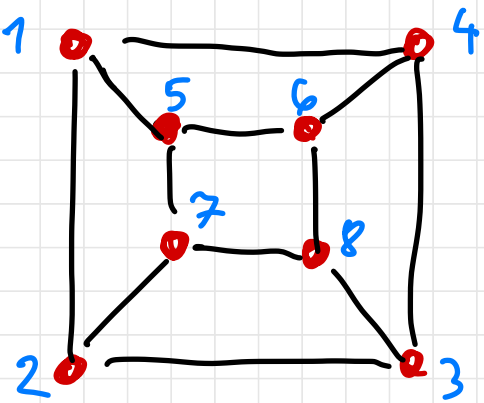
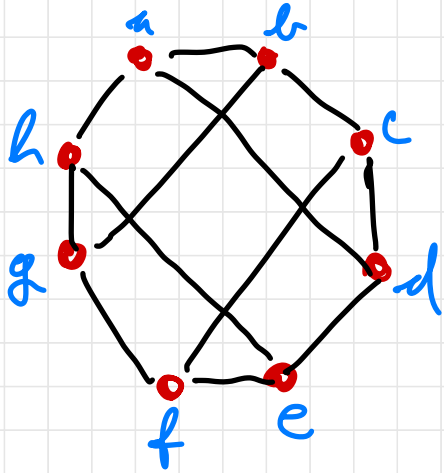
DS 2 VAJE 3

1. ALI STA GRAFA IZOMORFNA?





GRAFA G_1, G_2 IZOMORFNA, ČE OBSTAJA BIJEKCIJA $f: V(G_1) \to V(G_2)$, KI OHRANJA POVEZAVE.

f:

$1 \mapsto a$

$2 \mapsto h$

$4 \mapsto d$

$5 \mapsto b$

$6 \mapsto c$

$7 \mapsto g$

$8 \mapsto f$

$3 \mapsto e$

$12 \to ah$

$34 \to ed$

$23 \to he$

$14 \to ad$

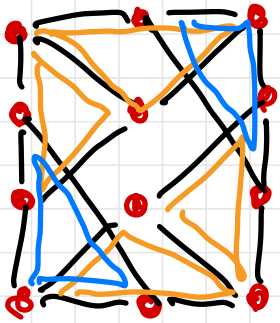
$15 \to ab$

$\vdots$

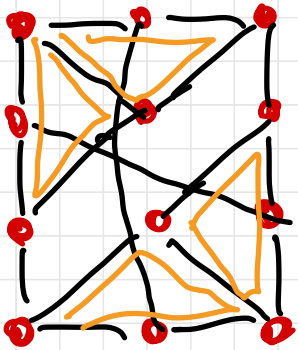
✓ STA IZOMORFNA

2. ALI STA IZOMORFNA?

G_1:



G_2:



ŠTEVLO 4-CIKLOV V G_1, G_2

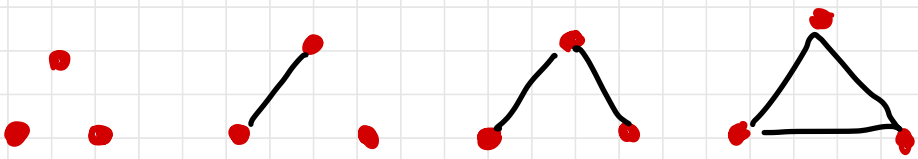
G_1: 6 4-CIKLOV

G_2: 4 4-CIKLE

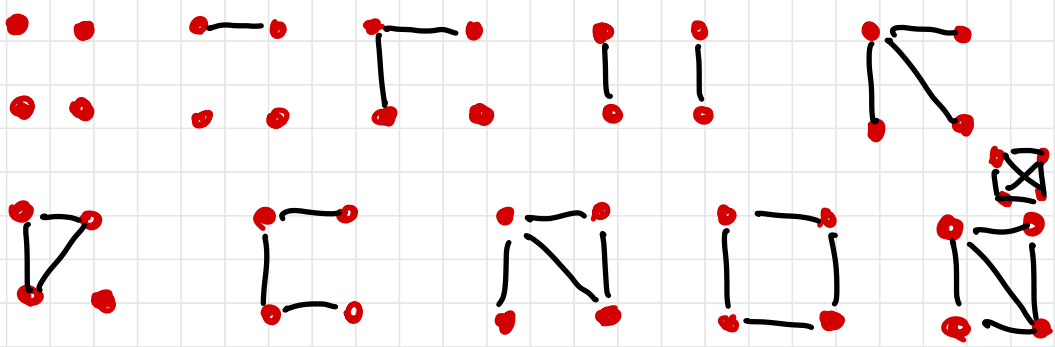
$\Rightarrow$ NISTA IZOMORFNA

3. POIŠČI VSE NEIZOMORFNE GRAFE NA 3 IN 4 VOZLIŠČIH.

3:



4:

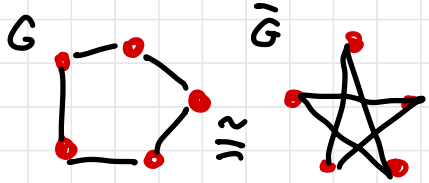


4. Poišči vse grafe na 5 vozliščih, ki so izomorfni svojemu komplementu.

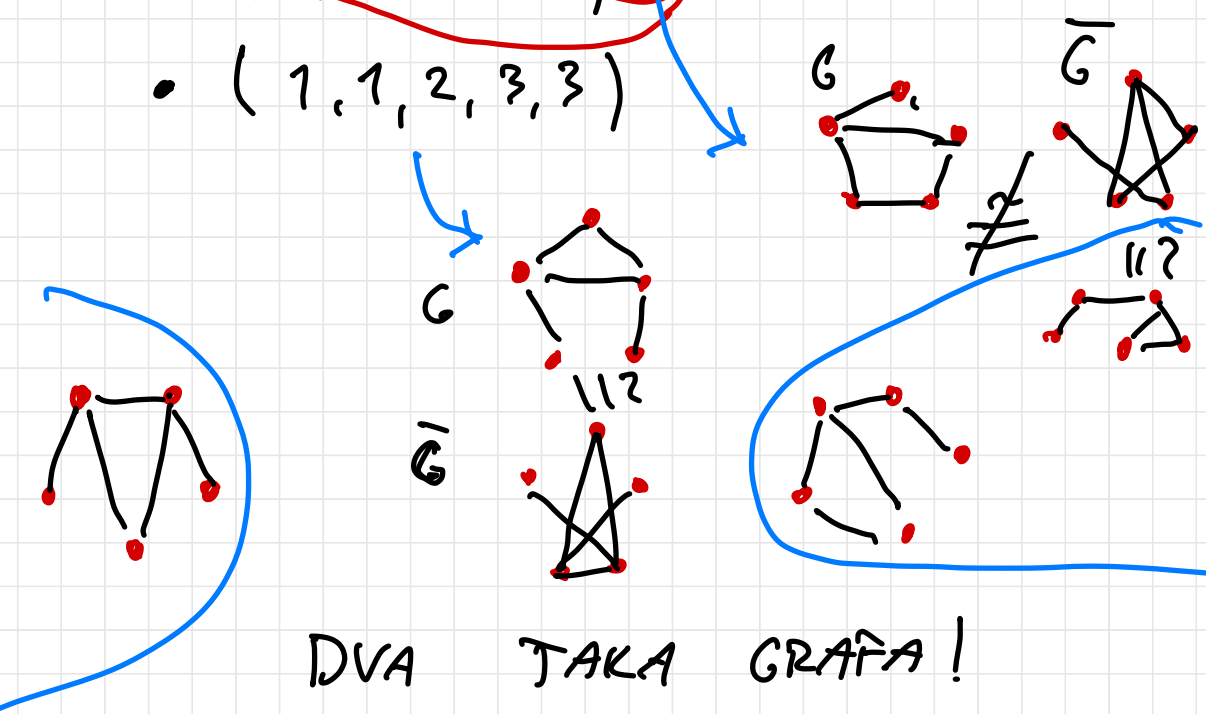
$$|E(G)| = |E(\overline{G})| = \binom{5}{2} - |E(G)|$$

$$|E(G)| = \frac{10}{2} = 5$$

STOPNJE:

- $(2, 2, 2, 2, 2)$ → 

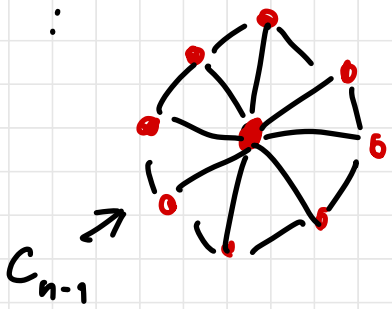
- $(1, 2, 2, 2, 3)$
- $(0, 2, 2, 2, 4)$ ni mogoče.
- $(1, 1, 2, 3, 3)$



DVA TAKA GRAFA!

ČE G: (1 1 2 2 4) POTEM $\bar{G}$: (3, 3, 2, 2, 0)

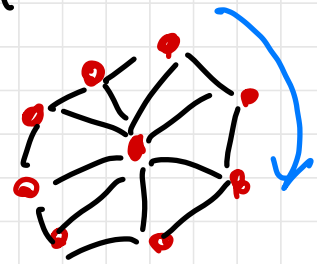
5. GRAF W_n :



KOLIKO AVTOMORFIZMOV IMA W_n ?

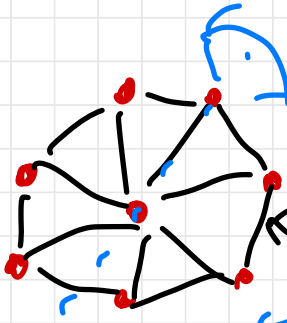
AVTOMORFIZMI: $n > 4$

- id
- ROTACIJA ZA k VOZLIŠČ

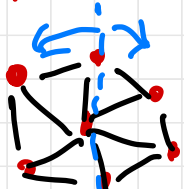


$n-1$ ROTACIJ (SKUPAJ Z id)

- ZRCALJENJA



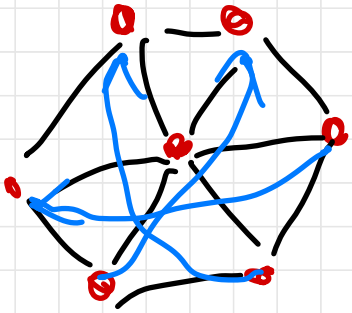
LIHO: $n-1$ ZRCALJEN



$\frac{n}{2}$ ZRCALJEN PREKO VOZLIŠČ

SODO

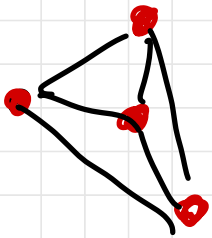
$\frac{n-1}{2}$ ZRCALJENJ
2 PREKO POVEZAV



ZRCALJENJE ČEZ
SREDIŠČE $\simeq$ ROTACIJA $\frac{n-1}{2}$

$\Rightarrow 2\cdot(n-1)$ AVTOMORFIZMOV

- $n=4$

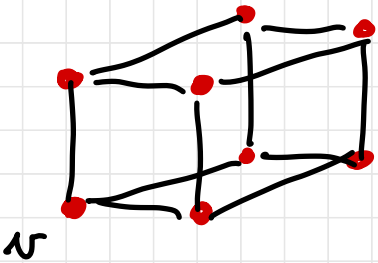


$W_4 \cong K_4$

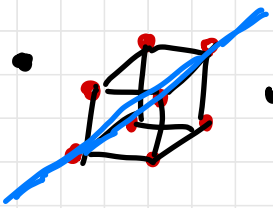
VSAKA BIJEKCIJA (PERMUTACIJA) JE IZO.

$\Rightarrow 4!$ AVTOMORFIZMOV

6. Q_3 KOCKA. NAJ BO $v \in V(Q_3)$.
KOLIKO AVTOMORFIZMOV Q_3 PRESLIKA
v V v?

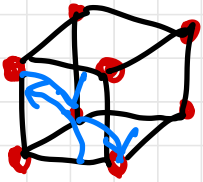


• id

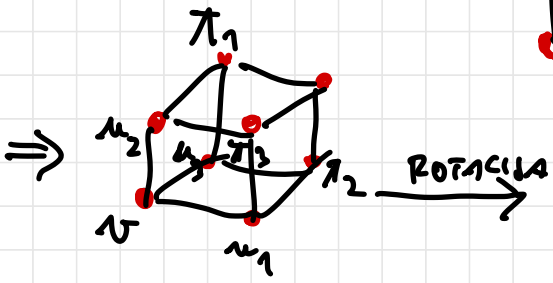


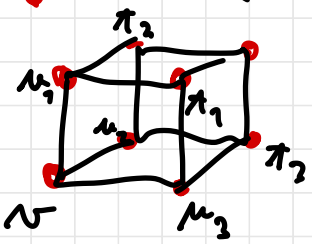
• "ZRCALJENJE ČEZ RAVNINO"

3 ZRCALJENJA



• 3-ROTACIJE (VKLJUČNO Z id)



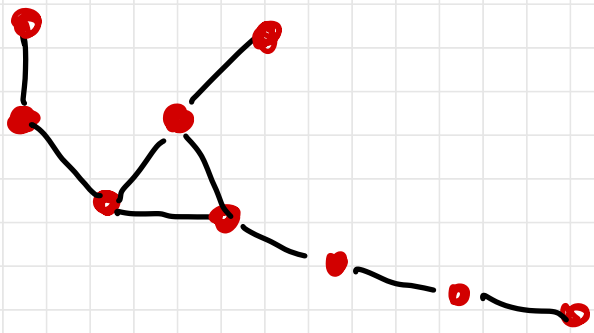


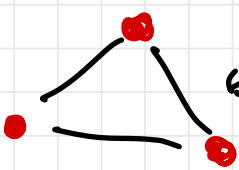
ČE f PRESLIKA $v \mapsto v$, PRESLIKA SOSEDE v V SOSEDE v. 3 SOSEDE PERMUTIRA $\Rightarrow$ $3! = 6$ MOŽNOSTI.

KO FIKSIRAMO SOSEDE v, FIKSIRAMO CEL AVTOMORFIZEM.

$\Rightarrow$ 6 AVTOMORFIZMOV

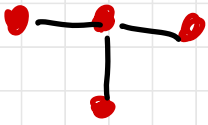
7. POIŠČI GRAF NA VSAJ DVEH VOZLIŠČIH, KI IMA SAMO EN AVTOMORFIZEM. POIŠČI TAKEGA, KI IMA NATANKO 3 AVTOMORFIZME



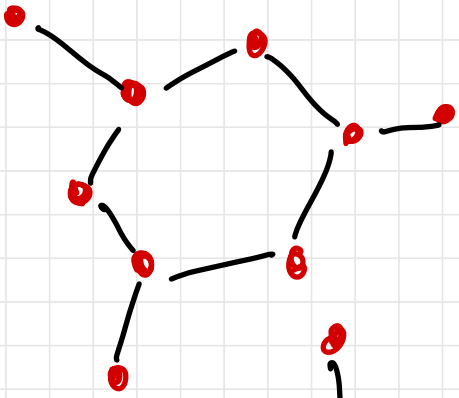


6 AVTOMORFIZMOV.

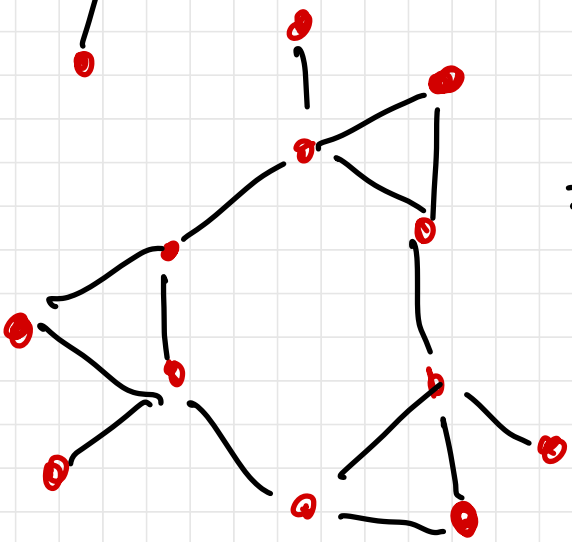
2 AVTOMORFIZMA



3! AVTOMORFIZMOV



SPET 6 AVTOMORFIZMOV



$\Rightarrow$ 3 AVTOMORFIZME

9. NAPIŠI ALGORITEM, KI ZA POVEZAN GRAF VRNE ALI JE GRAF DVODELEN.

DVODELNOST (V, E)

```
h ← MAP
FOR v IN V:
    h[v] = []
```

FOR $\{a, b\}$ IN E:

$$h[a] = h[a] + [b]$$
$$h[b] = h[b] + [a]$$

BARVANJE ← MAP

BARVANJE$[v]$ = ČRNO

POGLEDAM

NADALJUJEMO NASLEDNIČ