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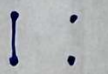
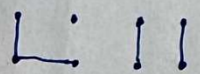
1) neizomorfní grafy na 4 vrcholech

Uvažujeme podle počtu hran: maximálně $\binom{4}{2} = \frac{4 \cdot 3}{2} = \frac{12}{2} = 6$ hran => máme tedy 7 skupin, které mají 0, 1, 2, 3, 4, 5, 6 hran.

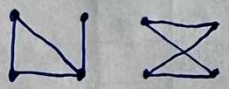
0: 
1 neiz. g.

1: 
1 neiz. g.

2: 
2 neiz. g.

3: 
3 neiz. g.

Pro skupiny 0–3 hran celkem 1+1+2+3 = 7 neizom. grafů.

4: 
2 neiz. g.

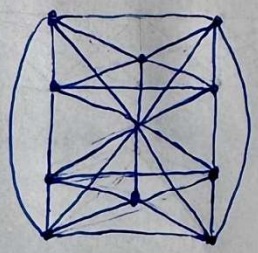
5: 
1 neiz. g.

6: 
1. neiz. g.

Pro skupiny 4–6 hran celkem 2+1+1 = 4 neiz. grafů.

Dohromady máme tedy 7+4 = 11 různých neizomorfních grafů na 4 vrcholech.

2) graf s 10 vrcholy stupně 5



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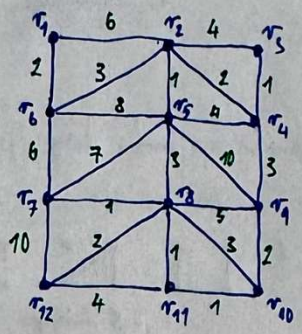
3)



vzdálenost	0	6	9	8	7	2	8	9	11	11	10	11
uzel	r_1	r_2	r_3	r_4	r_5	r_6	r_7	r_8	r_9	r_{10}	r_{11}	r_{12}
	$r_2(6)$	$r_5(7)$		$r_3(9)$	$r_4(11)$	$r_7(10)$	$r_8(9)$	$r_9(14)$	$r_{10}(15)$		$r_{10}(11)$	
	$r_6(2)$	$r_3(10)$		$r_9(11)$	$r_7(14)$	$r_5(8)$	$r_{12}(14)$	$r_{10}(12)$			$r_{12}(14)$	
		$r_4(8)$			$r_8(10)$			$r_{11}(10)$				
					$r_9(17)$			$r_{12}(17)$				

$r_1 \rightarrow r_6 \rightarrow r_2 \rightarrow r_5 \rightarrow r_4 \rightarrow r_7 \rightarrow r_3 \rightarrow r_8 \rightarrow r_{11} \rightarrow r_9 \rightarrow r_{10} \rightarrow r_{12}$

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4) $(1,1,2,3,3,5,6,6,7)$ $n=1$ $d_n=7$ $n-d_n=2$

$(1,0,1,2,2,4,5,5)$

$(0,1,1,2,2,4,5,7)$ $n=8$ $d_n=5$ $n-d_n=3$

$(0,1,0,1,1,3,4)$

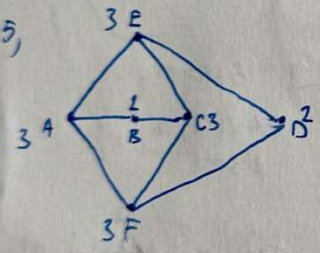
$(0,0,1,1,1,3,4)$ $n=7$ $d_n=4$ $n-d_n=3$

$(0,0,0,0,0,2)$ $n=6$ $d_n=2$ $n-d_n=4$

$(0,0,0,-1,-1)$

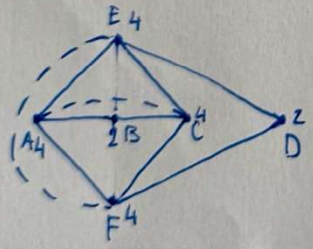
není skóre grafu

5)

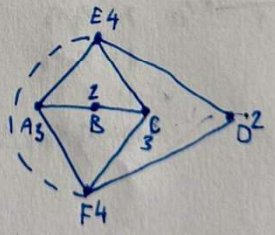


má neorientovaný a orientovaný eul. graf

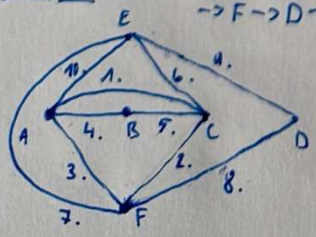
a) nesouvislý graf 2 hrany



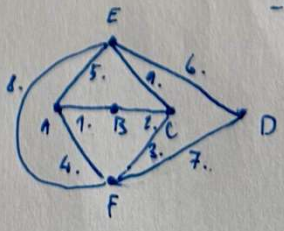
b) nesouvislý graf 1 hrana



Ind: A -> C -> F -> A -> B -> C -> E -> -> F -> D -> E -> A



Ind: A -> B -> C -> F -> A -> E -> D -> -> F -> E -> C



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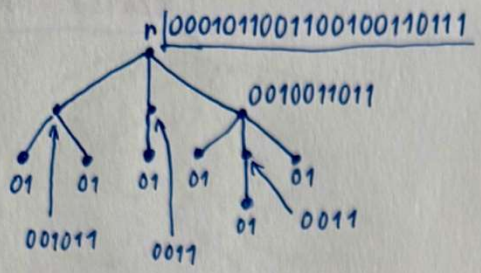
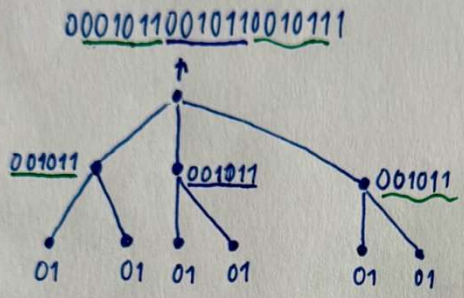
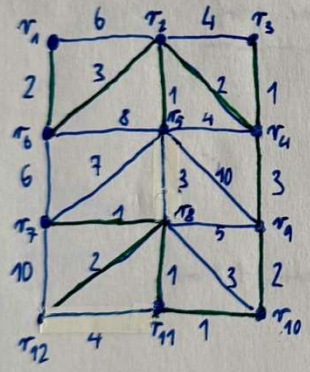
6) a)



b)



7)



1: $r_3 r_4$ i $r_2 r_5$ i $r_7 r_8$ i $r_8 r_{11}$ i $r_{11} r_{10}$
2: $r_1 r_6$ i $r_2 r_4$ i $r_9 r_{10}$ i $r_8 r_{12}$
3: $r_2 r_6$ i $r_4 r_9$ i $r_5 r_8$ i $r_8 r_{10}$
4: $r_2 r_3$ i $r_4 r_5$ i $r_{11} r_{12}$
5: $r_5 r_9$
6: $r_1 r_2$ i $r_5 r_7$
7: $r_5 r_7$
8: $r_7 r_6$
9: X
10: $r_5 r_9$ i $r_7 r_{12}$

$5 \cdot 1 = 5$
$4 \cdot 2 = 8$
$2 \cdot 3 = 6$

Počet min. hodnot je 19

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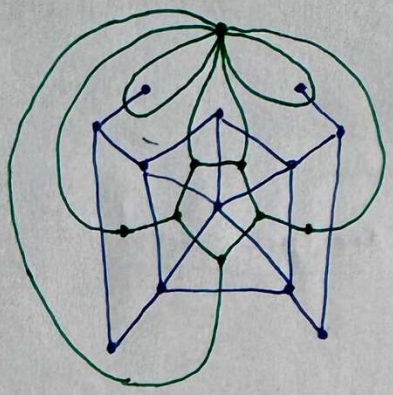
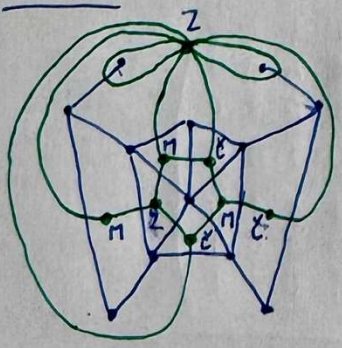
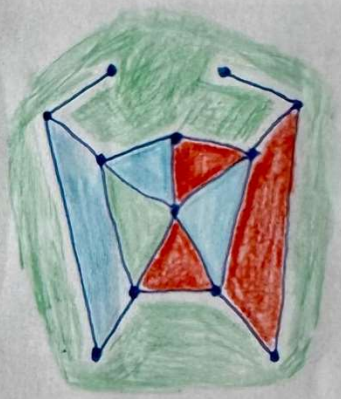
8)



Otevřeme:



=>



3 Barvy

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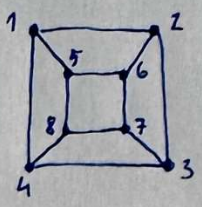
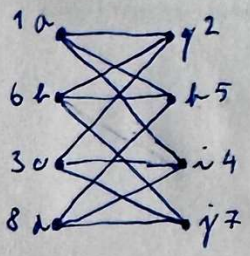
Bonus

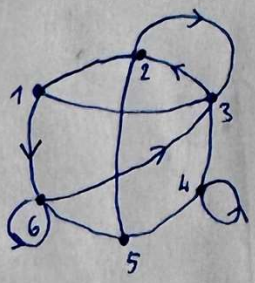
B1





Ano, jsou isomorfní

B2



6×6

$$A = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{array} \begin{array}{c} \begin{array}{cccccc} 1 & 2 & 3 & 4 & 5 & 6 \end{array} \\ \begin{pmatrix} 0 & 1 & 1 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 \end{pmatrix} \end{array}$$