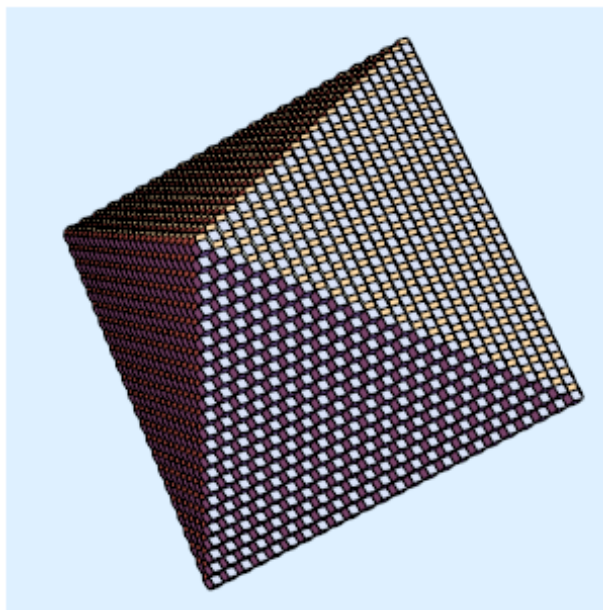
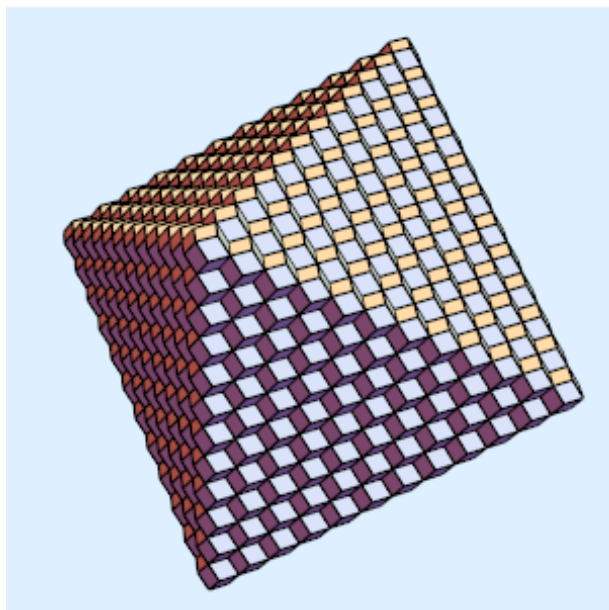
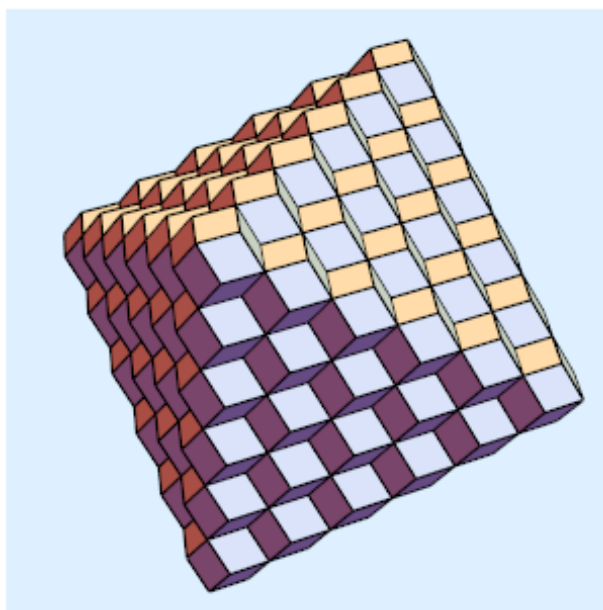
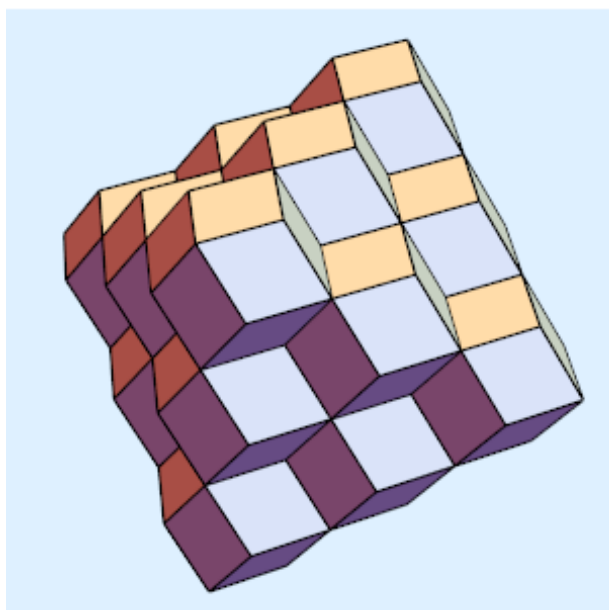


Spoštovani,

Prišli smo do 3. številke 34. letnika revije Logika in razvedrilna matematika. Za tiste, ki radi rešujejo naloge, priporočamo naslednje strani na spletu: <https://sites.google.com/view/revija-linrm-in-zbirke/domov>, <https://sites.google.com/view/zbirkelogicnihnalog/domov>, <https://sites.google.com/view/criptografia-para-estudiantes/domov>, http://logika.si/subpages/sklop_logika/naloge.html in <http://logika.si/subpages/prostorska/index.html>.

Za tiste, ki bi radi izdelali enako sestavljive poligone s 3D tiskom ali laserskim razrezom, so ustrezne datoteke na internetni strani

<https://sites.google.com/view/stlsforpolyhedralkaleidoscopes/domov>.



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.

1.

			4
	1		
3			

2			
	1		

	2		
3			

			4
2		1	

	2		
	1		

			4
			1
		2	

2			
3			

			3
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4			

		2	
1		4	
	4		

		2	
		3	

3			
1			

	1		
2			

2.

	3			5
		5		
	1			
	4			

4		2	
2	4		
1			

		1			4
	5				1
5			6		
		2		5	
3					
6			2		

		1	
			4
4			2

	2		
1			
	3		
			4

		2	1
	3	4	

4		1	
3			
1			4

		4			
			1		
	5			6	
				1	
1					3
4		3	2		

	1	3	
			4
2			

			1
3			
	3		2

	3		1	
		3		
		4		
			5	

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

Sudoku z večkotniki

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 skladnih večkotnikih nastopalo vseh n števil.

Latinski kvadrati

V $n \times n$ kvadratkov moraš vpisati začetne črke tako, da bo v vsaki vrstici, v vsakem stolpcu nastopalo vseh n črk.

D	B		
A			C
	A		

			C
	C	A	
			B
	D		

			B
		B	C
A			

C			D
	C		E
		A	C
D			
		A	

B		E	
			D
A			
	D		
	C		B

			A
	C	E	A
		C	
B			
	E		B

			C
		C	A
		B	
	D		
B	E		

	C		
	D	B	
D			C

	D		
		C	D
A		E	
	C		
C			E

	A	D	
C			
		A	

			A
			C
		C	
A		B	

B			A
		D	C
	A		E
			C
			E

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.

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

D	A ⁵	C	C	A
D ¹	E	B	A	A
C	C	E	B	C
A ³	B	E	B	E
D ²	B	E	D	D

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

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

D	D	D	B	C
A ⁴	D	B	C	C
A ²	B	E	C ³	B
E	E ⁵	E	D	E
A	B	A	A	C

E	E ²	C	A	B
E	D	C ⁵	D	A
E ¹	D	D ³	B	C
A	B	C	A	A
D	B	B	E	C

D	E	B	C	C
B	E	B	D	A
C ¹	A	D	C	A
C	A	D	D	A ⁴
B ³	E	B	E	E ⁵

B	A ²	D	C	E
C	A	E	C	A ³
D ⁵	E	E	C	A
D	A	D	E	B ¹
D	B	B	C	B

A	A ²	B	B	D
E	E	E	B	B
D ⁵	C	C	A	B ¹
A	C	D	E	D
D	C ³	E	C	A

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

A	B ²	A	C	E ¹
A	D	E	B	B ⁴
D	C	C	D	A
C	D	B	D	C
E ⁵	E	B	E	A

B	C	D	D	B
C	A ³	B ²	E	A
C	C	E ³	B	A
C	A	B ¹	E ⁵	E ²
D	A	D	D	E

Futoshiki

V $n \times n$ kvadratkov moraš vpisati začetna 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. Tu $a \equiv_k b$ pomeni, da je razlika med a in b deljiva s k .

1.

<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $-2=$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $+1=$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $<$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $+1=$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $<$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $-2=$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF; text-align: center;">1</div> $<$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $-1=$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF; text-align: center;">1</div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF; text-align: center;">2</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF; text-align: center;">4</div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $>$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF; text-align: center;">1</div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF; text-align: center;">2</div> $<$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div>
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width: 30px; height: 30px; background-color: #00FFFF; text-align: center;">4</div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $<$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> $-1=$ <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF; text-align: center;">4</div> <div style="border: 1px solid black; width: 30px; height: 30px; background-color: #00FFFF; 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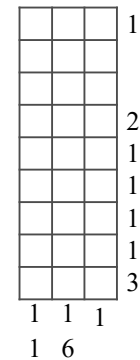
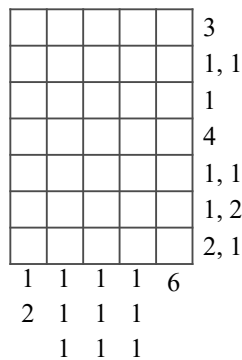
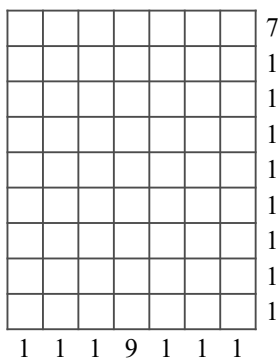
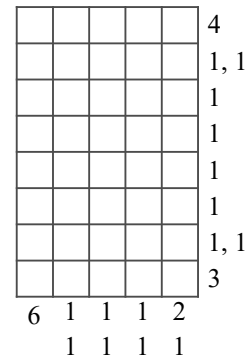
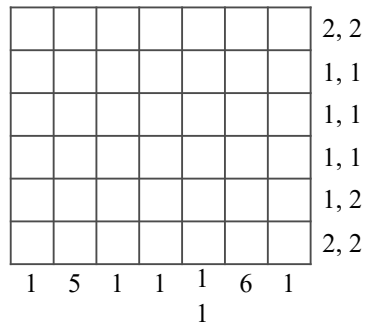
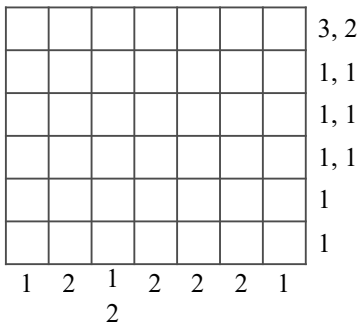
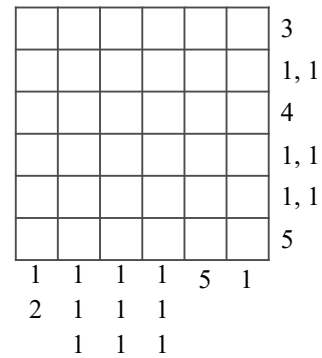
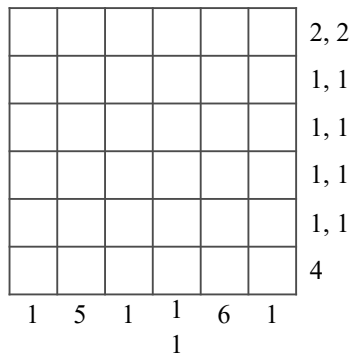
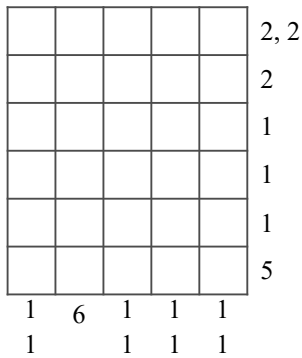
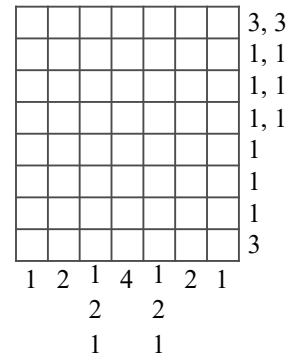
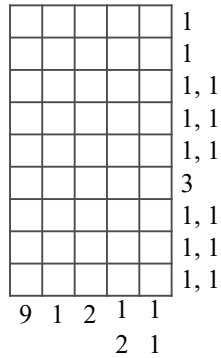
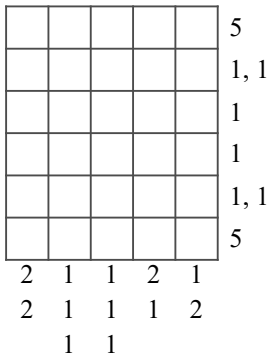
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<i>C</i> JE SOSEDA OD <i>E</i> .	N																				

Gobelini

Kvadratke v razpredelnici moraš pobarvati sivo tako, da bo zaporedje sivih pasov v vrstici ustrezalo zaporedju števil na desni in da bo zaporedje sivih pasov v stolpcu ustrezalo zaporedju števil pod njim.



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.

	12	13		
10			20	
21				8
		8		
		14		

	15	5		
7			17	
20				11
		5		
		16		

	7	15		
15				10
6				
		11		

	13	17		
14			15	
17				4
		8		
		10		

	4	6		
7			13	
10				13
		5		
		14		

	9	14			
16				8	13
6			15	13	14
	10		3	9	
		16			
		4			

	15	16			
12				13	3
17			17	14	21
	11		8		
		20			
		11			

	9	11			
14			5		
10				21	
		5			8
			16		
			9		

	8	9			
3			14		
23				6	
		7			12
			12		
			4		

	4	15		
6				16
12				
		17		

	14	13			
12				8	17
8		15	15	19	20
		13		9	
			17		

	8	14			
6				15	9
12			17	13	17
	13		10		
		21		15	
			12		

Križni produkti

Naloga reševalca je, da izpolni bele kvadratke s števkami od 2 do 9 tako, da bo zmnožek števk v zaporednih belih kvadratih po vrsticah in stolpcih enak 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		
30				
224				14
		18		
		35		

	63	28		
63			54	
252				188
		42		
			72	45
			15	

	12	160				
10						63
48					63	27
		28		210		
	28			135		
		192		48		
			42			

	21	30	42
210			
126			

	45	28	48
120			
504			

	6	108	
6			
126			63
		54	

Labirint na kocki

Poveži točki na kocki. Na tej poti je zapisano zaporedje besed, kjer zadnja beseda ni nujno zapisana v celoti. Poišči zaporedje.

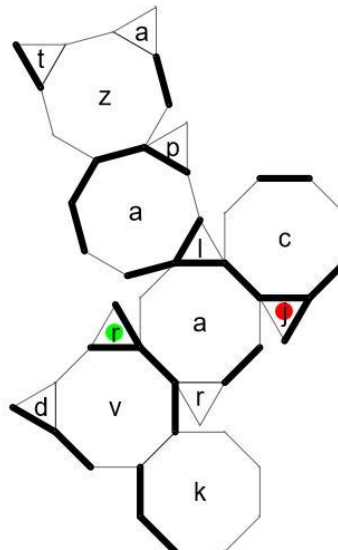
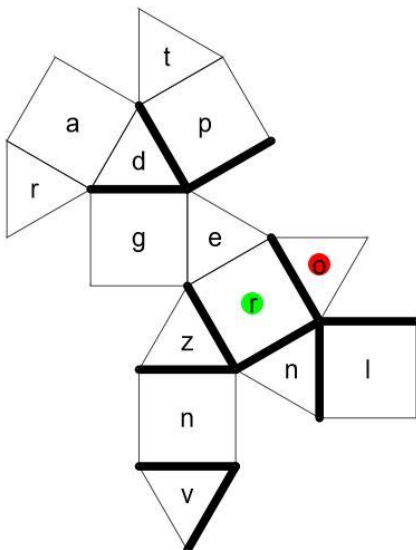
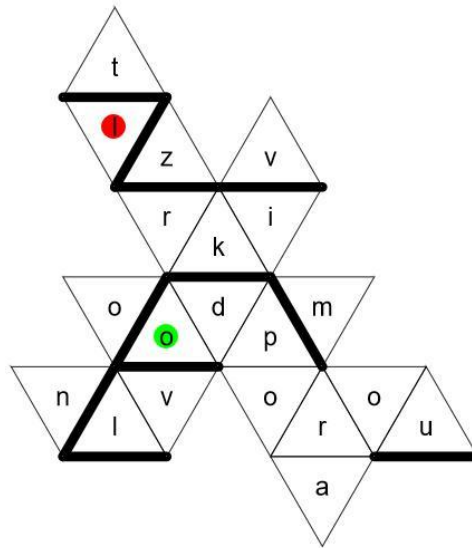
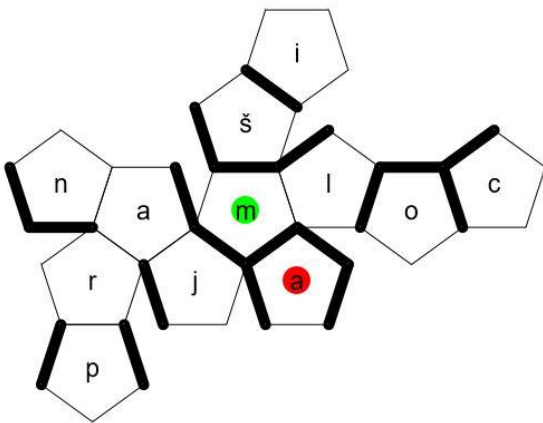
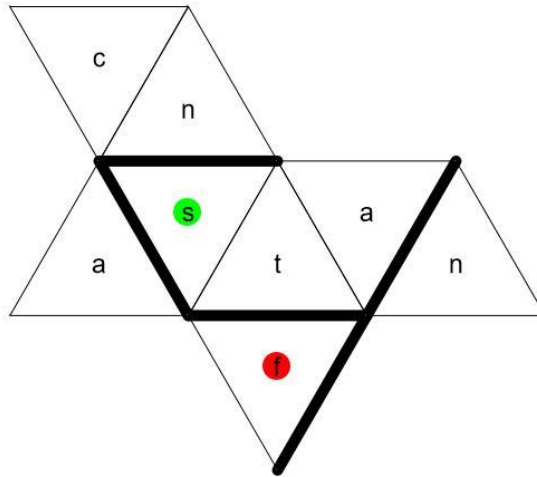
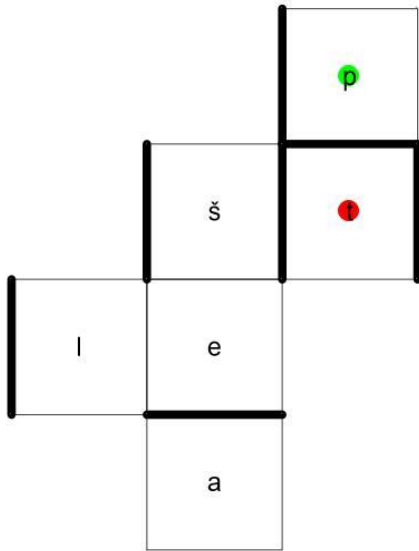
				U	P						
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I	T	L	P	K	Č	U	B				
J	A	I	Š	I	F	Z	T				
		L	N								
		F	P								

				U	N						
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		O	D	J	P	A	V				
		E	Z	A	L	E	N				
O	B	L	I								
L	K	I	J								

		I	C								
		A	A								
T	N	I	C	D	N	I	N				
P	O	B	E	E	Š	A	A				
		H	R								
		M	A								

Labirinti na poliedrih

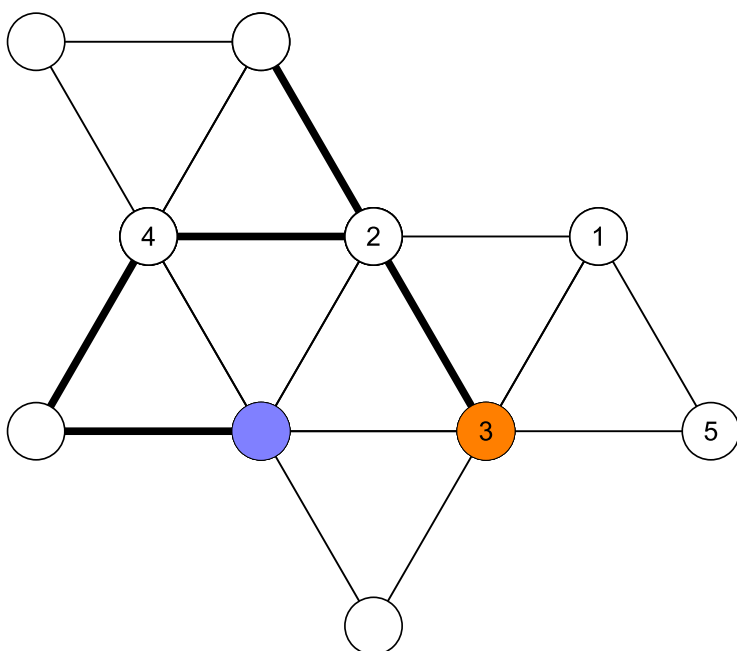
Poveži točki na poliedru. Na tej poti so zapisane besede (zadnja, ne nujno cela). Poišči jih.



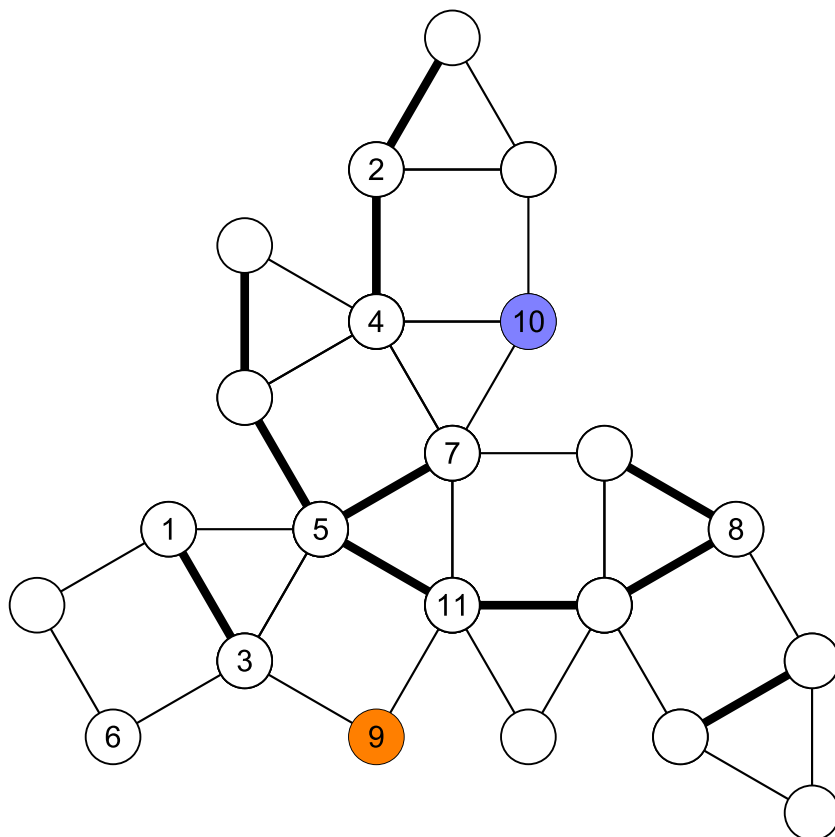
Labirinti na robovih poliedra

V naslednjih nalogah moramo povezati dve oglišči poliedra, ki je podan z mrežo. Poiskati moramo pot od oranžne do modre točke. Iz ene točke lahko gremo do druge točke, če je med njima debelejša črta ali pa točki predstavljata isto oglišče poliedra.

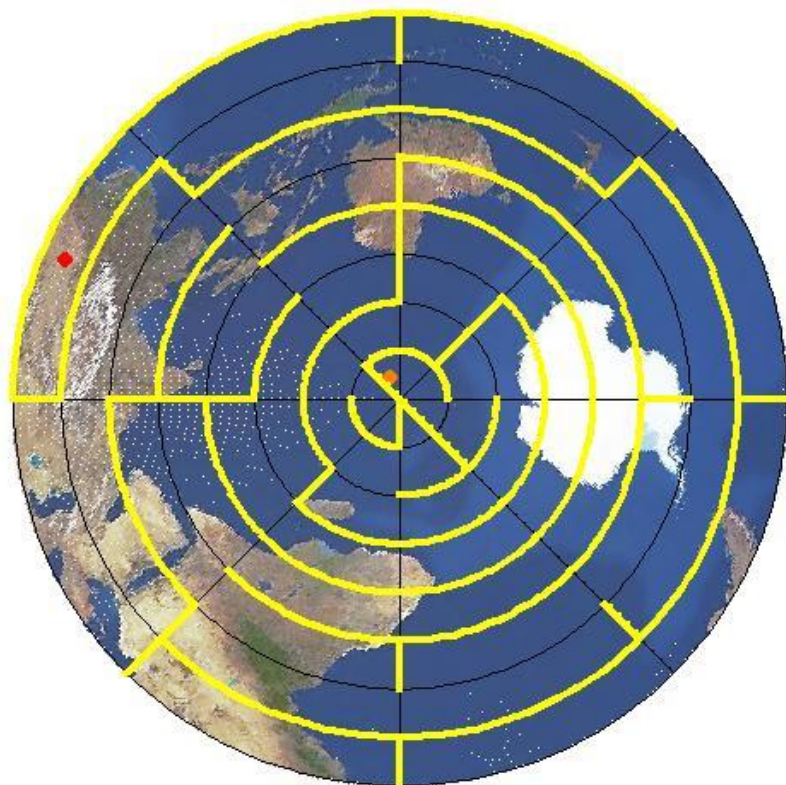
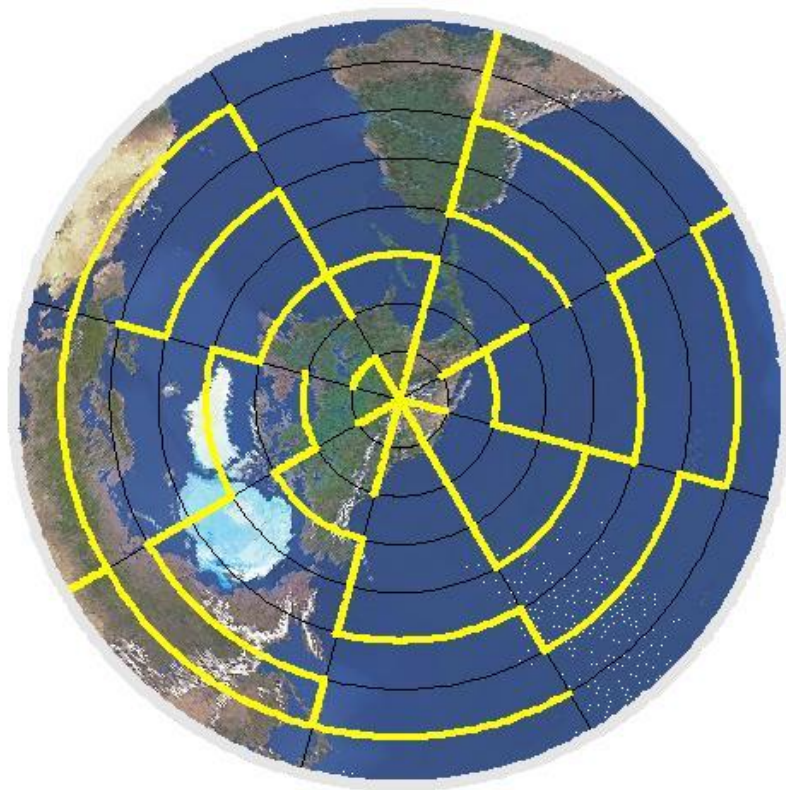
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2.

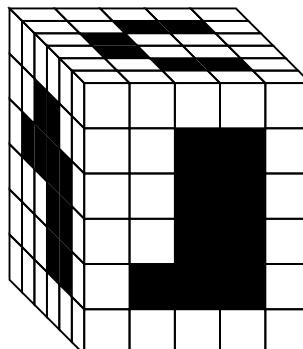
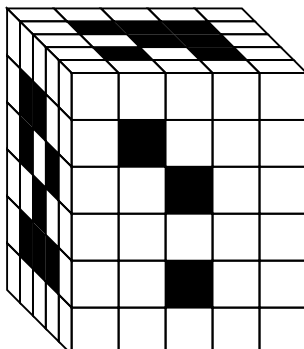
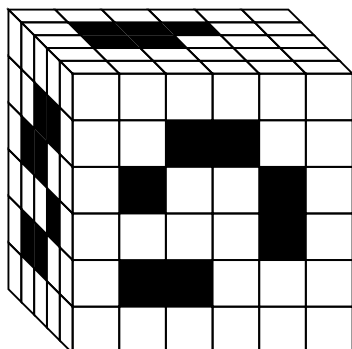
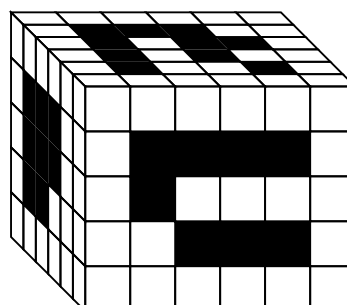
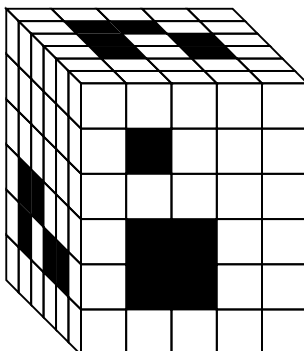
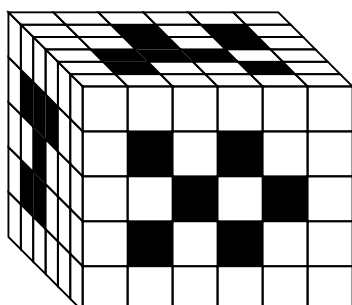
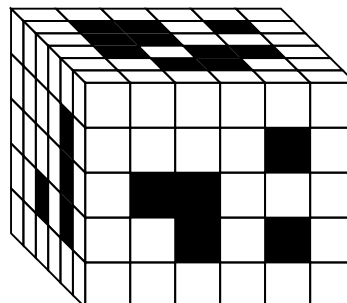
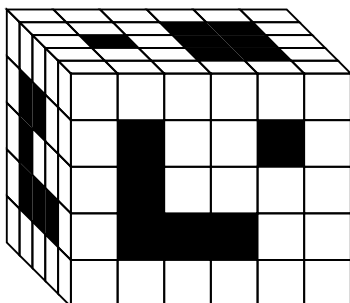
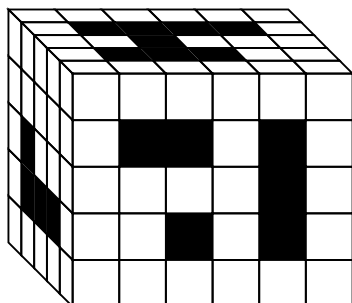
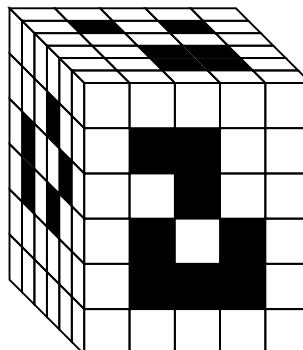
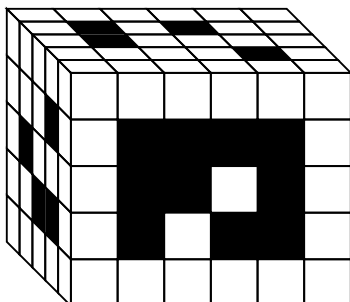
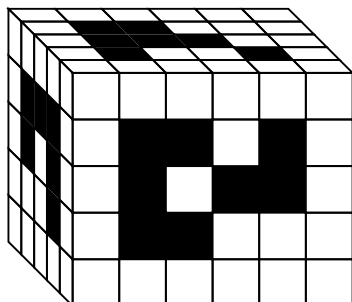


Labirint na zemljevidu



Odstranjene kocke

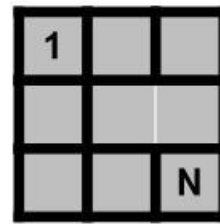
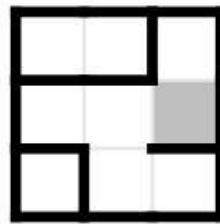
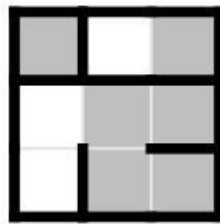
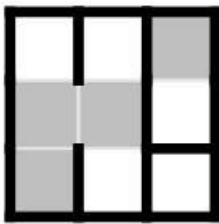
Dan je kvader, ki sestoji iz kockic. Odstranimo vse kocke, ki so zaznamovane črno od vrha do dna, od leve do desne in od spredaj do zadaj. Koliko kock smo odstranili?



Labirint v kvadru

Kvader sestoji iz vodoravnih slojev kockastih oddelkov (zgornji, srednji in spodnji sloj so dani od leve proti desni). Odebeljene črte preprečujejo prehajanje med sosednjima oddelkoma istega sloja. Med oddelkom in oddelkom neposredno pod njim lahko prehajamo, če in samo če je prvi pobarvan belo.

Poišči najkrajšo pot od oddelka z 1 do oddelka z N! Pot označi z zaporednimi naravnimi števili. Prvi oddenek je že označen z 1, vsak naslednji sosednji oddenek (kocko) pa s številom, večjim za 1. Na poti je zapisano zaporedje besed, kjer zadnja ni nujno podana v celoti, Poišči to zaporedje.

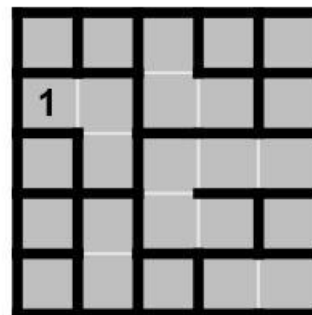
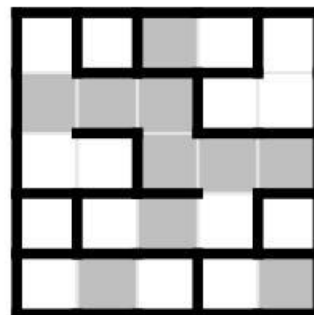
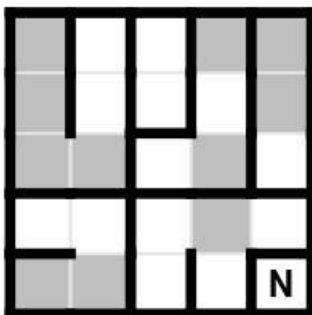


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Š	K	K

U	Š	V
N	O	Š
V	K	B

O	J	Č
Č	N	T
K	I	C

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M	Š	U
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J	H	N	M	H
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D	V	R	A	T
R	O	N	Z	N

G	D	S	G	E
A	S	T	V	O
M	O	L	A	D
H	A	A	V	F
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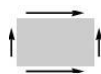
Labirinti na ploskvah

Podan je labirint na pravokotniku. Prehod med sosednjima kvadratkoma je možen, če med njima ni odebeljene črte. Skica zgoraj pomeni, kako sta nasprotni stranici pravokotnika povezani (miselno ju moramo zlepiti). Na neki (daljši) poti je zapisano zaporedje besed. Zadnja beseda ni nujno podana v celoti. Poišči začetek in konec poti in zapiši zaporedje besed.



a	l	g	ž	r	l
b	i	e	r	n	a
o	t	p	s	o	s
r	l	a	t	j	h
t	a	k	o	b	e

					•
•					



r	u	k	k	a	a
a	m	o	b	r	ž
o	e	t	m	e	m
č	k	i	e	r	a
a	š	r	e	v	g

				•	•

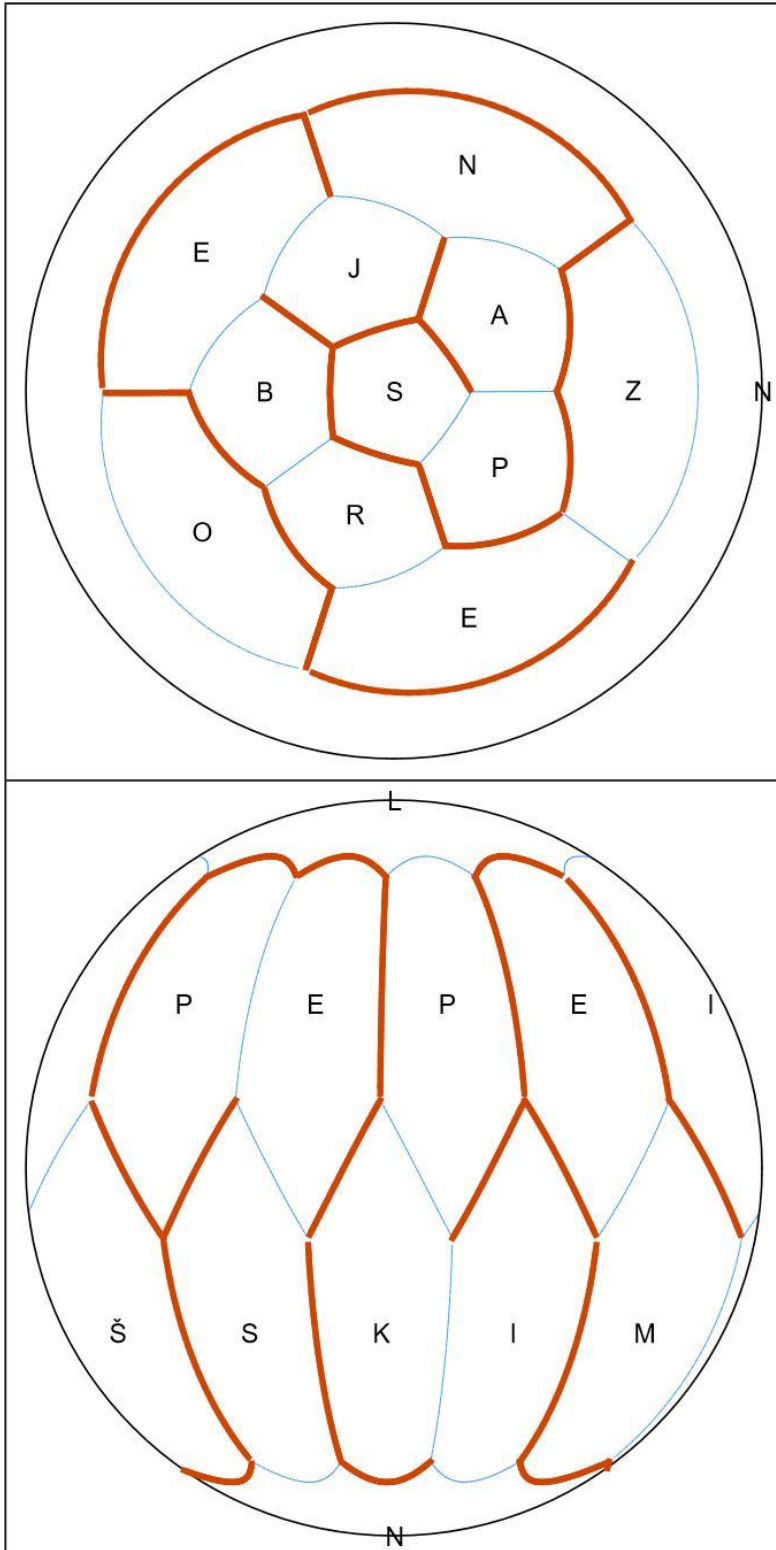


n	r	h	m	b	č
š	č	ž	j	a	g
n	i	s	a	m	i
b	t	l	i	o	d
n	s	a	c	e	z

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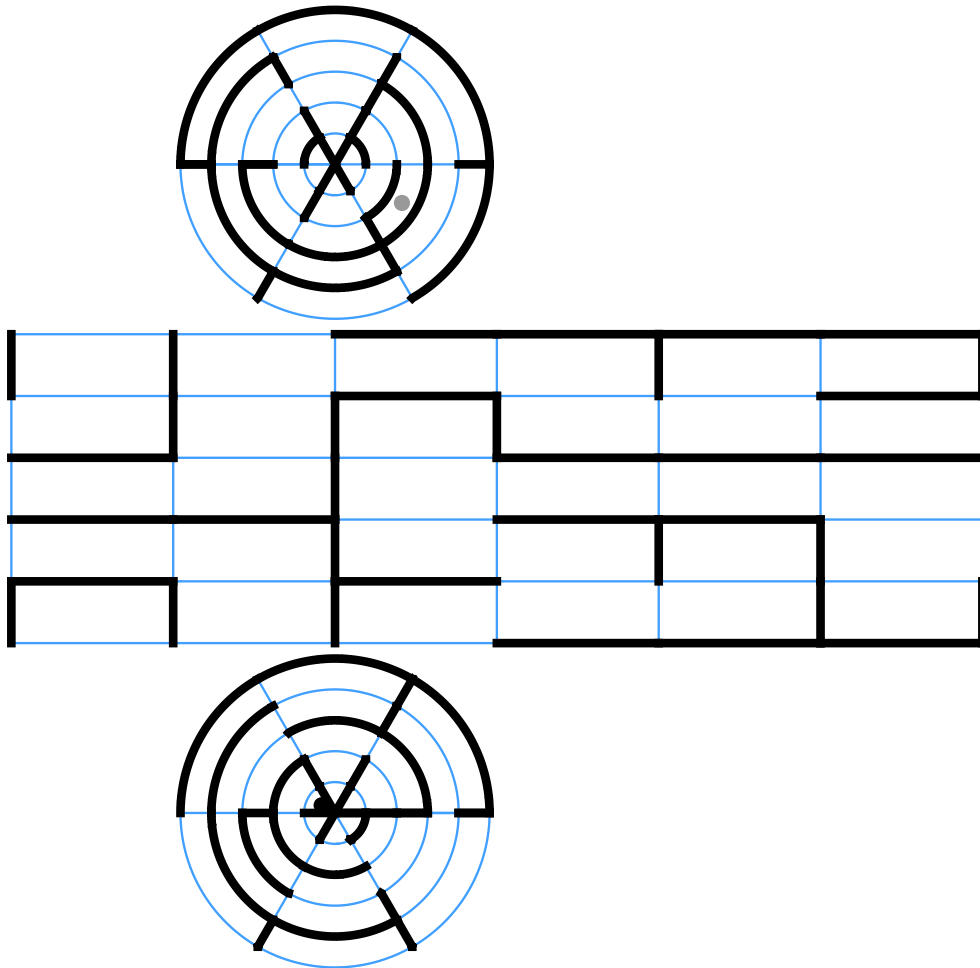
Labirinti na projekcijah telesa

Telo je projicirano v ravnino. Na projekciji je podan labirint, kjer odebeljene črte preprečujejo prehod iz projekcije mejne ploskve na projekcijo sosednje mejne ploskve. Poišči pot v labirintu in besedo na njej.

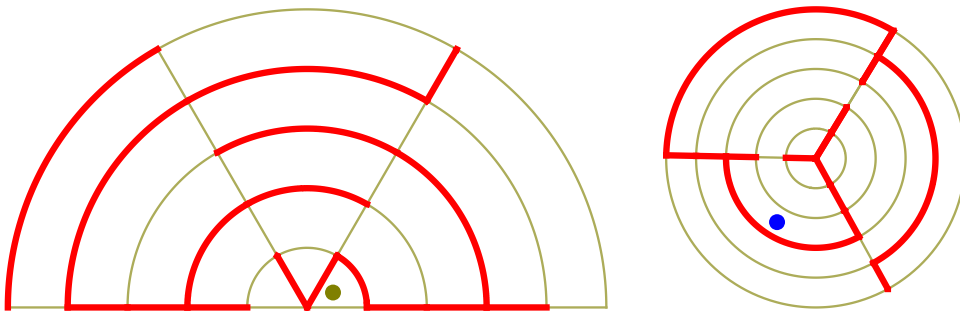


Labirinti na mreži valja in stožca

1.



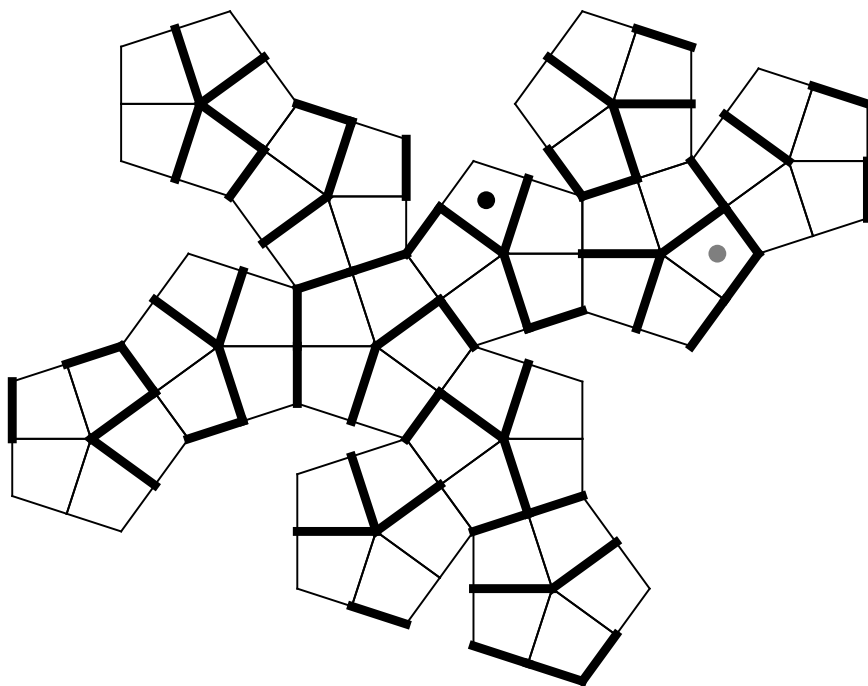
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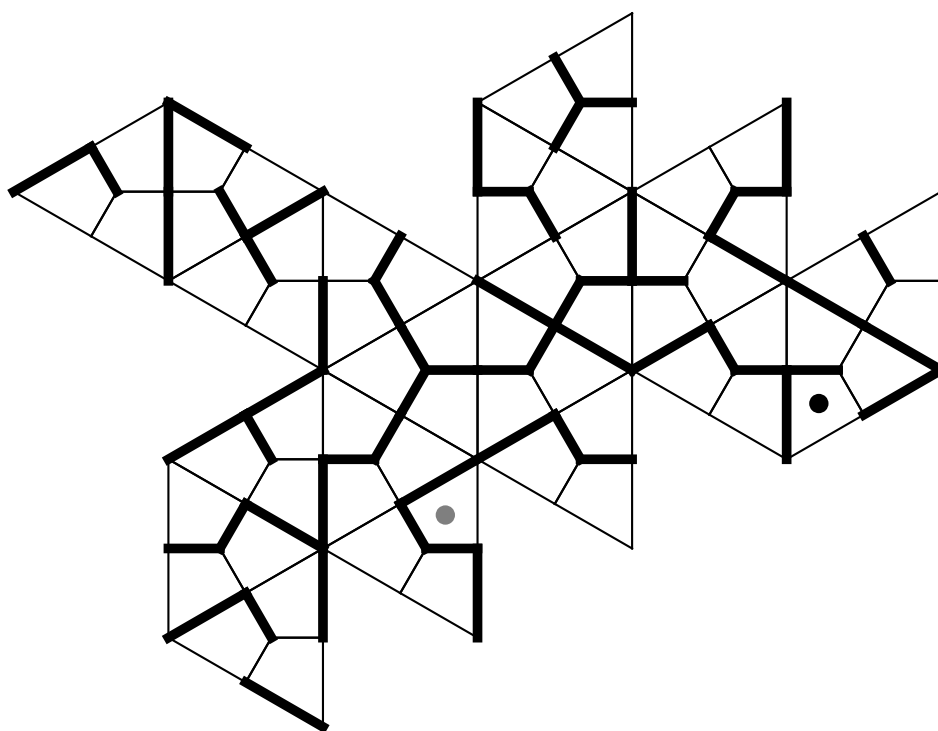
Srečanje na poliedrskem labirintu

Dan je labirint na mreži poliedra. Med sosednjima poljema se lahko prehaja, če med njima ni odebeljene črte. Črna pika se pomika po korakih proti sivi piki in siva pika proti črni. Kje se bosta srečali? Če je dolžina celotne poti sodo število, se srečata na meji med dvema poljema. Označi ta del za obe piki. Če je dolžina celotne poti liho število, potem se srečata na nekem polju, ki ga moraš označiti.

1.



2.



Logična naloga

Štiri prijateljice (Iva, Lana, Nina, Ada) imajo z različne konje (Tornado, King, Reno, Flobert), ki so različnih pasem (arabec, lisec, vranec, islandec).

Za vsako določi ime, ime konja in njegovo pasmo.

1. Tornado ni ne islandec ne vranec.
2. Reno ni ne vranec ne islandec.
3. Ada nima lisca.
4. Flobert ni vranec.
5. Ivin konj je arabec.
6. Reno ni arabec.
7. Nina nima Rena.
8. Ada nima Floberta.

	Tornado	King	Reno	Flobert	arabec	lisec	vranec	islandec
Iva								
Lana								
Nina								
Ada								
arabec								
lisec								
vranec								
islandec								

ime	konj	pasma
Iva		
Lana		
Nina		
Ada		

Naloga v esperantu

Kvar amikinoj (Maja, Dora, Jana, Nina) havas kvar hundojn (Etono, Tornado, Pongo, Bucefalo) de diversaj bredoj (grejhundo, mopso, pudelo, boksero).

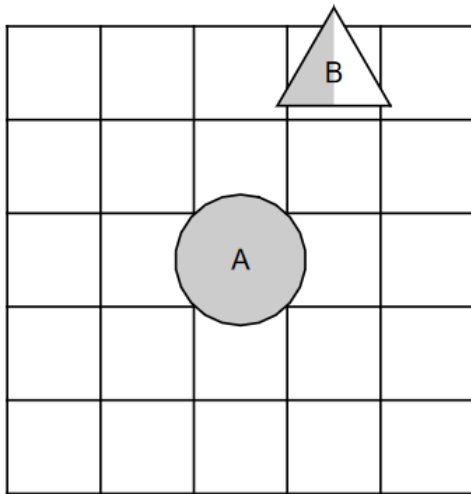
Divenu iliajn nomojn kaj la nomojn kaj bredojn de iliaj hundoj.

1. Jana ne havas pudelon.
2. Etono estas nek boksero nek pudelo.
3. Jana havas nek bokseron nek mopson.
4. Tornado ne estas pudelo.
5. Nina ne havas bokseron.
6. Bucefalo estas grejhundo.
7. Maja ne havas Tornadon.
8. Nina ne havas Etonon.

	Etono	Tornado	Pongo	Bucefalo	grejhundo	mopso	pudelo	boksero
Maja								
Dora								
Jana								
Nina								
grejhundo								
mopso								
pudelo								
boksero								

nomo	hundo	bredo
Maja		
Dora		
Jana		
Nina		

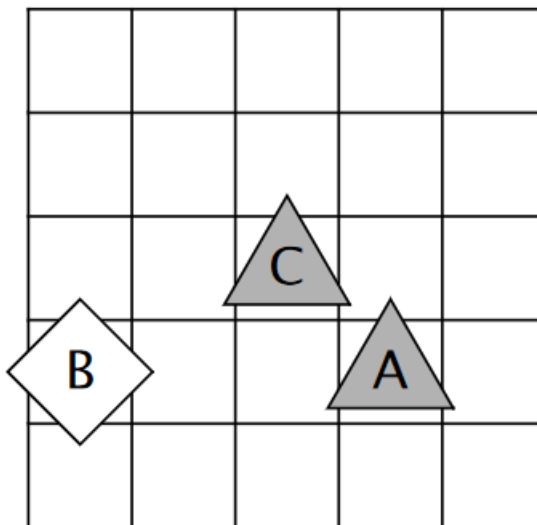
4. Pogojna verjetnost. Slučajno izberemo lik X, ki je A ali B. Izračunati moramo verjetnost dogodka S in pogojne verjetnosti.



S	P(S)	P(X = A S)	P(X = B S)
* (X)			
$\square(X)$			
$\neg \bullet(X)$			
$\neg \Delta(X)$			
$\bullet(X) \vee \Delta(X)$			
$\circ(X) \wedge \neg \square(X)$			
$\neg \circ(X) \vee \Delta(X)$			
$\neg \bullet(X) \vee \neg \Delta(X)$			

5. Določi vrednosti stavkov.

1. $\forall x(\circ(x) \Rightarrow \circ(x))$
2. $\forall x(\circ(x) \Rightarrow *(x))$
3. $\forall x(\square(x) \Rightarrow \bullet(x))$
4. $\exists x(\bullet(x) \wedge \Delta(x))$
5. $\forall x(\bullet(x) \Rightarrow *(x))$
6. $\exists x(*(x) \wedge \neg \bullet(x))$
7. $\exists x(\Delta(x) \wedge \neg \circ(x))$
8. $\forall x(*(x) \Rightarrow \neg \square(x))$
9. $\forall x(\square(x) \Rightarrow \neg *(x))$
10. $\exists x(*(x) \wedge \neg *(x))$



1	2	3	4	5	6	7	8	9	10

Rešitve:

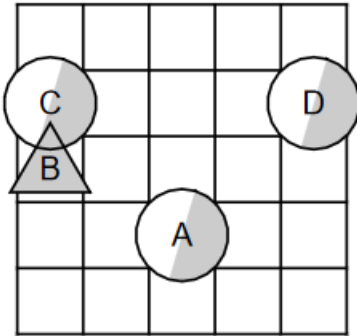
1.

1	2	3	4	5	6	7	8	9	10	11	12
R	R	R	R	N	R	N	R	R	N	N	R

2.

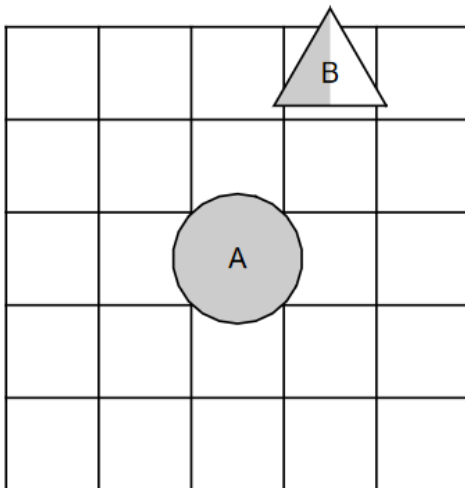
1	2	3	4	5	6	7
0	0	0	1	0	1	1

3.



1. $\bullet(C) \vee \Delta(D)$	$\frac{2}{3}$
2. $\neg\Delta(B) \vee \neg*(D)$	$\frac{2}{3}$
3. $\neg\Delta(D) \wedge \Delta(D)$	0
4. $\neg\circ(A) \vee \square(A)$	$\frac{2}{3}$
5. $\Delta(B) \vee \bullet(D)$	1
6. $\neg\Delta(B) \vee \square(D)$	$\frac{1}{3}$
7. $\bullet(D) \vee \square(A)$	$\frac{2}{3}$
8. $\Delta(D) \vee \circ(A)$	$\frac{2}{3}$

4.



S	P(S)	P(X = A S)	P(X = B S)
$*(X)$	$\frac{1}{6}$	1	0
$\square(X)$	$\frac{1}{6}$	1	0
$\neg\bullet(X)$	$\frac{1}{4}$	0	1
$\neg\Delta(X)$	$\frac{1}{3}$	1	0
$\bullet(X) \vee \Delta(X)$	1	$\frac{1}{2}$	$\frac{1}{2}$
$\circ(X) \wedge \neg\square(X)$	$\frac{1}{4}$	0	1
$\neg\circ(X) \vee \Delta(X)$	1	$\frac{1}{2}$	$\frac{1}{2}$
$\neg\bullet(X) \vee \neg\Delta(X)$	$\frac{7}{12}$	$\frac{4}{7}$	$\frac{3}{7}$

5.

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

Nekaj novih nalog

Silogizmi

Določiti moramo, ali je zadnji stavek v vrstici logična posledica predhodnih.

Če je, je sklepanje veljavno in vpišemo 'V', drugače pa 'N'.

Stavki, ki v nalogi nastopajo, se imenujejo kategorični stavki.

V tradicionalni logiki se uporabljajo naslednje oznake:

S a P pomeni, da je vsak S tudi P,

S e P pomeni, da noben S ni P,

S i P pomeni, da neki S je P,

S o P, pomeni, da neki S ni P,

Ex(S) pomeni, da obstaja vsaj en S.

Naloge

1.

$M \neq \emptyset$. $P \cap M = \emptyset$. $M \subset S$. $S - P \neq \emptyset$.

$M \cap P = \emptyset$. $S \cap M \neq \emptyset$. $S \cap P = \emptyset$.

$P \cap M \neq \emptyset$. $M \subset S$. $S \cap P \neq \emptyset$.

$P \cap M \neq \emptyset$. $S - M \neq \emptyset$. $S \cap P \neq \emptyset$.

$M - P \neq \emptyset$. $M \cap S = \emptyset$. $S - P \neq \emptyset$.

$P \subset M$. $S - M \neq \emptyset$. $S \cap P \neq \emptyset$.

2.

M a P. S a M. S a P.

M i P. S e M. S e P.

M a P. S o M. S o P.

M o P. S a M. S e P.

P o M. M i S. S i P.

M o P. M a S. S o P.

3.

Noben M ni P. Neki S je M. Vsi S so P.

Noben P ni M. Neki M ni S. Noben S ni P.

Neki M ni P. Vsi M so S. Neki S ni P.

Noben P ni M. Vsi S so M. Noben S ni P.

Noben P ni M. Vsi S so M. Vsi S so P.

Obstaja M. Noben P ni M. Vsi M so S. Neki S ni P.

4.

$\exists x(M(x) \wedge \neg P(x))$. $\exists x(S(x) \wedge \neg M(x))$. $\exists x(S(x) \wedge P(x))$.

$\forall x(M(x) \Rightarrow \neg P(x))$. $\exists x(S(x) \wedge M(x))$. $\forall x(S(x) \Rightarrow \neg P(x))$.

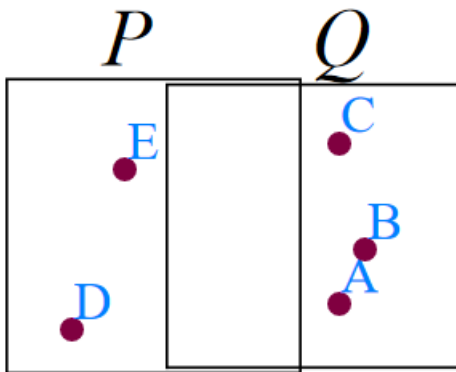
$\forall x(M(x) \Rightarrow \neg P(x))$. $\exists x(M(x) \wedge S(x))$. $\exists x(S(x) \wedge \neg P(x))$.

$\exists x(P(x) \wedge \neg M(x))$. $\forall x(M(x) \Rightarrow \neg S(x))$. $\exists x(S(x) \wedge \neg P(x))$.

$\forall x(P(x) \Rightarrow M(x))$. $\forall x(S(x) \Rightarrow M(x))$. $\exists x(S(x) \wedge \neg P(x))$.

$\exists xS(x)$. $\forall x(M(x) \Rightarrow \neg P(x))$. $\forall x(S(x) \Rightarrow M(x))$. $\exists x(S(x) \wedge \neg P(x))$.

5. Določi vrednosti stavkov



$\exists x (P(x) \wedge Q(x))$	
$\exists x P(x) \wedge \exists x Q(x)$	
$\exists x (P(x) \vee Q(x))$	
$\exists x P(x) \vee \exists x Q(x)$	
$\exists x (P(x) \Rightarrow Q(x))$	
$\exists x P(x) \Rightarrow \exists x Q(x)$	
$\exists x (P(x) \Leftrightarrow Q(x))$	
$\exists x P(x) \Leftrightarrow \exists x Q(x)$	
$\forall x (P(x) \wedge Q(x))$	
$\forall x P(x) \wedge \forall x Q(x)$	
$\forall x (P(x) \vee Q(x))$	
$\forall x P(x) \vee \forall x Q(x)$	
$\forall x (P(x) \Rightarrow Q(x))$	
$\forall x P(x) \Rightarrow \forall x Q(x)$	
$\forall x (P(x) \Leftrightarrow Q(x))$	
$\forall x P(x) \Leftrightarrow \forall x Q(x)$	

Rešitve

1.

 $M \neq \emptyset. P \cap M = \emptyset. M \subset S. S - P \neq \emptyset. V$ $M \cap P = \emptyset. S \cap M \neq \emptyset. S \cap P = \emptyset. N$ $P \cap M \neq \emptyset. M \subset S. S \cap P \neq \emptyset. V$ $P \cap M \neq \emptyset. S - M \neq \emptyset. S \cap P \neq \emptyset. N$ $M - P \neq \emptyset. M \cap S = \emptyset. S - P \neq \emptyset. N$ $P \subset M. S - M \neq \emptyset. S \cap P \neq \emptyset. N$

2.

 $M a P. S a M. S a P. V$ $M i P. S e M. S e P. N$ $M a P. S o M. S o P. N$ $M o P. S a M. S e P. N$ $P o M. M i S. S i P. N$ $M o P. M a S. S o P. V$

3.

Noben M ni P. Neki S je M. Vsi S so P. V

Noben P ni M. Neki M ni S. Noben S ni P. N

Neki M ni P. Vsi M so S. Neki S ni P. V

Noben P ni M. Vsi S so M. Noben S ni P. V

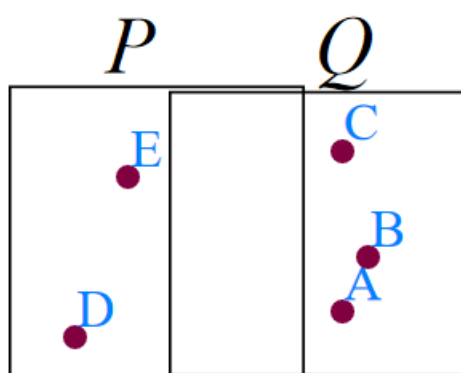
Noben P ni M. Vsi S so M. Vsi S so P. N

Obstaja M. Noben P ni M. Vsi M so S. Neki S ni P. V

4.

$\exists x(M(x) \wedge \neg P(x)). \exists x(S(x) \wedge \neg M(x)). \exists x(S(x) \wedge P(x)). N$
 $\forall x(M(x) \Rightarrow \neg P(x)). \exists x(S(x) \wedge M(x)). \forall x(S(x) \Rightarrow \neg P(x)). N$
 $\forall x(M(x) \Rightarrow \neg P(x)). \exists x(M(x) \wedge S(x)). \exists x(S(x) \wedge \neg P(x)). V$
 $\exists x(P(x) \wedge \neg M(x)). \forall x(M(x) \Rightarrow \neg S(x)). \exists x(S(x) \wedge \neg P(x)). N$
 $\forall x(P(x) \Rightarrow M(x)). \forall x(S(x) \Rightarrow M(x)). \exists x(S(x) \wedge \neg P(x)). N$
 $\exists xS(x). \forall x(M(x) \Rightarrow \neg P(x)). \forall x(S(x) \Rightarrow M(x)). \exists x(S(x) \wedge \neg P(x)). V$

5.



$\exists x (P(x) \wedge Q(x))$	N
$\exists x P(x) \wedge \exists x Q(x)$	R
$\exists x (P(x) \vee Q(x))$	R
$\exists x P(x) \vee \exists x Q(x)$	R
$\exists x (P(x) \Rightarrow Q(x))$	R
$\exists x P(x) \Rightarrow \exists x Q(x)$	R
$\exists x (P(x) \Leftrightarrow Q(x))$	N
$\exists x P(x) \Leftrightarrow \exists x Q(x)$	R
$\forall x (P(x) \wedge Q(x))$	N
$\forall x P(x) \wedge \forall x Q(x)$	N
$\forall x (P(x) \vee Q(x))$	R
$\forall x P(x) \vee \forall x Q(x)$	N
$\forall x (P(x) \Rightarrow Q(x))$	N
$\forall x P(x) \Rightarrow \forall x Q(x)$	R
$\forall x (P(x) \Leftrightarrow Q(x))$	N
$\forall x P(x) \Leftrightarrow \forall x Q(x)$	R

Silogizmi na tekmovanju Logična pošast

Na državnem tekmovanju v šolskem letu 2023/2024 je bila pri višji razredih naloga, kjer je se je ugotavljala pravilnost silogizmov. Rešitev naloge v 8. razredu je bila takale:

3. PRAVILNOST SKLEPANJA

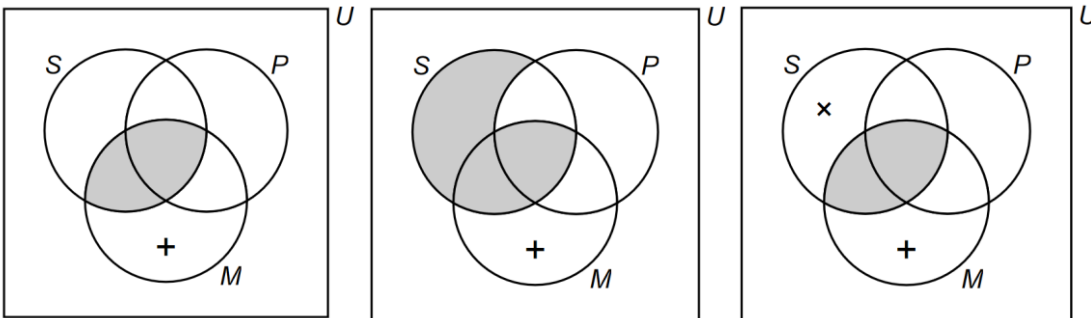
Ugotovi, ali zadnji stavek v vrstici logično sledi iz prejšnjih stavkov v vrstici. Če sledi, zapiši D, če ne sledi, zapiši N.

- N $M - P \neq \emptyset. S \cap M = \emptyset. S \subset P.$
 D $P \subset M. S - M \neq \emptyset. S - P \neq \emptyset.$
 N $P - M \neq \emptyset. S - M \neq \emptyset. S \cap P = \emptyset.$
 D $S \neq \emptyset. P \cap M = \emptyset. S \subset M. S - P \neq \emptyset.$
 N $P \cap M = \emptyset. S - M \neq \emptyset. S - P \neq \emptyset.$

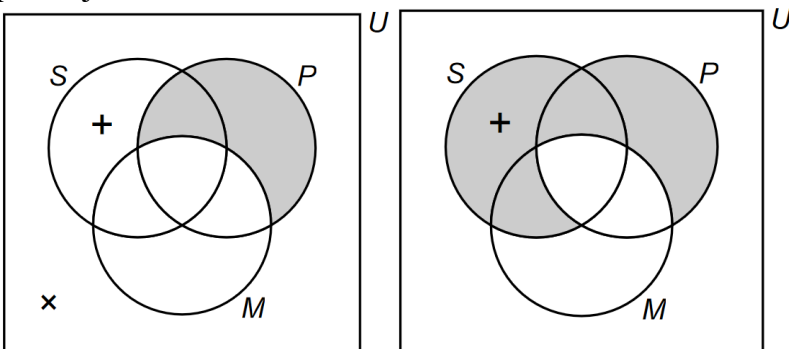
$M \cap P$ presek
 $M \cup P$ unija
 $M - P$ razlika
 $M \subset P$ M je podmnožica množice P
 \emptyset prazna množica

Tokrat bomo pravilnost silogizmov preverjali z Vennovimi diagrami.

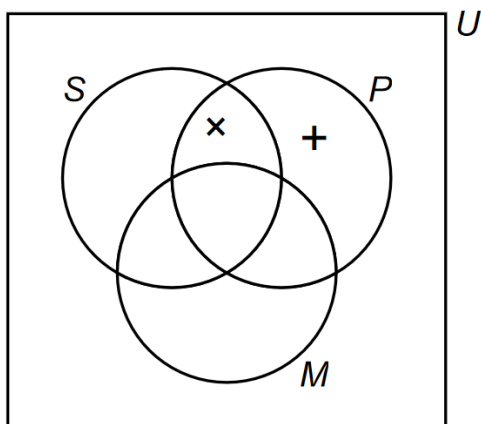
1. V prvem diagramu sta premisi resnični. V drugem je tudi zaključek resničen. V tretjem pa je zaključek neresničen. Silogizem ni pravilen.



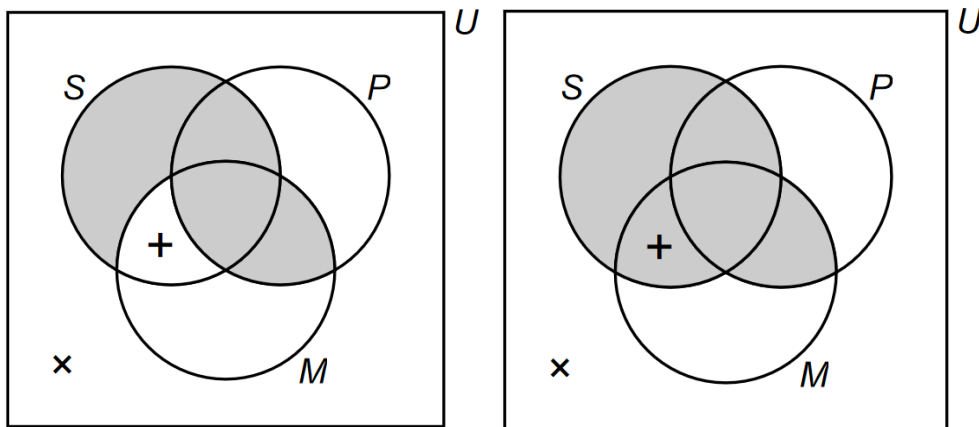
2. V prvem diagramu sta premisi resnični in avtomatično je tudi zaključek resničen. Silogizem je pravilen. Če vzamemo, da je zaključek neresničen, dobimo protislovje, to je, + v zatemnjenem področju.



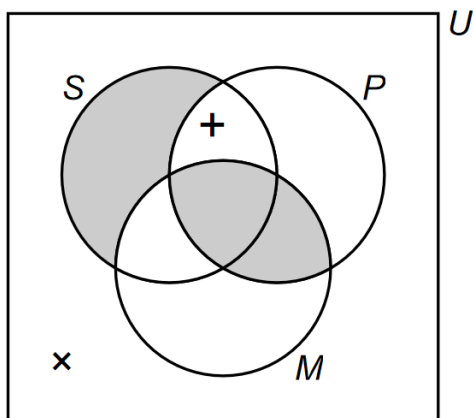
3. V tretji vrstici je nepravilen silogizem. Diagram prikazuje resničnost premis in neresničnost zaključka.



4. Silogizem je pravilen. V diagramu so vse tri premise resnične in avtomatično je resničen zaključek. Če vzamemo negacijo zaključka, dobimo protislovje (desni diagram).



5. Silogizem je nepravilen. V diagramu sta premisi resnični, zaključek pa je neresničen.



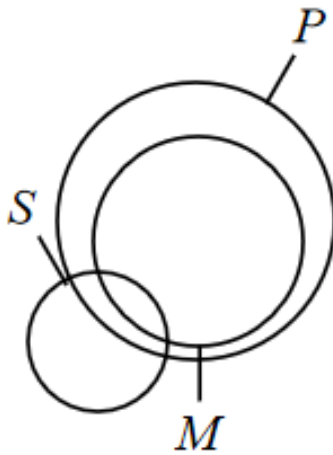
Tokrat bomo uporabili Eulerjeve kroge. Naloge v 1. letniku je bila takale:

8. PRAVILNOST SKLEPANJA

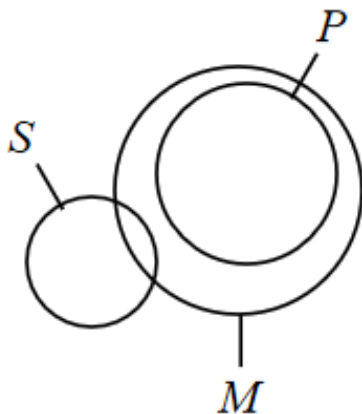
Ugotovi, ali zadnji stavek v vrstici logično sledi iz prejšnjih stavkov v vrstici. Če sledi, zapiši D, če ne sledi, zapiši N.

- $M \subset P$. $M \cap S \neq \emptyset$. $S \cap P = \emptyset$.
- $S \neq \emptyset$. $P \subset M$. $M \cap S = \emptyset$. $S - P \neq \emptyset$.
- $M \subset P$. $M \subset S$. $S \subset P$.
- $P \cap M \neq \emptyset$. $M - S \neq \emptyset$. $S \subset P$.
- $M \neq \emptyset$. $M \subset P$. $M \subset S$. $S \cap P \neq \emptyset$.

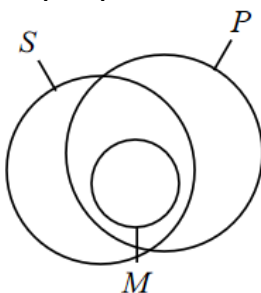
1. Krog M je v celoti v P in presek M in S ni prazen. Avtomatično tudi presek S in P ni prazen. Silogizen ni pravilen.



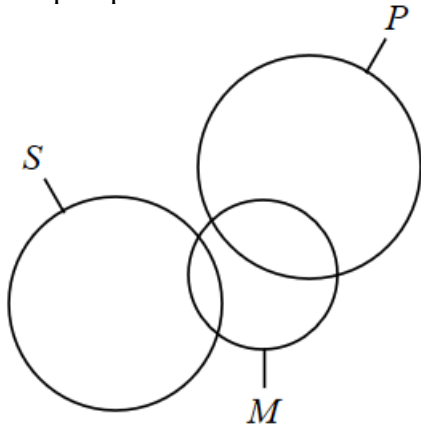
2. Premise so resnične, zaključek pa ni. Sklep ni pravilen.



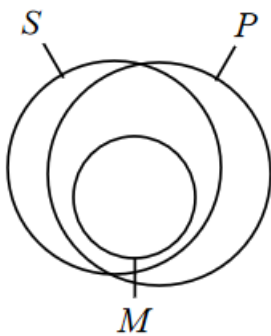
3. Sklep ni pravilen.



4. Sklep ni pravilen.



5. Silogizem je pravilen.



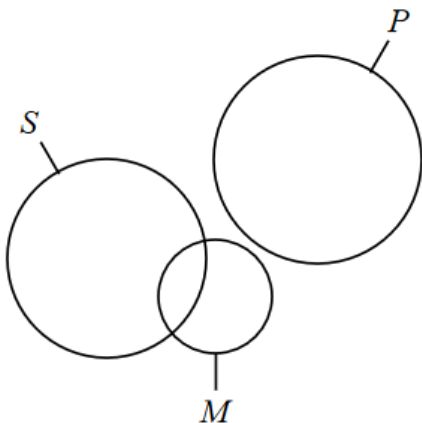
Naloge drugi letnik

8. PRAVILNOST SKLEPANJA

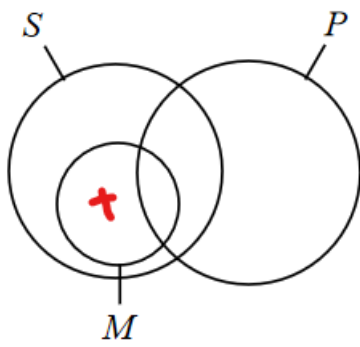
Ugotovi, ali zadnji stavek v vrstici logično sledi iz prejšnjih stavkov v vrstici. Če sledi, zapiši D, če ne sledi, zapiši N.

- $M \cap P = \emptyset. M \cap S \neq \emptyset. S - P \neq \emptyset.$
- $M - P \neq \emptyset. M \subset S. S - P \neq \emptyset.$
- $P \cap M = \emptyset. S \cap M \neq \emptyset. S \subset P.$
- $P - M \neq \emptyset. S \subset M. S - P \neq \emptyset.$
- $M \cap P = \emptyset. S \cap M \neq \emptyset. S \cap P \neq \emptyset.$

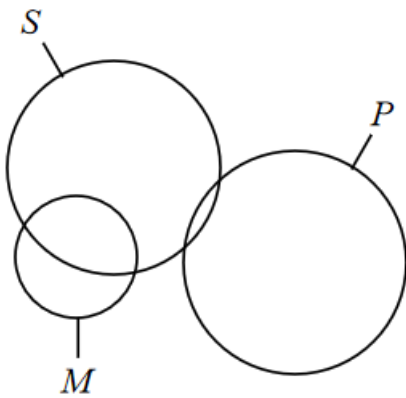
1. Sklep je pravilen.



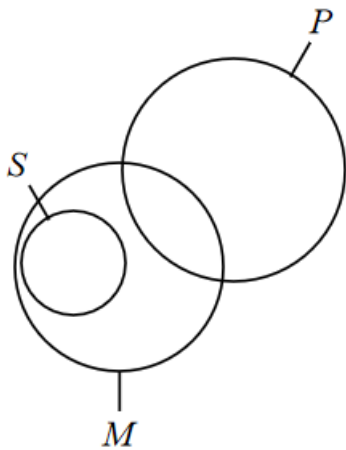
2. Sklep je pravilen.



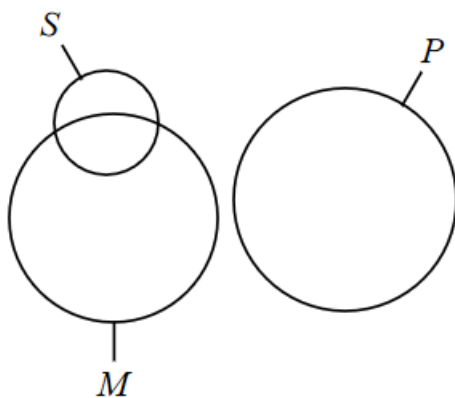
3. Sklep ni pravilen.



4. Sklep ni pravilen.



5. Sklep ni pravilen.



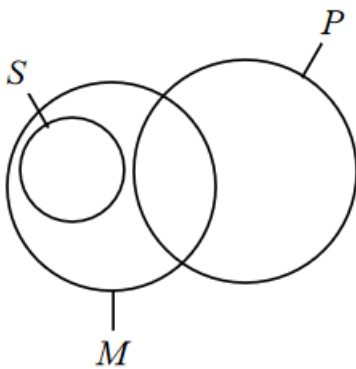
Naloge tretji letnik

6. PRAVILNOST SKLEPANJA

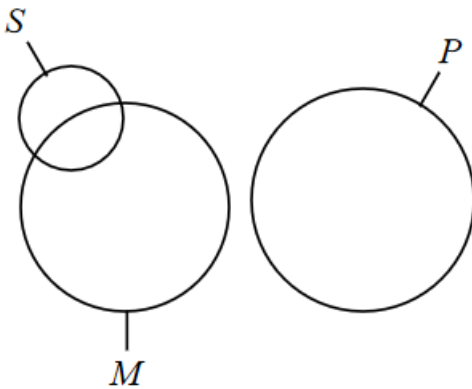
Ugotovi, ali zadnji stavek v vrstici logično sledi iz prejšnjih stavkov v vrstici. Če sledi, zapiši D, če ne sledi, zapiši N.

- $M - P \neq \emptyset. S \subset M. S \subset P.$
 $P \cap M = \emptyset. M \cap S \neq \emptyset. S - P \neq \emptyset.$
 $M \cap P = \emptyset. M \cap S \neq \emptyset. S - P \neq \emptyset.$
 $M \cap P = \emptyset. M \cap S = \emptyset. S \cap P \neq \emptyset.$
 $S \neq \emptyset. M \cap P = \emptyset. S \subset M. S - P \neq \emptyset.$

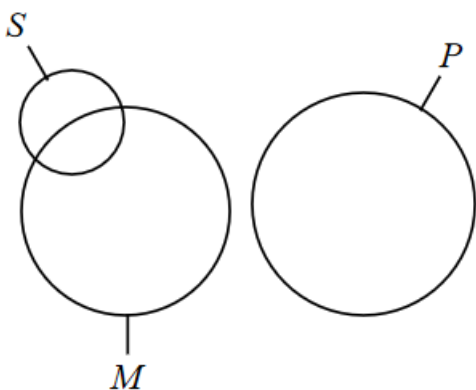
1. Sklep ni pravilen.



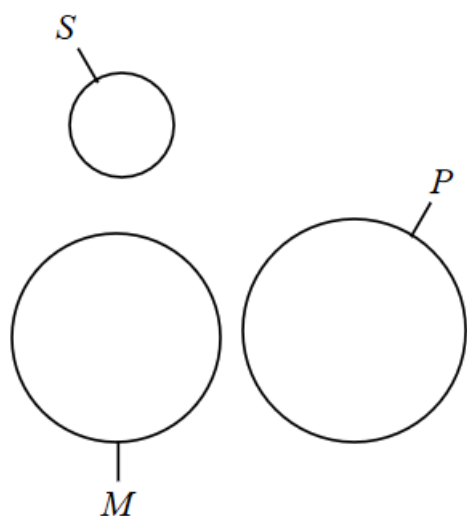
2. Sklep ni pravilen.



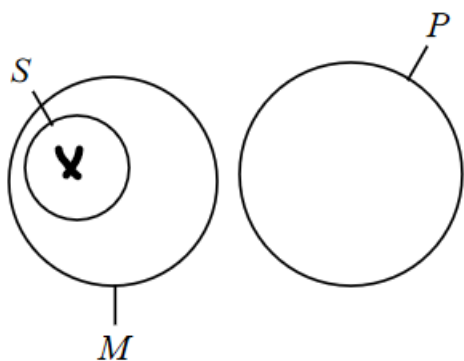
3. Sklep ni pravilen.



4. Sklep ni pravilen.



5. Sklep je pravilen.



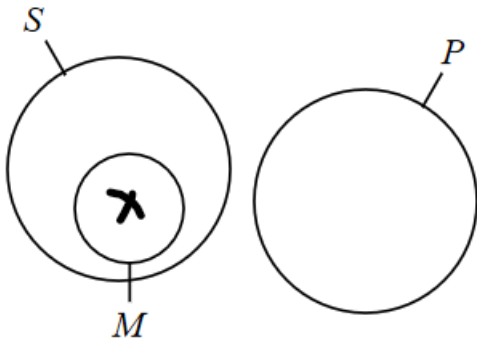
Naloge četrti letnik

6. PRAVLNOST SKLEPANJA

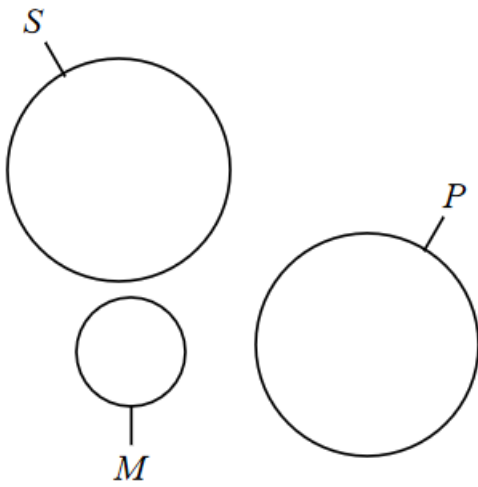
Ugotovi, ali zadnji stavek v vrstici logično sledi iz prejšnjih stavkov v vrstici. Če sledi, zapiši D, če ne sledi, zapiši N.

- $M \neq \emptyset. P \cap M = \emptyset. M \subset S. S - P \neq \emptyset.$
- $P \cap M = \emptyset. M \cap S = \emptyset. S \subset P.$
- $P \cap M \neq \emptyset. M \subset S. S \cap P \neq \emptyset.$
- $M \subset P. S \subset M. S - P \neq \emptyset.$
- $M - P \neq \emptyset. S - M \neq \emptyset. S \cap P \neq \emptyset.$

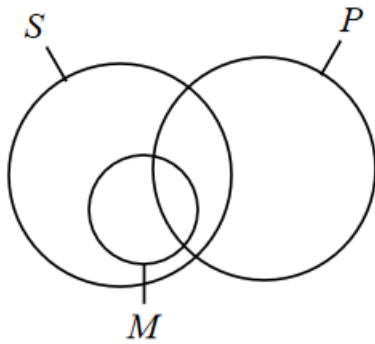
1. Sklep je pravilen.



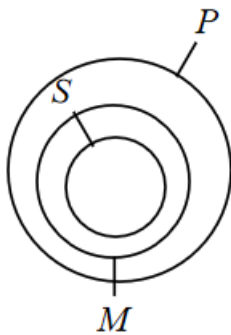
2. Sklep ni pravilen.



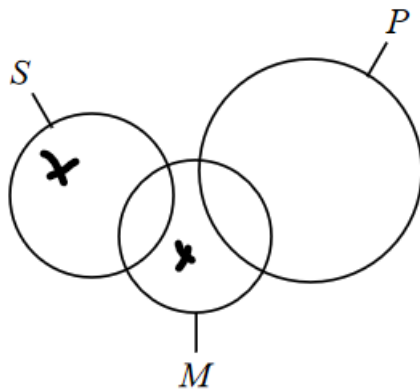
3. Sklep je pravilen.



4. Sklep ni pravilen.



5. Sklep ni pravilen.



Tokrat bomo uporabili **Lewisove diagrame**.

V 9. razredu je bila tale naloga:

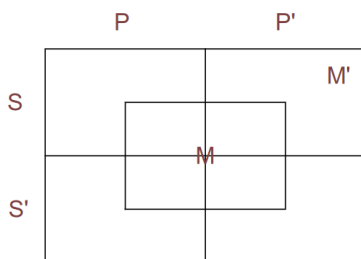
3. PRAVILNOST SKLEPANJA

Ugotovi, ali zadnji stavek v vrstici logično sledi iz stavkov prejšnjih v vrstici. Če sledi, zapiši D, če ne sledi zapiši N.

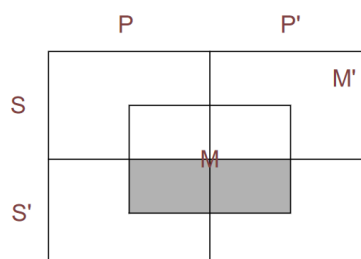
- $P - M \neq \emptyset. M - S \neq \emptyset. S - P \neq \emptyset.$
- $M - P \neq \emptyset. M \subset S. S - P \neq \emptyset.$
- $M \cap P = \emptyset. M \subset S. S \subset P.$
- $P \cap M \neq \emptyset. M \subset S. S \cap P \neq \emptyset.$
- $M \subset P. S \subset M. S \subset P.$

$M \cap P$ presek
 $M \cup P$ unija
 $M - P$ razlika
 $M \subset P$ M je podmnožica množice P
 \emptyset prazna množica

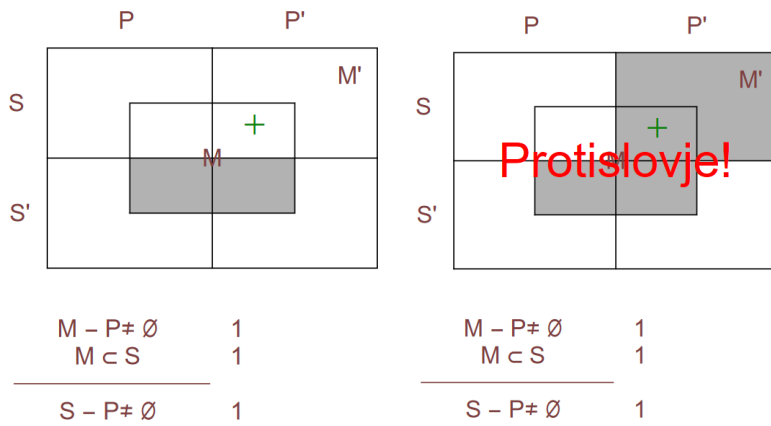
Pravilna sta 2. in 6. silogizem. Vsakemu terminu X (množici, predikatu) ustreza negacija (komplement) X'. Diagram je podeljen na osem delov. Da je tak del prazen, prikažemo z zatemnitvijo. Začnemo z drugo premiso, zatemnimo vse M, ki niso v S. Upoštevamo še prvo premiso, da obstaja vsaj en M, ki ni P. Sledi, da obstaja S, ki ni P. Druga možnost za dokaz pravilnosti je, da pokažemo, da resničnost premis in negacija zaključka predstavlja protislovje. Negacija zaključka je, da je S podmnožica P.



$M - P \neq \emptyset$	U
$M \subset S$	U
$S - P \neq \emptyset$	
	U

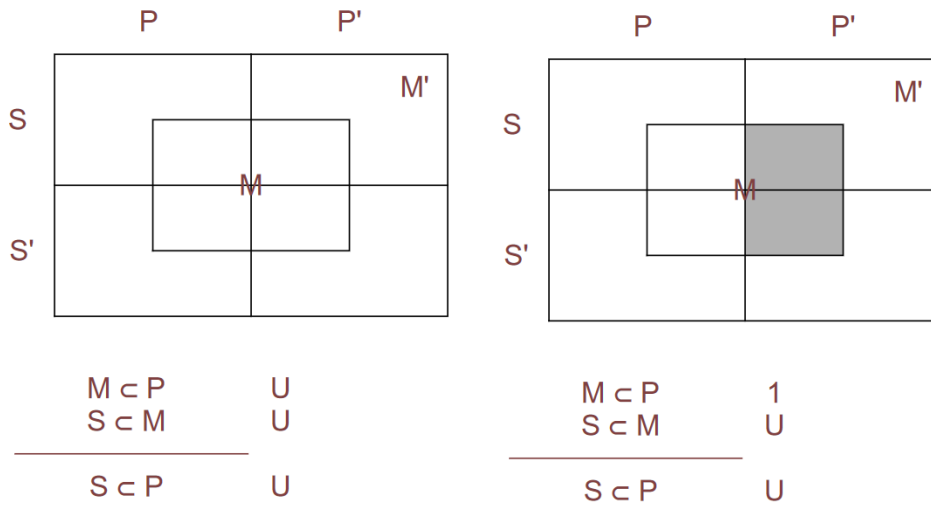


$M - P \neq \emptyset$	U
$M \subset S$	1
$S - P \neq \emptyset$	
	U

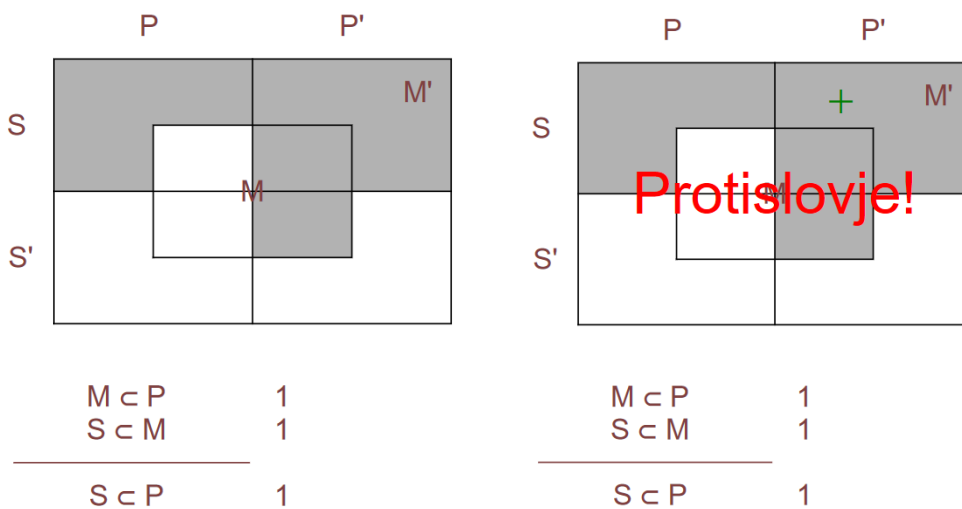


Znak + pomeni, da področje ni prazno, zatemnitev pa, da je prazno. Znak + na temnem področju je protislovje.

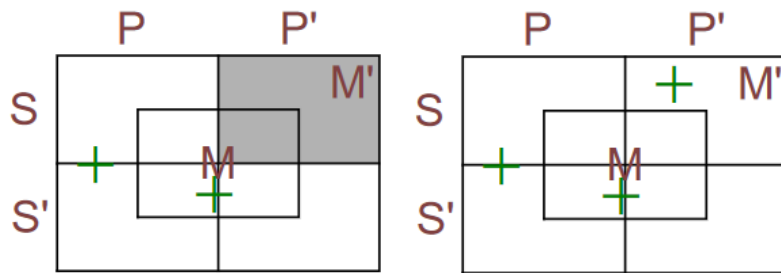
Pravilen je tudi zadnji silogizem.



Osenčili smo vse M, ki niso v P. Nato osenčimo vse S, ki niso v M. Tretji stavek je resničen. Če bi dokazovali s protislovjem, vzamemo, da obstaja S, ki ni v P.

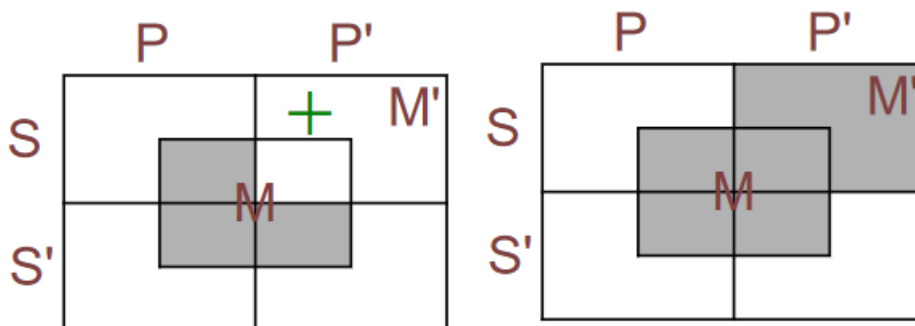


Za dokaz nepravilnosti silogizma moramo poiskati diagram, kjer so premise pravilne, zaključek pa nepravilen. Prva vrstica predstavlja nepravilen silogizem: $P - M \neq \emptyset$. $M - S \neq \emptyset$. $S - P \neq \emptyset$.

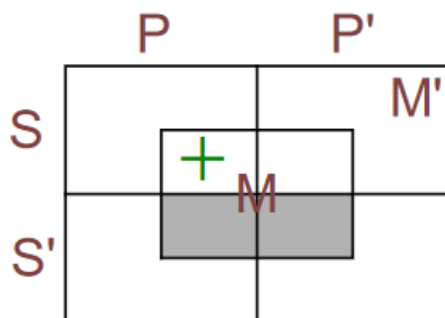


Levi + pove, da obstaja P, ki ni M. Desni plus pove, da obstaja M, ki ni S. Zatemnitev pomeni, da ne obstaja S, ki ni P, to je vsi S so P. Zaključek je nepravilen. Seveda to ne pomeni, da je zaključek vedno nepravilen. Drugi diagram prikazuje možnost, da so vse tri izjave pravilne. Veljavnost sklepanja pomeni, da iz pravilnosti premis sledi pravilnost zaključka.

Oglejmo si še tretjo vrstico. $M \cap P = \emptyset$. $M \subset S$. $S \subset P$. V obeh spodnjih diagramih sta premisi pravilni, v prvem je zaključek nepravilen, v drugem pa pravilen.



$P \cap M \neq \emptyset$. $M \subset S$. $S \cap P \neq \emptyset$. V prvem diagramu sta premisi pravilni. Toda zdaj je zaključek avtomatično pravilen. Torej je sklep pravilen.



Reference:

[Forms for Syllogisms - Wolfram Demonstrations Project](#)

[Euler Circles for Categorical Syllogisms - Wolfram Demonstrations Project](#)

[Lewis Carroll's Diagram and Categorical Syllogisms - Wolfram Demonstrations Project](#)

[Venn Diagrams and Syllogisms - Wolfram Demonstrations Project](#)

Velik dvajseterčev kalejdoskop

Kalejdoskop ima obliko prisekane tristrane piramide z večjim robom 85 cm. Datoteko je izdelal Izidor Hafner, laserski izrez pa je bil narejen pri Pečenko d.o.o. Izdelal ga je mizar Klemen Polak iz Mozirja. Zakital ga je Zdravko Budna. Izdelana sta bila dva primera.



Rešitve

Barvni sudoku

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Sudoku z večkotniki

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Sudoku s črkami

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Futoshiki

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Križne vsote

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3	2	1		14			
23	6	8	9		6		
			7	5	2	12	
					12	3	9
					4	1	3

		4	15		
6	1	5		16	
12	3	2	7		
		17	8	9	

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

		8	14						
6	5	1				15	9		
12	3	9	17			13	17	9	8
		13	4	9	10	3	6	1	
				21	8	7	6		
					12	8	4		

Križni produkti

	40	24		
30	5	6	315	
224	8	4	7	14
		18	9	2
		35	5	7

	63	28			
63	9	7	54		
252	7	4	9	168	
		42	6	7	45
			72	8	9
			15	3	5

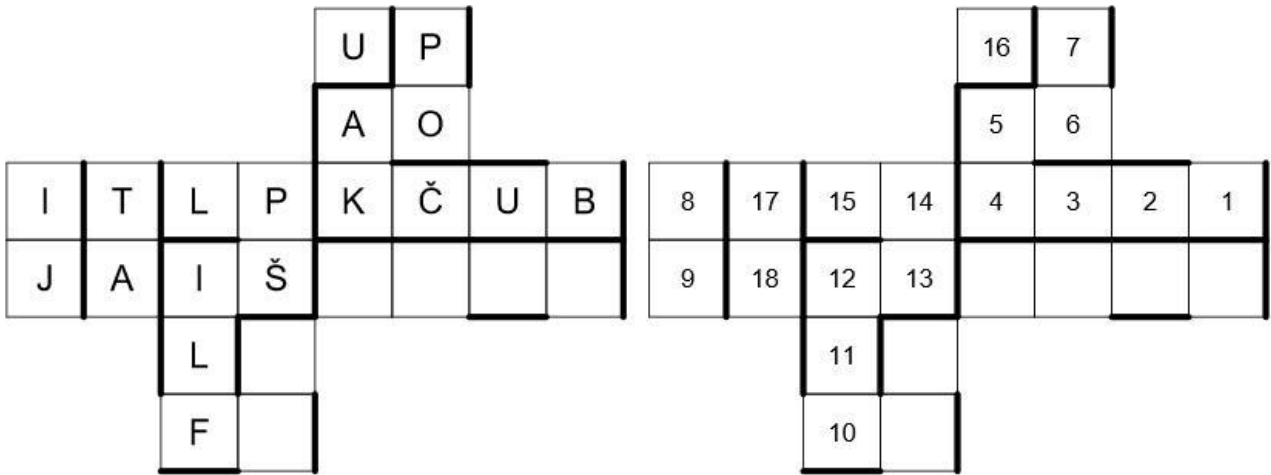
	12	180				
10	2	5			63	27
48	6	8	28		63	7
		4	7	135	5	9
		28	48		6	3
		192	4	8	6	
			42	6	7	

	21	30	42
210	7	5	6
126	3	6	7

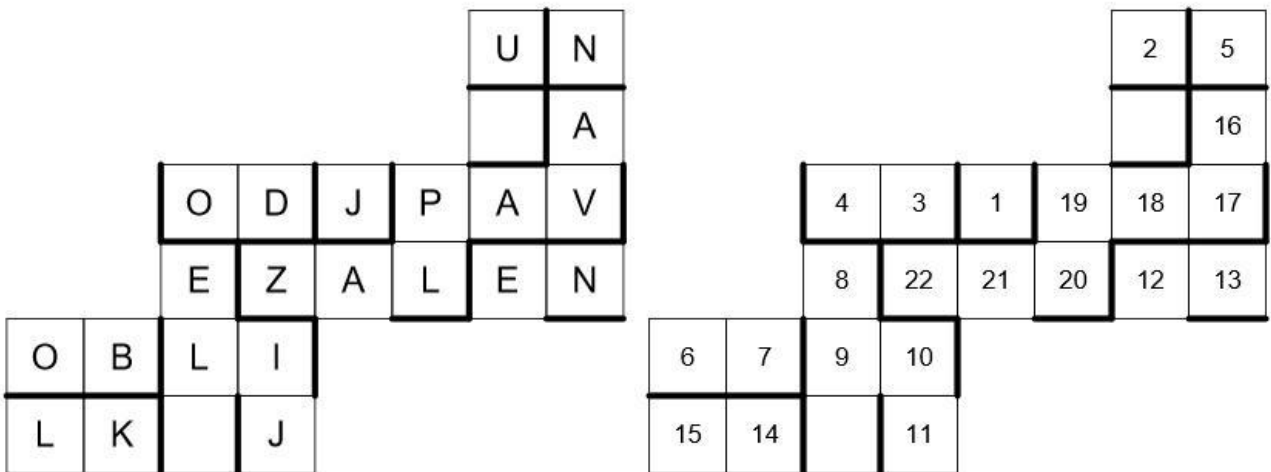
	45	28	48
120	5	4	6
504	9	7	8

	6	108	
6	3	2	63
126	2	9	7
	54	6	9

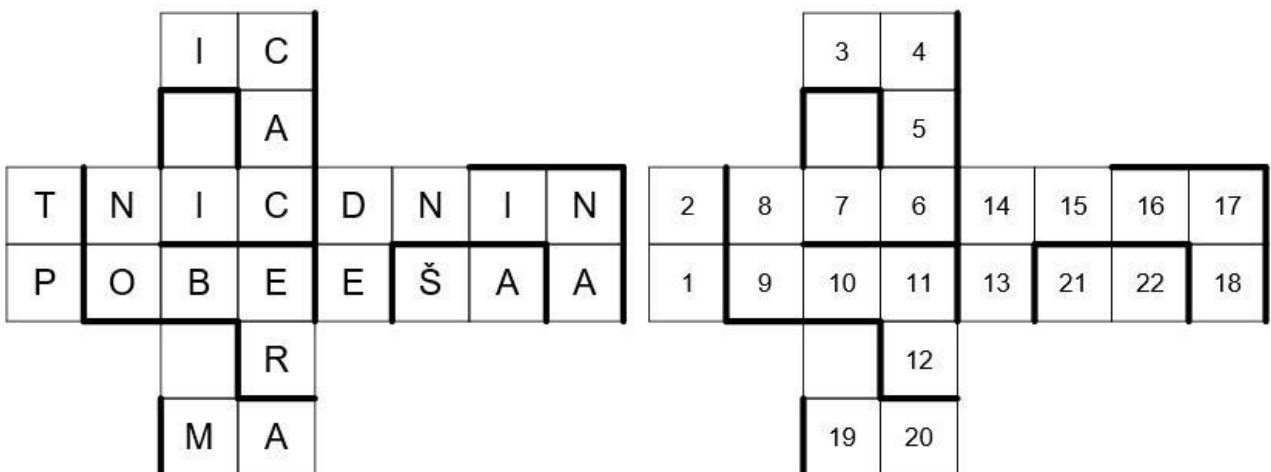
Labirint na kocki



BUČKA OPIJ FLIŠ PLUTA

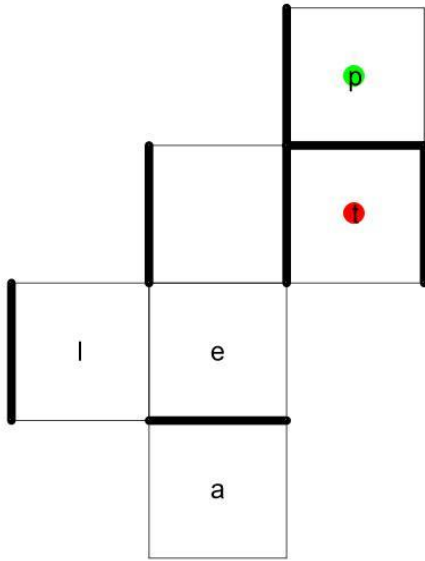


JUDONO BELI JENKLAVAPLAZ

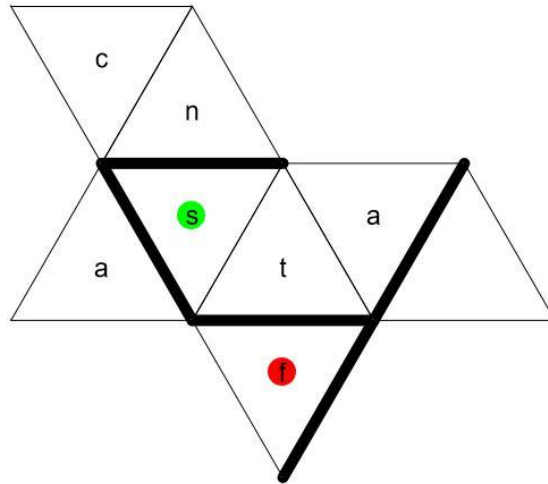


PTICACINOBEREDNINAMAŠA

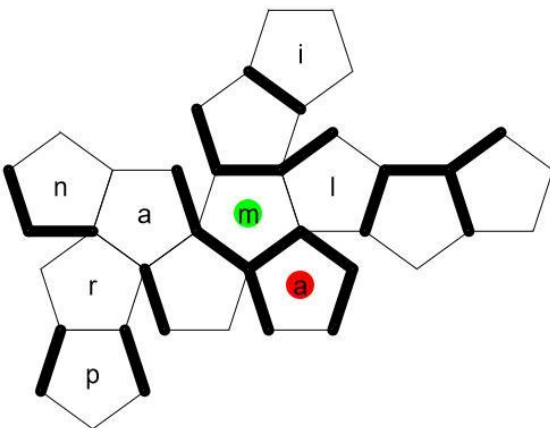
Labirinti na poliedrih



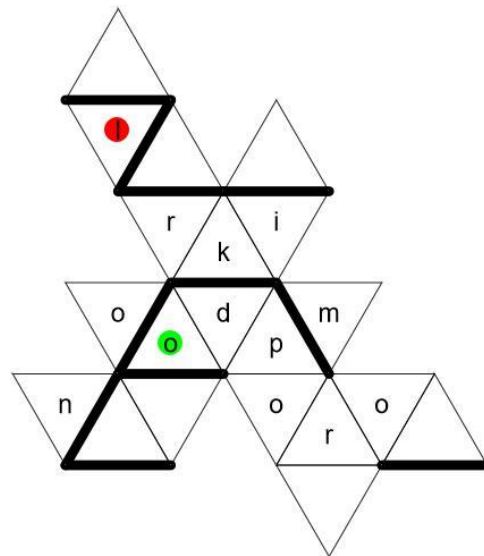
{paleta}



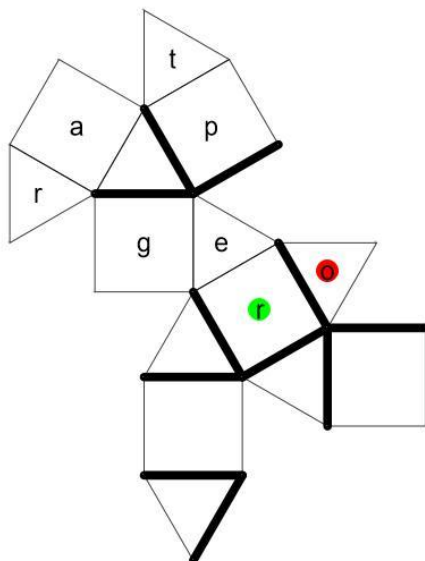
{stanca, fižol}



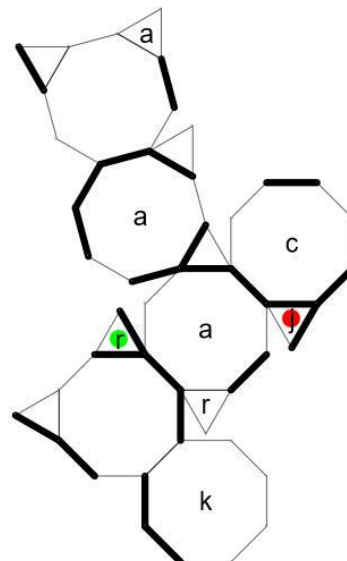
{mlinar, paprika}



{odpor, omikron, lazar}



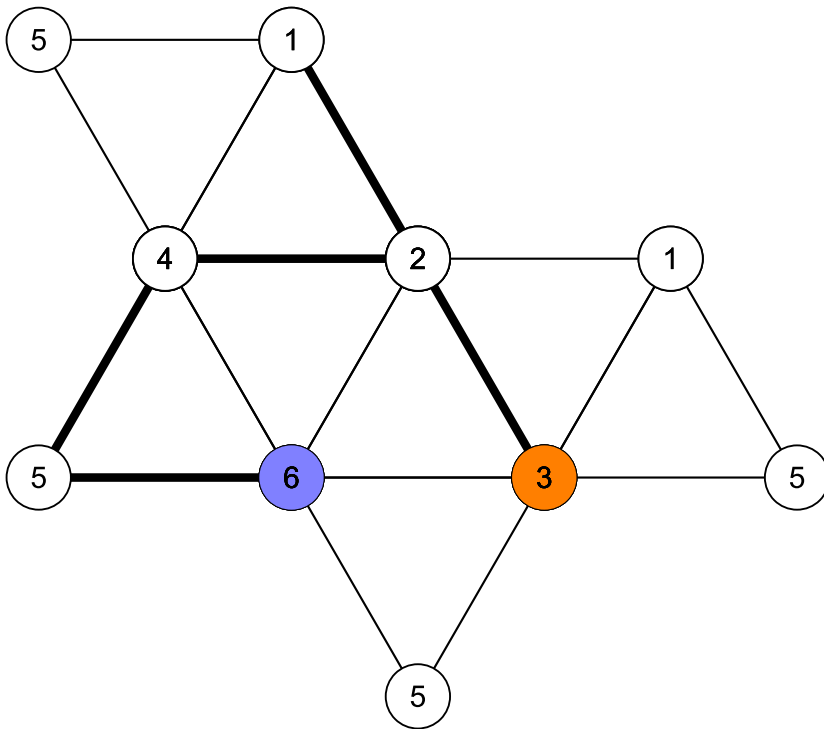
{regnat, podlaket}



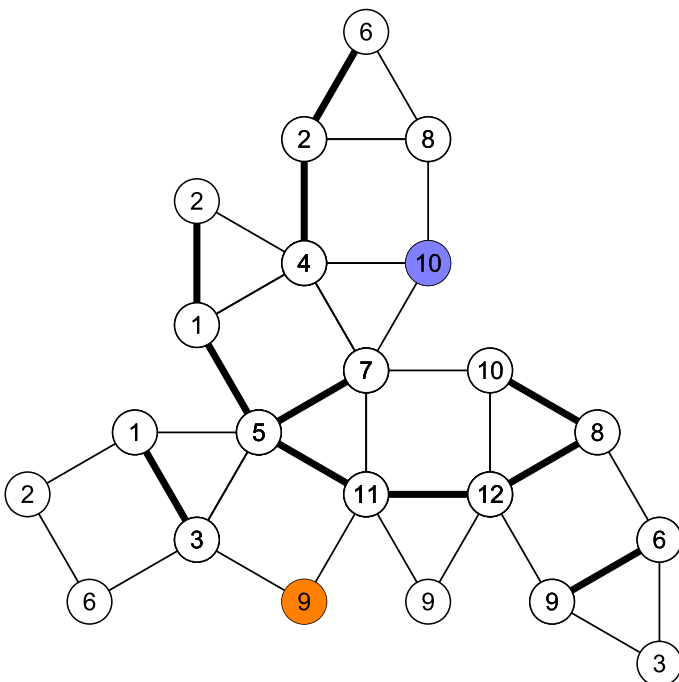
{raca, krajina}

Labirinti na robovih poliedra

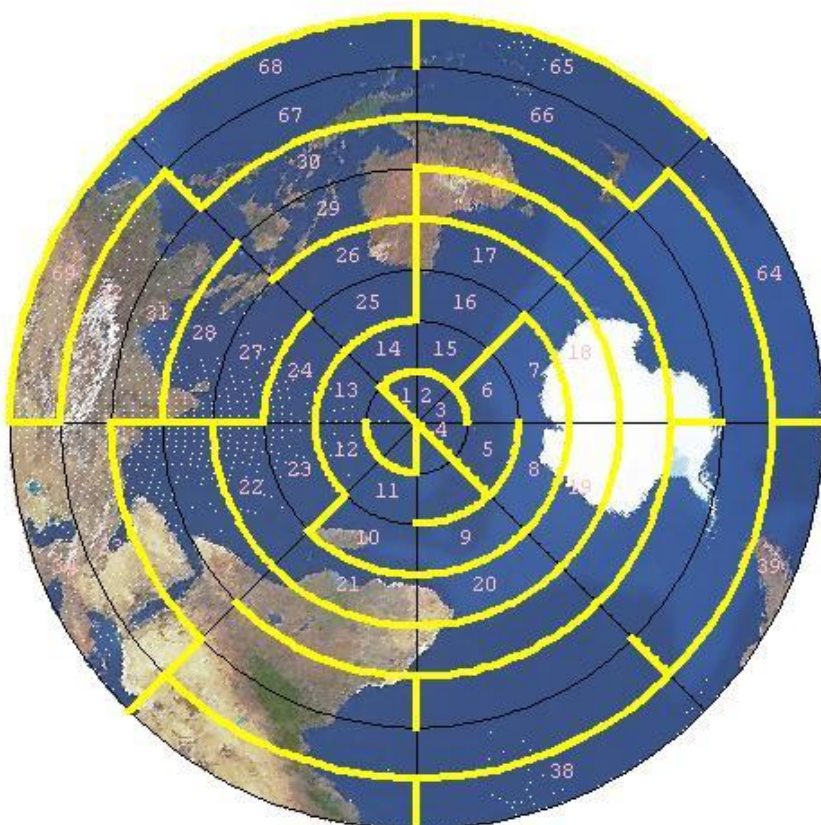
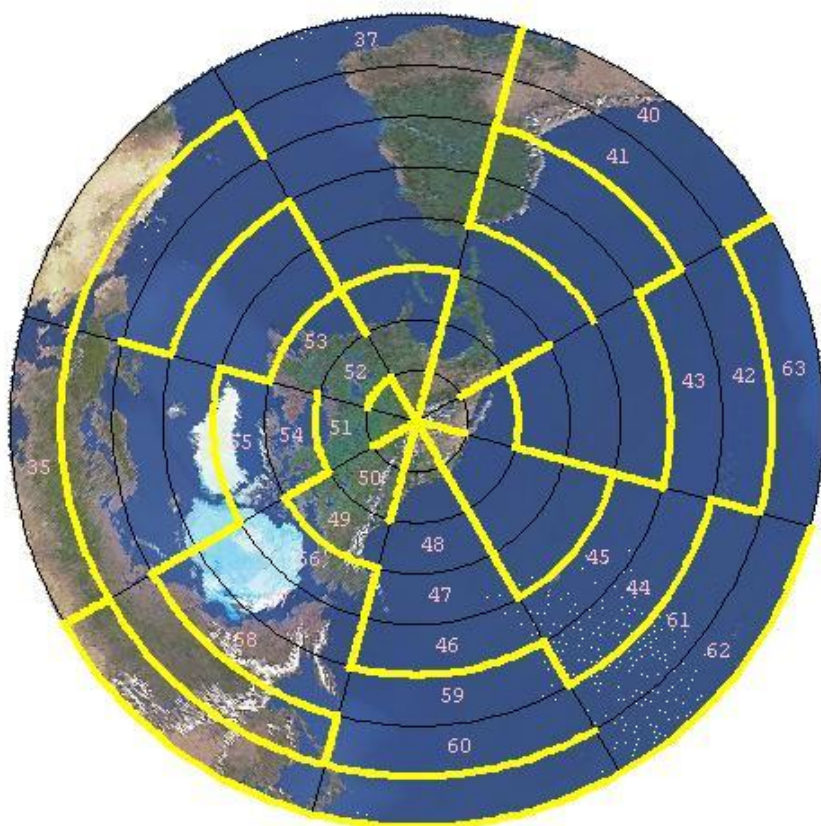
1.

 $\{3,2,4,5,6\}$

2.

 $\{9,6,2,1,5,11,12,8,10\}$

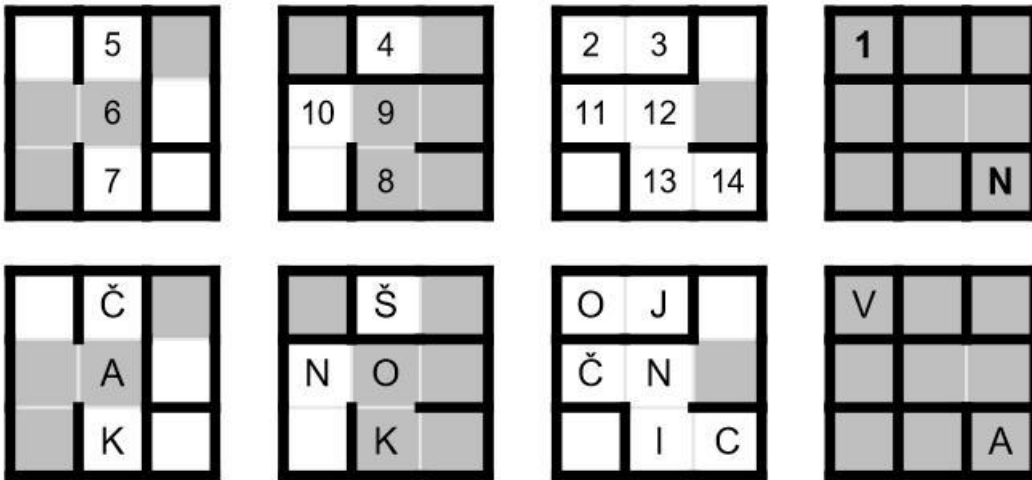
Labirint na zemljevidu



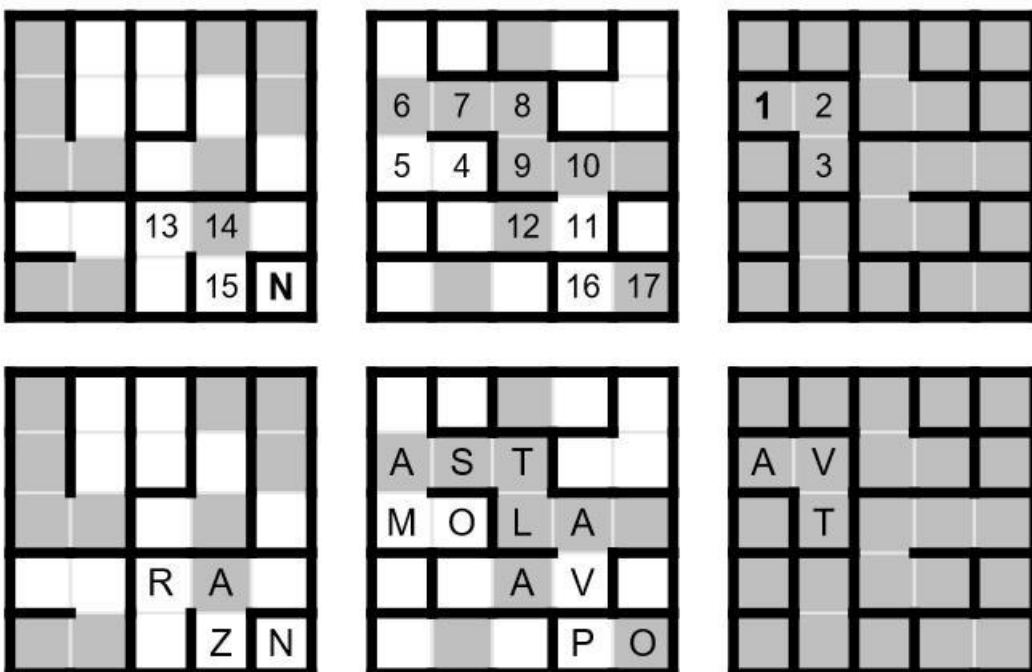
Odstranjene kocke

75 69 81
 69 71 79
 84 68 98
 80 69 95

Labirint v kvadru



VOJŠČAKKONČNICA



AVTOMASTLAVARAZPON

Labirint na ploskvah

² a					¹⁹ l
³ b		¹³ e	¹⁴ r	¹⁷ n	¹⁸ a
⁴ o		¹² p	¹⁵ s	¹⁶ o	
⁵ r	⁶ l	¹¹ a	¹⁰ t		
¹ t	⁷ a	⁸ k	⁹ o		

{tabor, lakota, personal}

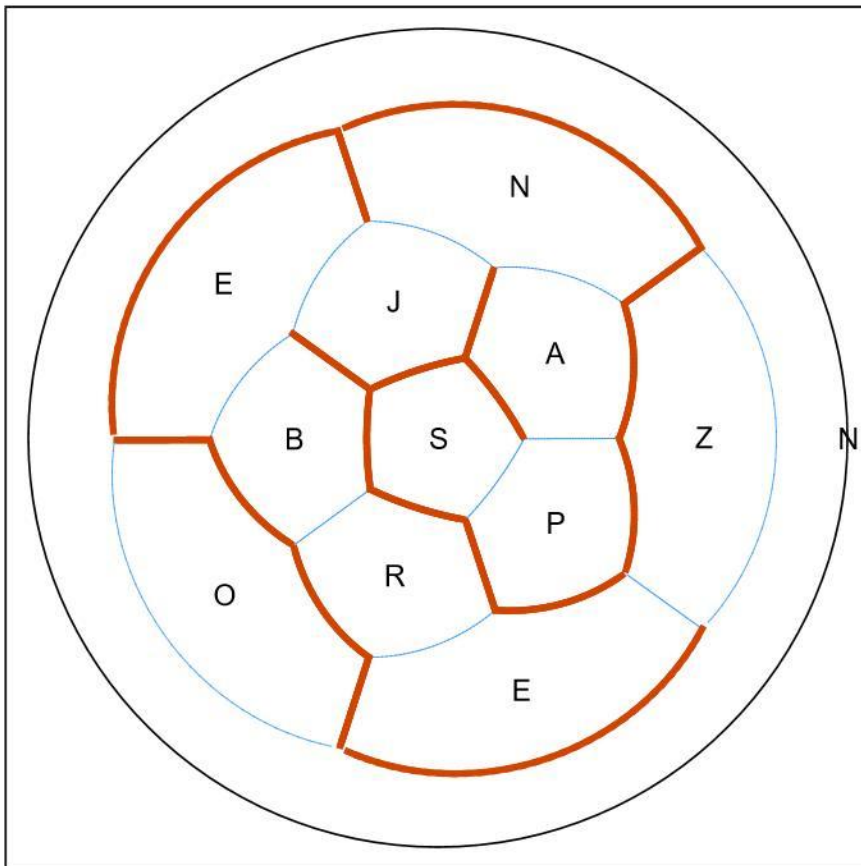
⁷ r	¹² u	¹⁹ k		²³ a	⁸ a
¹⁰ a	¹¹ m	²⁰ o	²¹ b	²² r	⁹ ž
² o	¹⁵ e	¹⁶ t	²⁷ m	²⁸ e	¹ m
³ č	¹⁴ k	¹⁷ i	²⁶ e	²⁵ r	⁴ a
⁶ a	¹³ š	¹⁸ r		²⁴ v	⁵ g

{moča, garaža, mušketir, kobra, vreme}

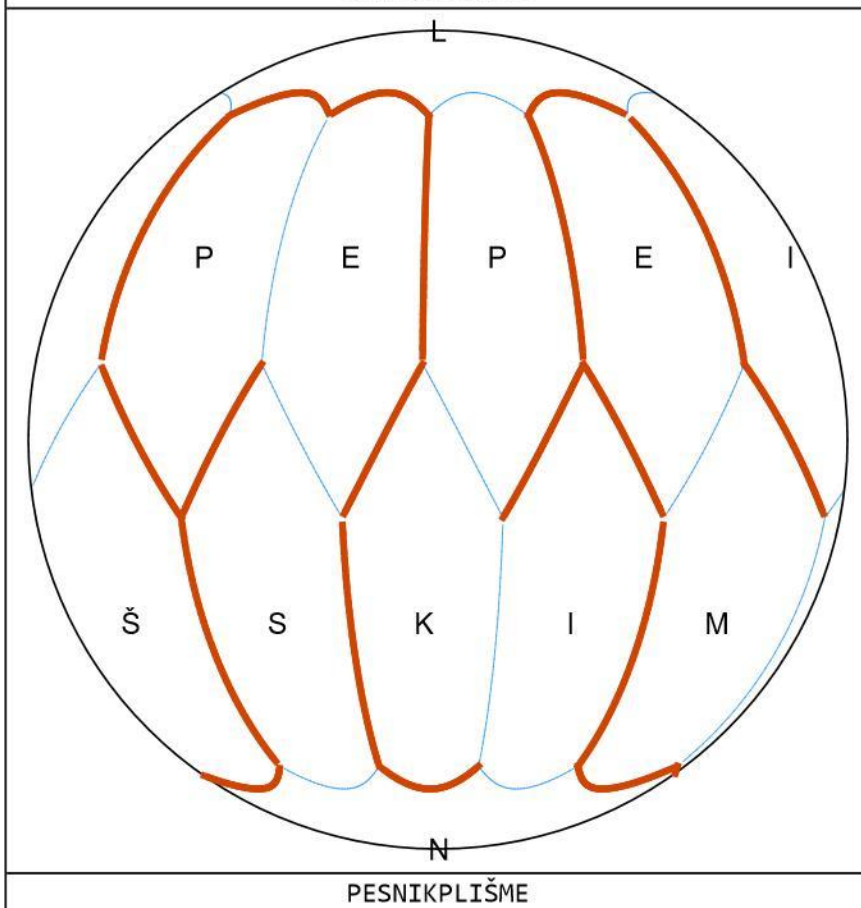
			⁷ m	⁸ b	
¹ š	² č		¹⁰ j	⁹ a	
	³ i	¹² s	¹¹ a	¹⁸ m	¹⁹ i
	⁴ t	¹³ l	¹⁴ i	¹⁷ o	
	⁵ s	⁶ a	¹⁵ c	¹⁶ e	

{ščit, samba, jaslice, omikron}

Labirint na projekcijah teles



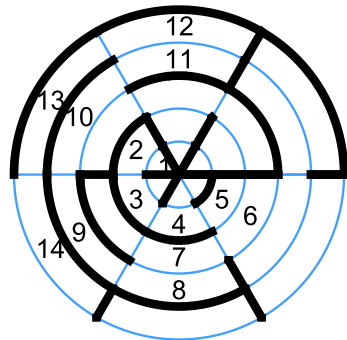
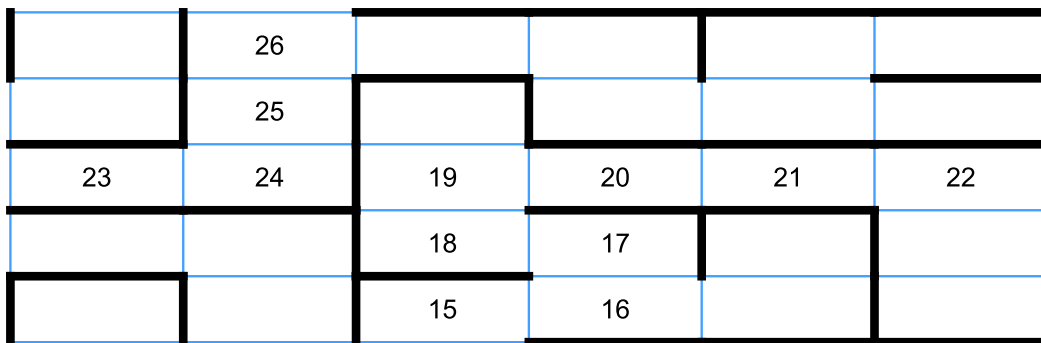
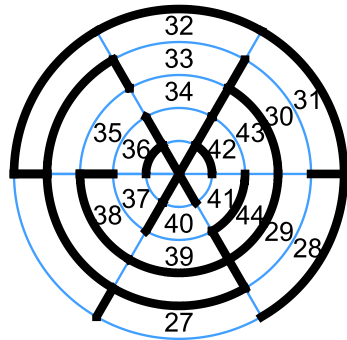
SPANJEBREZNO



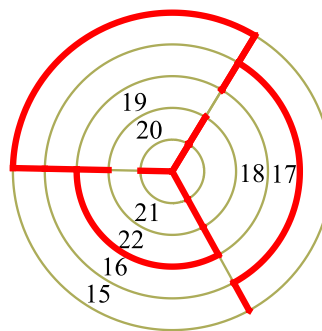
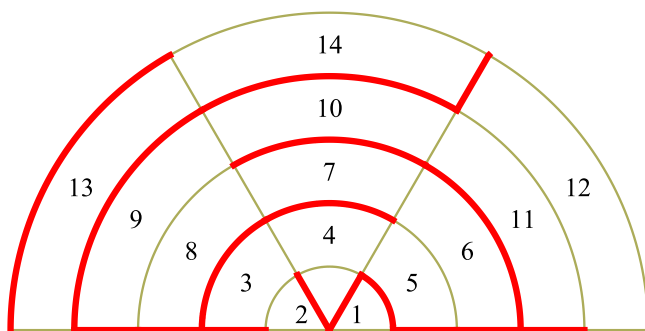
PESNIKPLIŠME

Labirinti na mreži valja in stožca

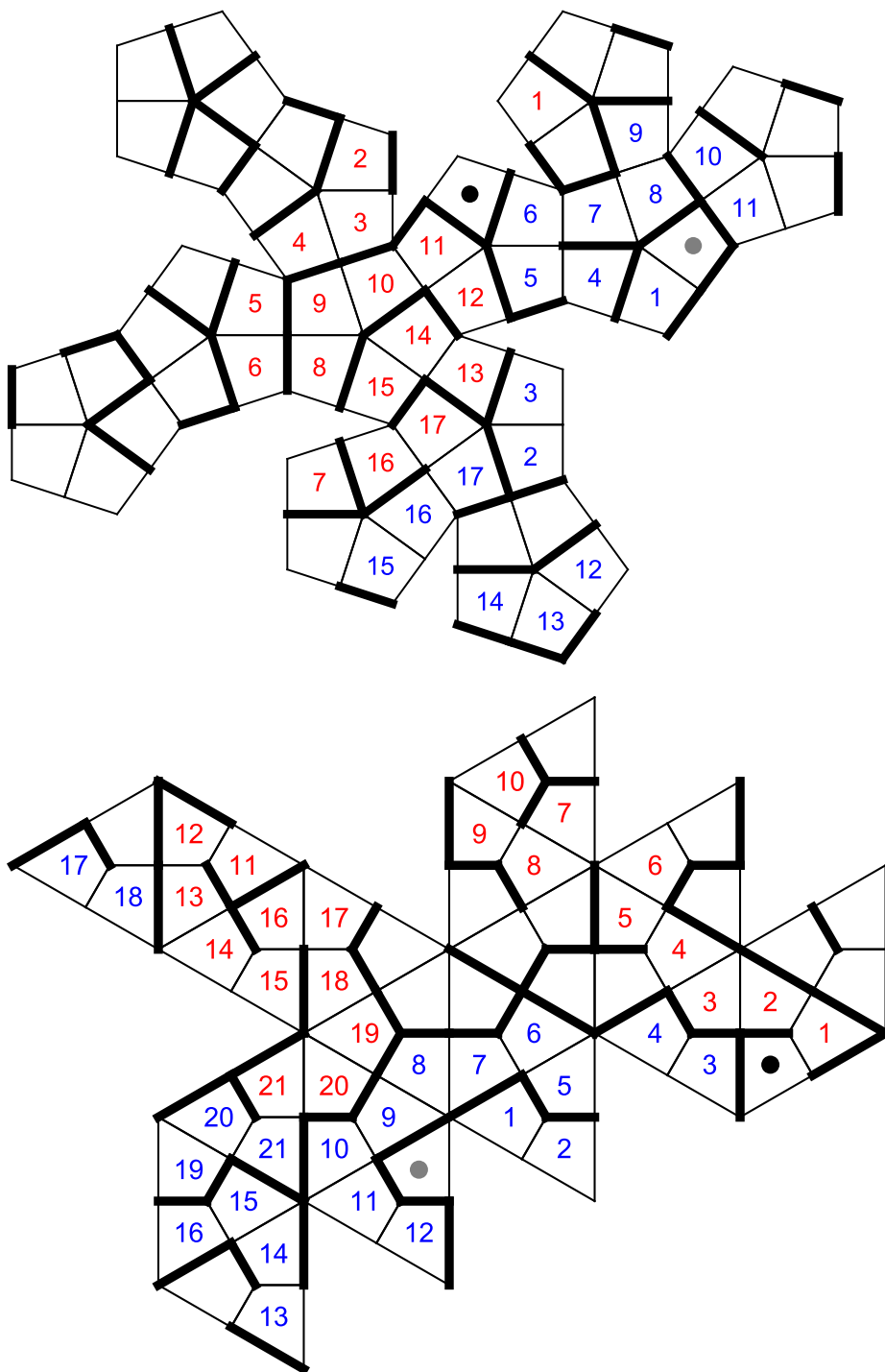
1.



2.



Srečanje na poliedrskem labirintu



Logična naloga

ime, konj, pasma

Iva, Tornado, arabec

Lana, Reno, lisec

Ada, King, vranec

Nina, Flobert, islandec

Naloga v esperantu

nomo, hundo, bredo

Jana, Bucefalo, grejhundo

Maja, Etono, mopso

Nina, Pongo, pudelo

Dora, Tornado, boksero

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

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

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Člana časopisnega sveta: *prof. dr. Tomaž Pisanski* in *dr. Darjo Felda*

Recenzent: *Vilko Domajnko, prof.*

Sodelavci: *mag. Urša Demšar, dr. Gregor Dolinar, Monika Kavalir, dr. Meta Lah, Boštjan Kuzman, Teja Oblak, Hiacinta Pintar, Maja Pohar, mag. Katka Šenk* in *dr. Aleš Vavpetič*.

Oblikovanje: *Ana Hafner*

Jezikovni pregled: *Besana*

Naslovnica: *Maša Bratkovič*

Za objavljene prispevke ne plačujemo honorarjev.

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