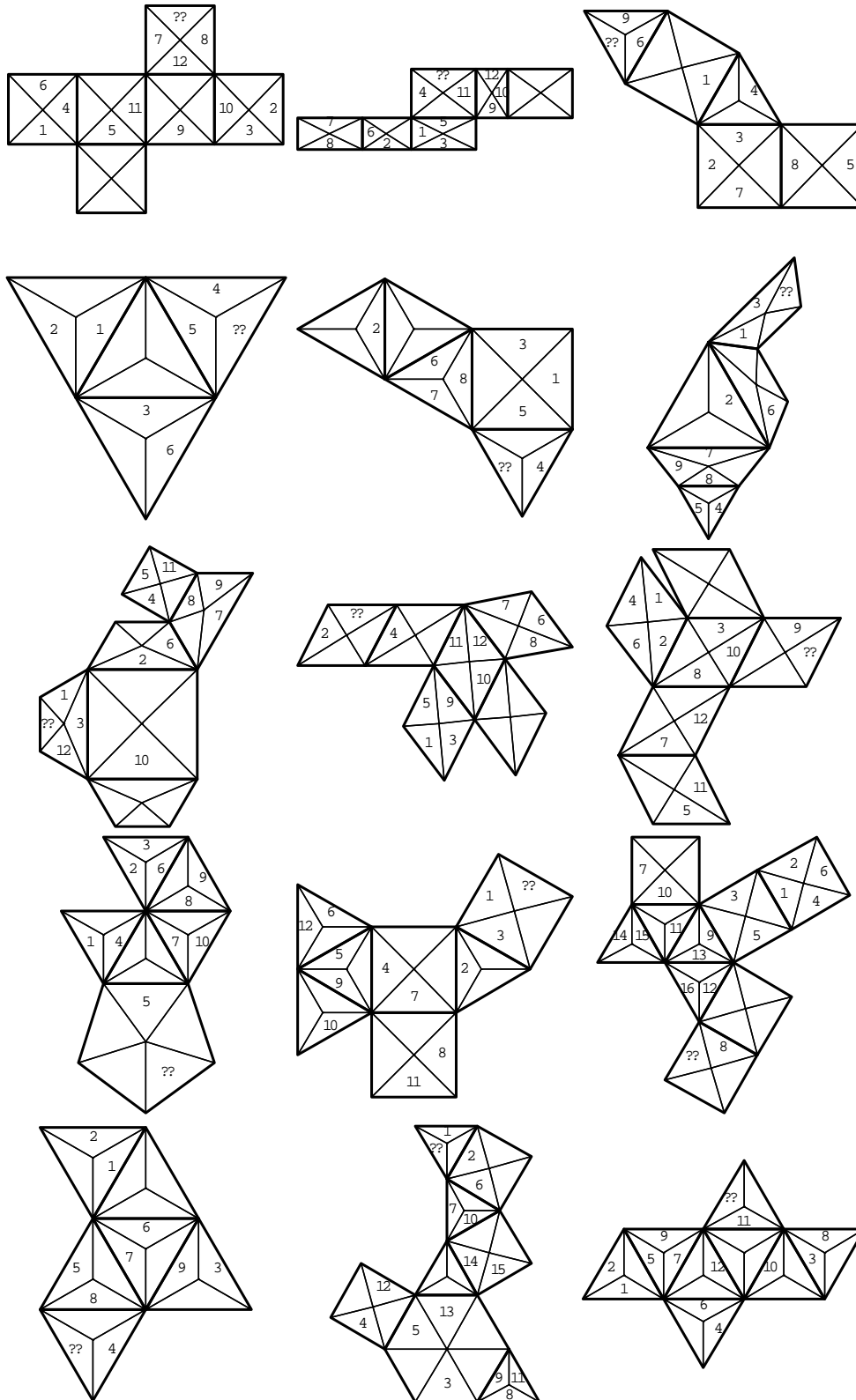


b)



# Prostorska predstavljivost

a) Katero številko moramo vpisati na mesto znaka ??, da bosta stranici pripadali istemu robu poliedra?



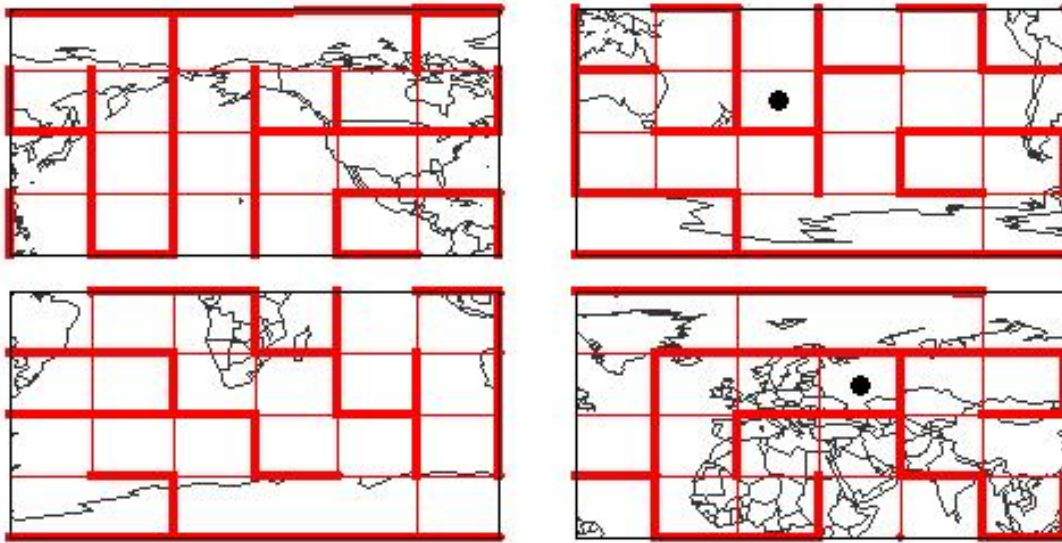
b) Katero številko moramo vpisati na mesto znaka ??, da bosta oglišči pripadali istemu oglišču poliedra?

The image displays 15 different nets of a cube, arranged in four rows. Each net consists of six squares connected at their edges. Some squares contain numbers (1-8) and some contain the placeholder '??'. The goal is to determine which number should replace '??' so that the two vertices marked with '??' in the net would coincide when the net is folded into a cube.

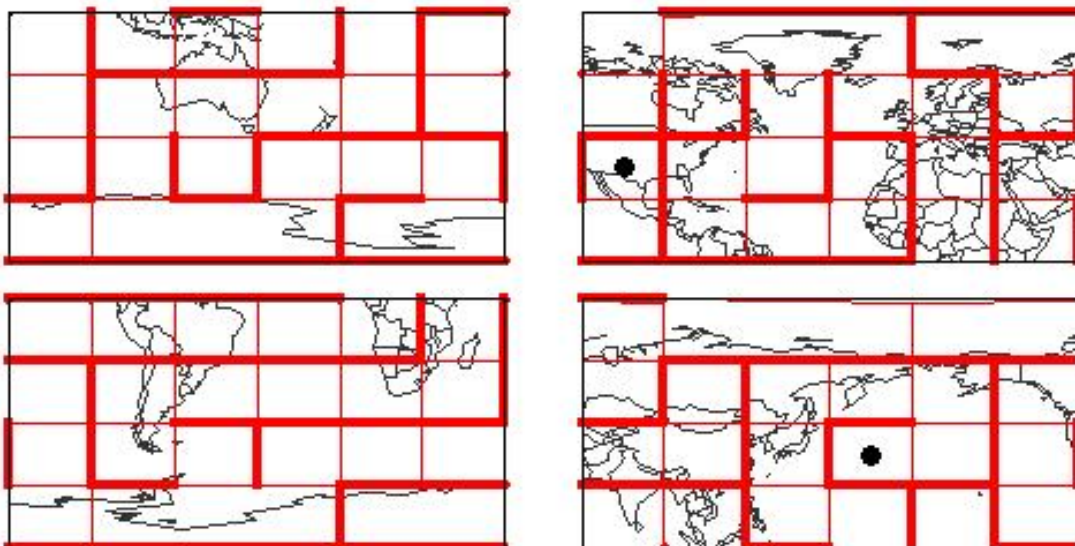
- Net 1 (top-left):** A 1-4-1 net. Top row: 4, 3. Middle row: 7, 8, 1. Bottom row: 5, 2, ??, 6.
- Net 2 (top-middle):** A 1-4-1 net. Top row: 3, 7, 8, ??, 6. Middle row: 5, 1, 2, 4.
- Net 3 (top-right):** A 1-4-1 net. Top row: 1, 4, 8. Middle row: 3, 7. Bottom row: ??, 2, 6, 5.
- Net 4 (second row, left):** A 3-2-1 net. Top row: 4, ??, 2. Middle row: 1, 3, 6. Bottom row: 5, 8, 7.
- Net 5 (second row, middle):** A 3-2-1 net. Top row: 7. Middle row: 8, 4, 3, 1, ??, 6. Bottom row: 5, 2.
- Net 6 (second row, right):** A 3-2-1 net. Top row: 7, 6. Middle row: ??, 3, 2, 4, 1. Bottom row: 8, 5.
- Net 7 (third row, left):** A 3-2-1 net. Top row: ??, 5, 6. Middle row: 1, 2, 3, 4. Bottom row: 3, 1, 4, ??.
- Net 8 (third row, middle):** A 3-2-1 net. Top row: 5. Middle row: 1, 2, 3, 4, 6. Bottom row: 3, ??, 4, 1.
- Net 9 (third row, right):** A 3-2-1 net. Top row: 3, 5, 6. Middle row: 4, 1, 2, ??.
- Net 10 (fourth row, left):** A 3-2-1 net. Top row: 5, 3, ??, 1. Middle row: 2, 4. Bottom row: 4, 1, 2, 5, ??, 5.
- Net 11 (fourth row, middle):** A 3-2-1 net. Top row: ??, 5, 2. Middle row: 4, 3, 1, 6. Bottom row: 1, 4, 3, 2, 4, 5, ??.
- Net 12 (fourth row, right):** A 3-2-1 net. Top row: 5, 2, 3, 4, 1. Middle row: 3, 1, 2, 4, 5, 6. Bottom row: 3, 4, 1, 2, 5, 6, ??.

# Labirinti na zemljevidu

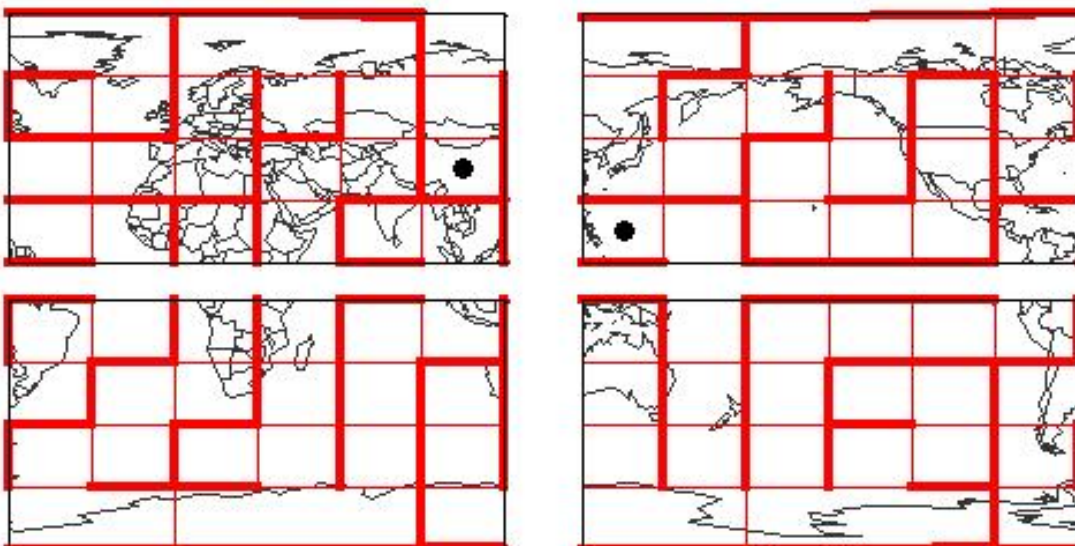
a)



b)

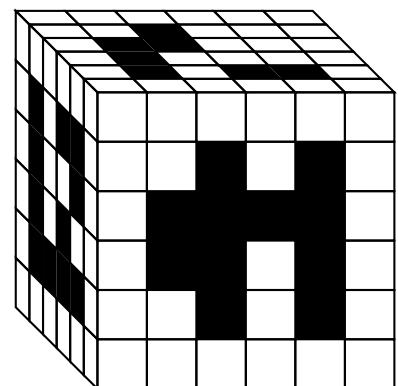
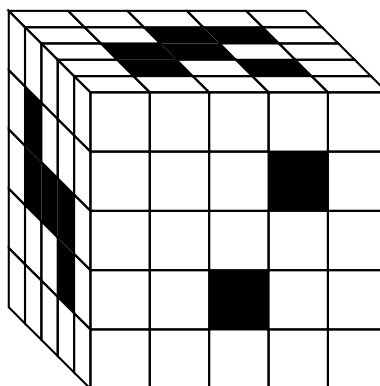
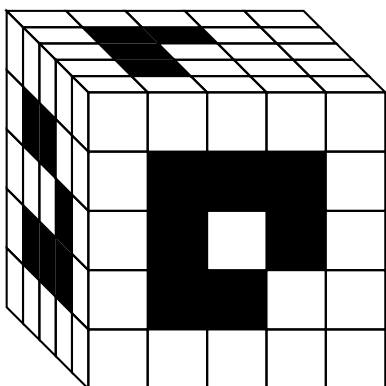
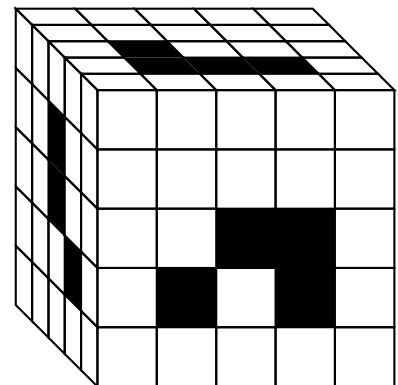
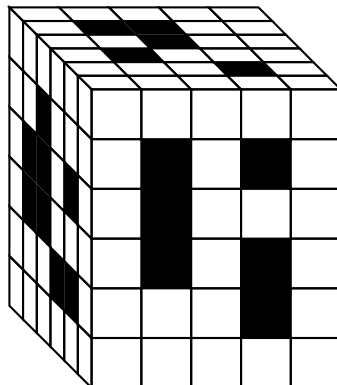
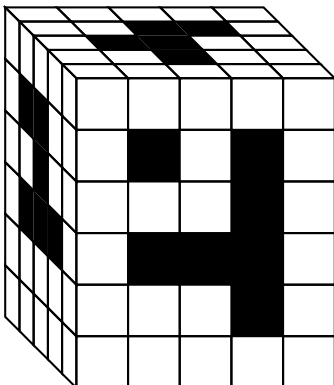
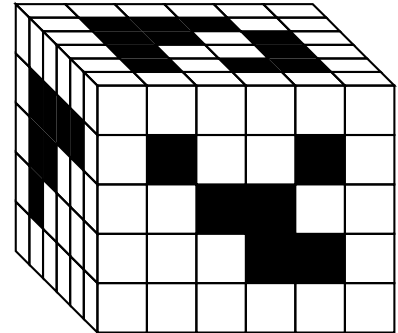
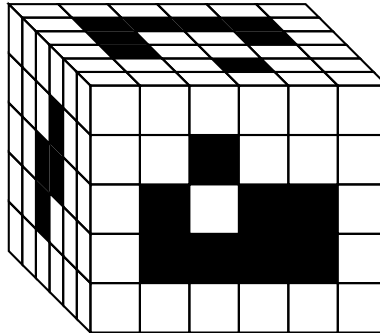
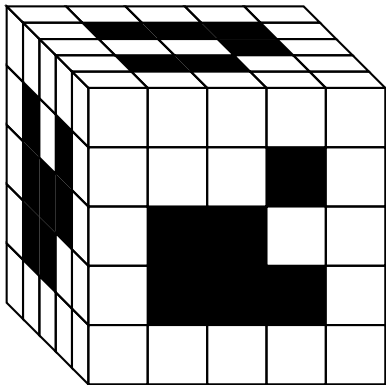
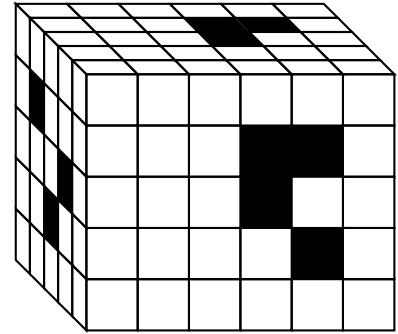
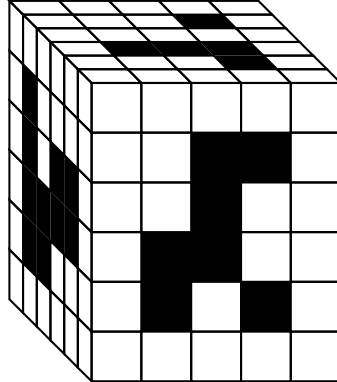
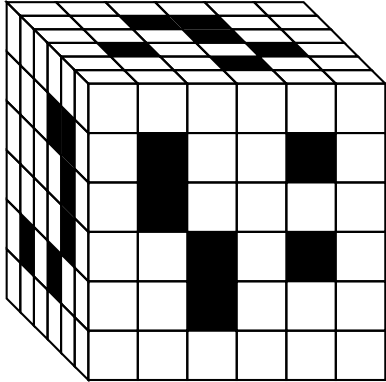


c)



## Odstranjene kocke

Dan je kvader, ki sestoji iz kockic. Odstranimo vse kocke, ki so zaznamovane črno od vrha do dna, od leve do desne in od spredaj do zadaj. Koliko kock smo odstranili?





## Nagradna logična naloga

Štirje prijatelji (Miha, Jure, Lan, Cene) z različnimi priimki (Gornik, Gorjanc, Rop, Gaber) različnih poklicev (matematik, igravec, kuhar, politik) so iz različnih krajev (Maribor, Ptuj, Koper, Lendava). Za vsakega določi ime, priimek, kraj bivanja in poklic.

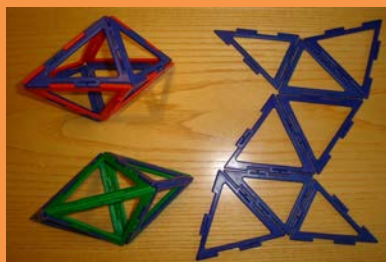
1. Rop ni po poklicu kuhar.
2. Kuhar je doma na Ptujju.
3. Igravec ni doma ne v Kopru ne v Lendavi.
4. Lan se ne piše Gorjanc.
5. Politik ni doma iz Koprja.
6. Rop ni doma iz Maribora.
7. Gaber je doma v Lendavi.
8. Gorjanc ni po poklicu igravec.
9. Miha se piše Gornik.
10. Jure je doma v Kopru.

	Gornik	Gorjanc	Rop	Gaber	matematik	igravec	kuhar	politik	Maribor	Ptuj	Koper	Lendava
Miha												
Jure												
Lan												
Cene												
Maribor												
Ptuj												
Koper												
Lendava												
matematik												
igravec												
kuhar												
politik												

ime	priimek	poklic	kraj
Miha			
Jure			
Lan			
Cene			

### Nagradno vprašanje

Na sliki je mreža, iz katere lahko dobimo dva različna poliedra. Ali obstaja še kakšna takšna mreža?



Odgovore pošljite na naslov Logika d.o.o, Svetčeva pot 11, 1241 Kamnik, s pripisom "nagradna uganka", do 15. oktobra 2013.

# Kako je Euler izračunal približek za $\pi$

V prvi lanskoletni številki revije smo govorili o računanju števila  $\pi$  z vrsta za arkustangens. Ta vrsta je bila uporabljena za računanje od 17. do 20. stoletja. Eno od takih formul, ki izvirajo iz te vrste je uporabil tudi Jurij Vega l. 1789, ko je izračunal  $\pi$  točno na 126 decimalk.

Euler se ni toliko zanimal za samo računanje tega števila ampak bolj za izpeljavo novih formul.

V [1] je Euler izpeljal formulo

$$\arctan(t) = \frac{t}{1+t^2} \sum_{i=0}^{\infty} \frac{(2i)!!}{(2i+1)!!} \left(\frac{t^2}{1+t^2}\right)^i$$

Trdil je, da je

ta formula boljša od Leibnizove formule

$$\arctan(t) = \sum_{i=0}^{\infty} \frac{t^{2i+1}}{2i+1}, \text{ ker je za } t = \frac{1}{3}, \frac{1}{7}, \frac{3}{79}, \text{ ima}$$

faktor  $\frac{t^2}{1+t^2}$  v njegovi vrsti vrednosti

$$\frac{1}{10}, \frac{2}{100}, \frac{144}{100000}, \text{ s katerimi pa je lažje računati.}$$

To je ilustriral s primerom

$$\pi = 8 \arctan\left(\frac{1}{3}\right) + 4 \arctan\left(\frac{1}{7}\right)$$

Izračunal je 8 členov vrste za arkustangens na 27 decimalk in ugotovil, da velja  $\pi \approx 3.14159265$ .

Pro parte priore.	
term. I.	= 2, 4 etc.
— II.	= - 16 etc.
— III.	= - - 128 etc.
— IV.	= - - - 109,714285,714285,714285,7142 etc.
— V.	= - - - - 97,523809,523809,523809,523 etc.
— VI.	= - - - - - 8,865800,865800,865800,865 etc.
— VII.	= - - - - - 81,838161,838161,838161,8 etc.
— VIII.	= - - - - - 76,382284,382284,382284, etc.
Pars. I. = 2,574004427   231435   231435   231435 etc.	
Pro parte posteriore.	
term. I.	= 0,560 etc.
— II.	= - - 74666666666666666666666666666666 etc.
— III.	= - - - 119406666666666666666666666666666666 etc.
— IV.	= - - - - 204800000000000000000000000000000000 etc.
— V.	= - - - - - 364088888888888888888888888888888888 etc.
— VI.	= - - - - - 661979797979797979797979797979797979 etc.
— VII.	= - - - - - 12221165501165501 etc.
— VIII.	= - - - - - 22812842268422 etc.
Pars. II. = 0,56758821841665131   412587   4125 etc.	

Hinc

Na naslednji strani je dodal še člene 9–16 prvega dela in člene 9–10 drugega dela ter ugotovil, da velja  $\pi \approx 3.14159265358979315$ .

V demonstraciji [[Izidor Hafner, "Euler's Estimate of Pi"](http://demonstrations.wolfram.com/EulersEstimateOfPi/Wolfram%20Demonstrations%20Project) [http://demonstrations.wolfram.com/EulersEstimateOfPi/Wolfram Demonstrations Project](http://demonstrations.wolfram.com/EulersEstimateOfPi/Wolfram%20Demonstrations%20Project) ] smo želeli prikazati Eulerjevo računanje.

izberi formulo za  $\pi/4$

$\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3}$   
  $2 \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7}$   
  $3 \tan^{-1}\frac{1}{7} + 2 \tan^{-1}\frac{2}{11}$   
  $5 \tan^{-1}\frac{1}{7} + 2 \tan^{-1}\frac{3}{79}$

decimall: e

zaok.roži ali odreži

število členov 1. dela

število členov 2. dela

pol. aži Eulerjevo računaje

term	1	24000000000000000000000000000000
---	2	01600000000000000000000000000000
---	3	00128000000000000000000000000000
---	4	0001097142857142857142857142857142
---	5	0000097523809523809523809523809523
---	6	0000008865800865800865800865800865
---	7	0000000818381618381618381618381618
---	8	0000000076382284382284382284382284
Part I.		2574004427231435231435231432
term	1	05600000000000000000000000000000
---	2	00074666666666666666666666666666
---	3	00001194666666666666666666666666
---	4	00000020480000000000000000000000
---	5	00000003640888888888888888888888
---	6	00000000066197979797979797979797
---	7	000000000012221165501165501
---	8	00000000000228128422688422
Part II.		0567588218416651314125874122
I. + II.		314159264564808654561105554
$\pi$		3141592653589793238462643383

izberi formulo za  $\pi/4$

$\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3}$   
  $2 \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7}$   
  $3 \tan^{-1}\frac{1}{7} + 2 \tan^{-1}\frac{2}{11}$   
  $5 \tan^{-1}\frac{1}{7} + 2 \tan^{-1}\frac{3}{79}$

decimall: e

zaok.roži ali odreži

število členov 1. dela

število členov 2. dela

pol. aži Eulerjevo računaje

term	1	24000000000000000000000000000000
---	2	01600000000000000000000000000000
---	3	00128000000000000000000000000000
---	4	0001097142857142857142857142857142
---	5	0000097523809523809523809523809523
---	6	0000008865800865800865800865800865
---	7	0000000818381618381618381618381618
---	8	0000000076382284382284382284382284
---	9	000000007188920883038530097
---	10	000000000681055662603650219
---	11	000000000064862444057490497
---	12	00000000006204233779412134
---	13	00000000000595606442823564
---	14	00000000000057354694494121
---	15	00000000000005537694640811
---	16	00000000000000535905932981
Part I.		2574004435173137489652205856
term	1	05600000000000000000000000000000
---	2	00074666666666666666666666666666
---	3	00001194666666666666666666666666
---	4	00000204800000000000000000000000
---	5	00000003640888888888888888888888
---	6	00000000066197979797979797979797
---	7	000000000012221165501165501
---	8	00000000000228128422688422
---	9	00000000000004294182074135
---	10	00000000000000081363449825
Part II.		0567588218416655689671398082
I. + II.		3141592653589793179323603938
$\pi$		3141592653589793238462643383

Reference:

[1] L. Euler, "Investigatio quarundam serierum, quae ad rationem peripheriae circuli ad diametrum vero proxime definiendam maxime sunt accommodatae," *Nova Acta Academiae Scientiarum Imperialis Petropolitinae* 11, 1798, pp. 133-149.

[www.math.dartmouth.edu/~euler/tour/tour\\_08.html](http://www.math.dartmouth.edu/~euler/tour/tour_08.html).

[2] E. Sandifer. "How Euler Did It: Estimating  $\pi$ ." *MAA Online*. Feb 2009. (Jun 20, 2013)

[www.maa.org/editorial/euler/HEDI%2064%20Estimating%20pi.pdf](http://www.maa.org/editorial/euler/HEDI%2064%20Estimating%20pi.pdf).

# Rešitve

## Barvni sudoku

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4	1	2	3
1	4	3	2
2	3	4	1

1	3	4	2
4	1	2	3
3	2	1	4
2	4	3	1

4	1	2	3
1	4	3	2
3	2	4	1
2	3	1	4

3	4	1	2
1	2	4	3
2	1	3	4
4	3	2	1

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3	5	2	1	4

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4	1	3	2

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1	4	5	2	3

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

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1	4	2	3
4	1	3	2
3	2	1	4

## Latinski kvadrati

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2	1	3	4

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4	1	2	5	3
1	5	3	2	4

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1	4	3	2

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5	3	4	1	2
4	1	2	5	3

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2	4	1	3
1	3	4	2

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2	1	4	3
1	4	3	2
4	3	2	1

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

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

2	3	4	1
4	1	3	2
3	2	1	4
1	4	2	3

3	4	2	1
1	3	4	2
4	2	1	3
2	1	3	4

## Sudoku s črkami

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

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

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

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

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

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

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

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

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

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

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

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

## Futoški

1 2 3	3 1 2	2 3 > 1
2 3 > 1	2 3 1	3 1 2
3 1 < 2	1 < 2 < 3	1 < 2 3
3 1 2 4 5	3 2 1	1 < 3 2
2 3 5 1 4	2 1 3	3 2 1
5 > 2 4 > 3 1	1 < 3 > 2	2 > 1 3
4 5 > 1 2 3		
1 4 > 3 5 2		
2 4 1 3	3 < 4 2 > 1	2 > 1 3
4 > 1 3 2	2 3 > 1 4	3 2 > 1
1 < 3 2 4	1 2 4 3	
3 2 < 4 1	4 1 3 2	1 3 2
1 3 > 2	4 1 5 2 3	3 1 < 2 < 4
3 > 2 1	1 3 4 5 2	1 3 4 2
2 1 3	2 4 3 1 5	2 4 3 1
	5 > 2 1 < 3 4	4 2 > 1 3
	3 5 > 2 4 > 1	

## Rdeči kvadrati

	0		R
	1	3	2
1	R		R
		2	

0		0	
	2		1
R	R	2	R
	2		

R			
1	2	2	
		R	R
	1	3	R

	1		
	R	2	1
	1		R
			1

			1
	1	R	1
		2	
	0		R

	1	R	R
			2
2	R	2	
	R	2	0

			R
	0		1
1		0	
R			

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	2		R
R	1		R
1	1		1

		1	
	0		R
			2
	0		R

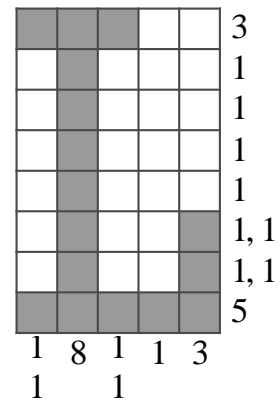
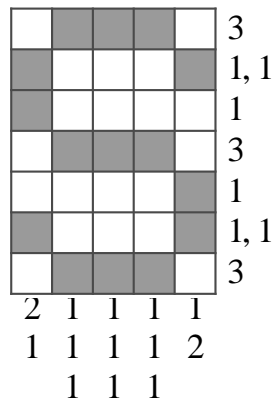
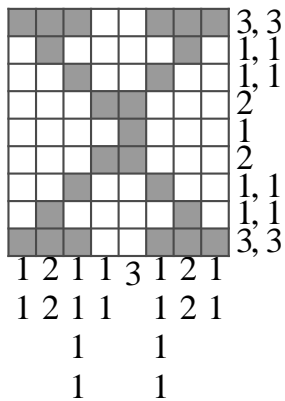
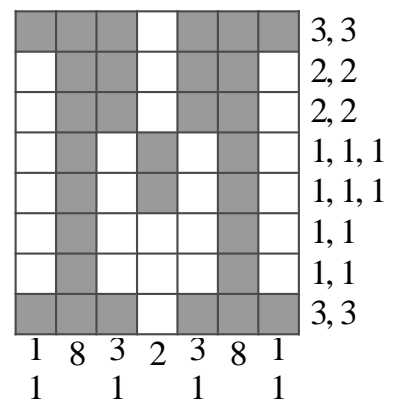
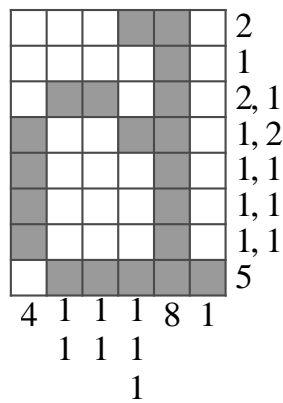
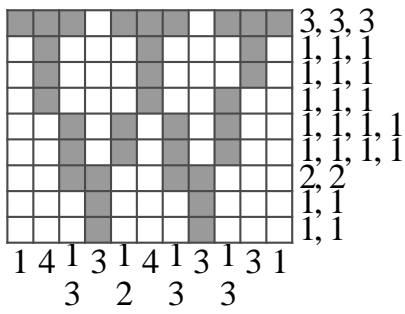
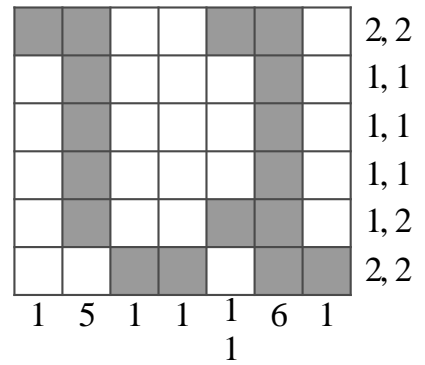
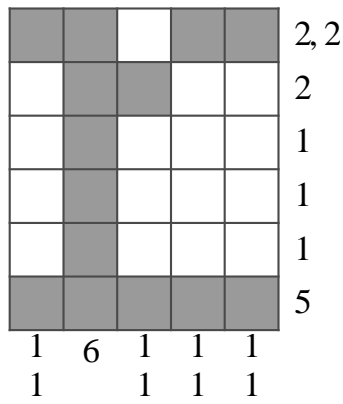
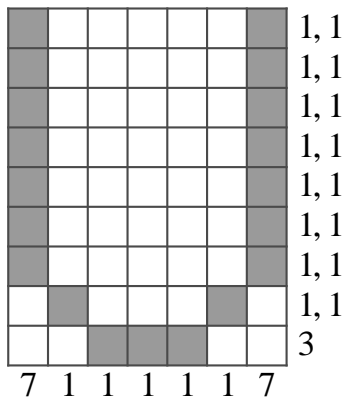
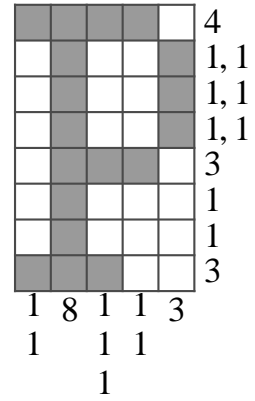
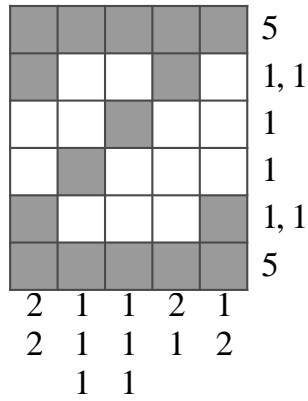
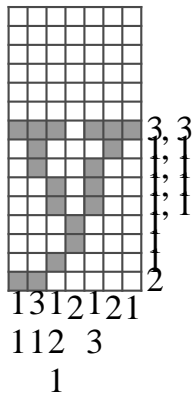
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			R
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0		1	

0		0	
1	R	R	
	2	2	1



Gobelini



Križne vsote

		4	16	
3	1	2	4	
12	3	8	1	
	9	6	3	

		14	17	
6	5	1	8	
18	9	7	2	
	15	9	6	

	14	9						
8	6	2			8	12		
9	8	1	3		16	7	9	
	7	6	1	7	11	7	1	3
			2	3	8			
			13	4	9			

	11	3		
3	2	1	14	
17	9	2	6	12
		7	3	4
		13	5	8

	6	13			
12	5	7	7		
12	1	6	5	17	
		3	2	1	14
			17	9	8
			13	7	6

	15	13							
7	6	1			7	8			
12	9	3	9		17	4	3	1	
		12	9	3	5	17	6	4	7
			10	6	1	3			
				12	4	8			

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

		7	12		
4	3	1	7		
8	4	3	1		
		14	8	6	

		7	9		
3	1	2	18		
18	6	7	5	6	
			14	9	5
			5	4	1

	14	15		
16	9	7	12	
15	5	8	2	14
		8	3	5
		16	7	9

	7	6			
3	1	2	15		
18	6	4	8	16	
		16	7	9	4
			5	2	3
			6	5	1

	4	8						
7	3	4			8	6		
4	1	3	11		14	9	7	2
	4	1	3	4	7	2	1	4
			12	8	1	3		
				12	3	9		

Križni produkti

	40	24			
32	8	4			
			54		
60	5	6	2	15	
			27	9	3
			15	3	5

		32	44		32	40				
	24	8	3		20	4	5	18		
		32	4	8		216	8	3	9	
				48	6	8		16	8	2
	72	62								
16	8	2		84	6	2	7			
	72	9	8		28	7	4			
				504	7	8	9			
				54	6	9				

	45	1080		5040	15					
27	9	3		30	6	5				
				24	8	3				
20	5	4		16						
			80	2	8	5				
				630	5	2	7	9		
			7							
63	7	9		21	3	7				

	20	189								
35	5	7				6	27			
12	4	3		48		180	27	3	9	
	72	9	8		30	5	2	3		
			270	6	5	9				
				28	7	4				

	35	54							
63	7	9		8					
60	5	6	2		48				
			12	4	3	27			
					18	2	9		
					24	8	3		

		6	216		72	80			
	18	2	9		45	9	5	35	
	12	3	4		112	8	2	7	
					20				
	24	20	6	2		15	3	5	
	12	3	4		210	5	7	6	
	40	8	5		27	3	9		
					14				
		24	3	2	4				
		14	2	7					

	16	18	32
192	8	6	4
48	2	3	8

	36	56					
63	9	7		15			
96	4	8	3		35		
				45	5	9	21
					15	5	3
					21	3	7

	28	20	72
160	4	5	8
252	7	4	9

	12	21			
6	2	3		360	
378	6	7	9	12	
			20	5	4
			24	8	3

	27	8	28
84	3	4	7
72	9	2	4

	24	144							
36	4	9				15	42		
12	6	2			21	3	7		
				32					
					108	4	5	6	
				96	8	4	3		
					27	3	9		

## Labirint na kocki

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

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

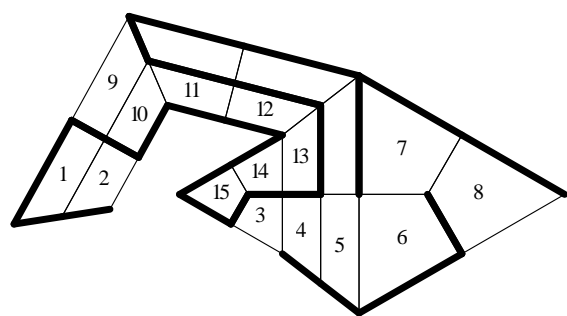
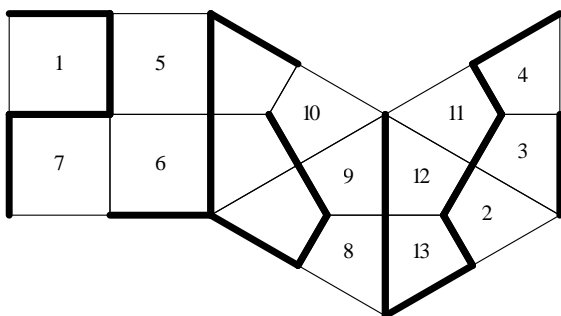
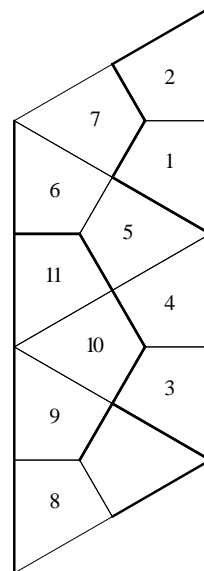
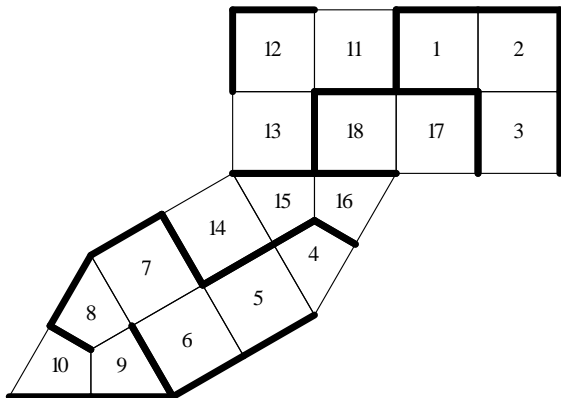
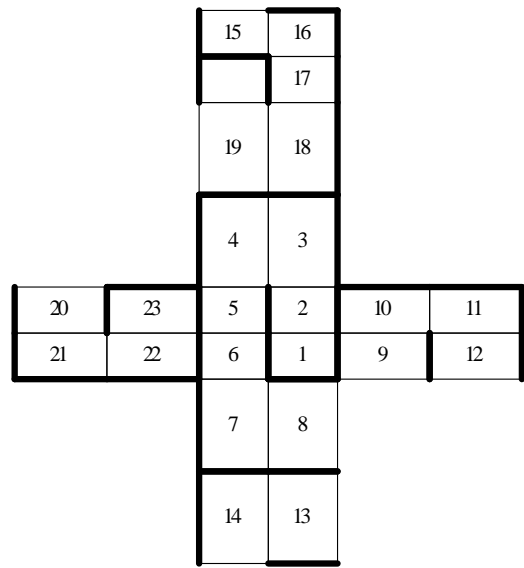
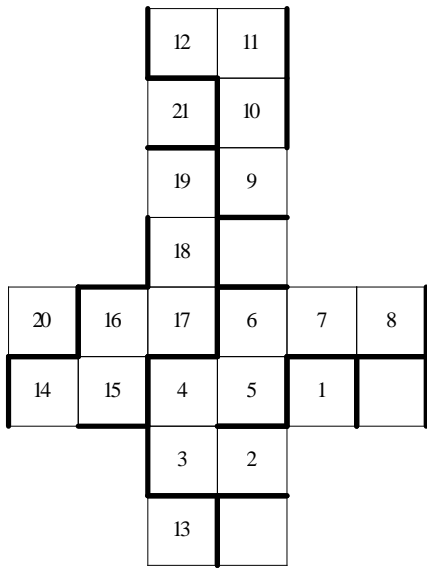
		8	7		
		13	14		5
		12	15		4
10	11	17	16		
9	19	18			
		2	3		
		1	6		

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

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

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

Labirinti na enostavnih poliedrih



## Grupe

Sličice na drugi sliki moramo zaporedoma označiti:  
 {1, 14, 11, 3, 5, 9, 2, 4, 15, 12, 17, 6, 13, 7, 10, 8, 16}

Linearne grupe:

a) {1, 6, 3, 7, 5, 4, 2}, {4, 6, 3, 5, 1, 2, 7}

b) {6, 4, 2, 7, 3, 5, 1}, {5, 4, 3, 7, 1, 2, 6}

## Prostorska predstavljalivost

a)

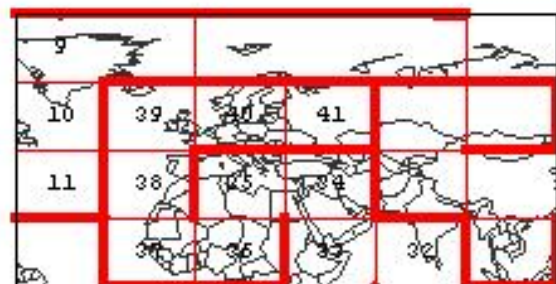
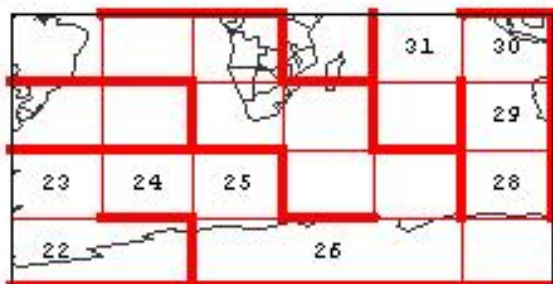
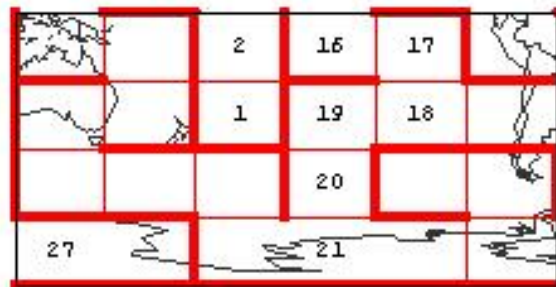
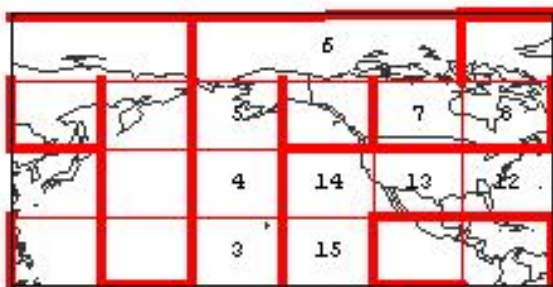
	1	2	3
1	6	7	7
2	6	7	9
3	5	6	11
4	9	6	14
5	2	4	9

b)

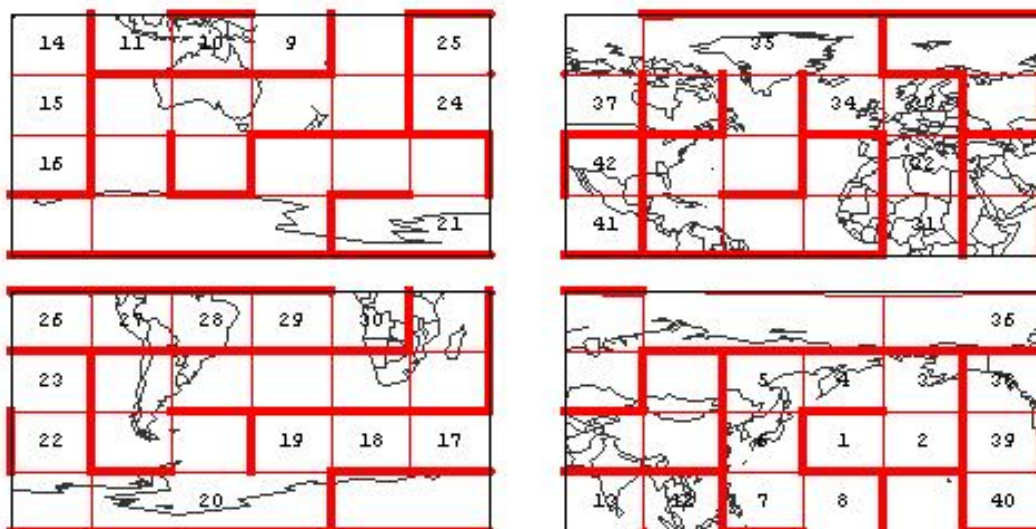
	1	2	3
1	5	4	1
2	7	2	7
3	3	6	4
4	5	3	1
5	2	6	4

## Labirinti na zemljevidu

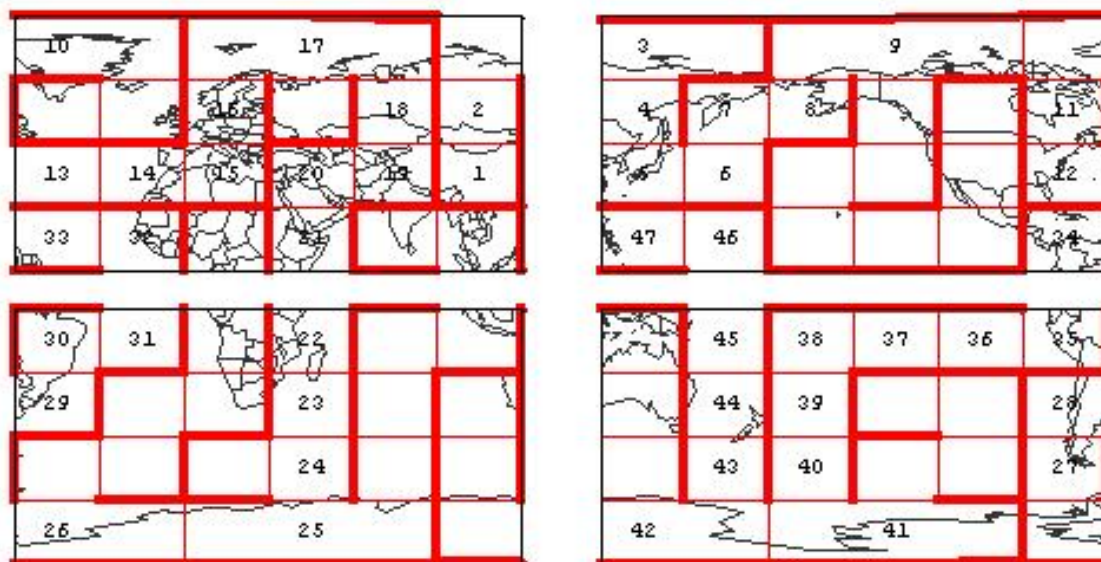
a)



b)



c)



## Odstranjene kockice

87 87 42

63 84 94

68 79 43

60 50 120

Izdaja: Založniško podjetje **LOGIKA d.o.o.**, Svetčeva pot 11, 1241 Kamnik. Poslovni račun pri NLB: 02312-0016592829. Davčna številka: SI56917309. Podjetje je obvezni zavezanec po zakonu o DDV. Za izdajatelja: *Izidor Hafner*.

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Spletna stran: <http://www.logika.si>.

Revija *Logika & razvedrilna matematika* je vpisana v register medijev pri Ministrstvu za kulturo pod številko 759. Revijo je sofinanciralo **Ministrstvo za izobraževanje, znanost, kulturo in šport**.

Strokovni pokrovitelj: *Inštitut za matematiko, fiziko in mehaniko - oddelek za teoretično računalništvo*.

Glavni in odgovorni urednik: *dr. Izidor Hafner* (<http://matematika.fe.uni-lj.si/people/izidor/homepage/>)

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ISSN 0354 0359

**LOGIKA & RAZVEDRILNA MATEMATIKA**, letnik XXIII, št. 1 od 4, 2013/2014

Elektronska izdaja. Cena revije: 0 €