

Algoritem potisni-povišaj za iskanje maksimalnih pretokov

Zagovor dela diplomskega seminarja

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13. september 2018

Pregled vsebine

- 1 Algoritem potisni-povišaj
- 2 Zgled
- 3 Časovna zahtevnost

Osnovni algoritem

POTISNI-POVIŠAJ(G, s)

- 1 INICIALIZIRAJ_PREDPRETOK(G, s)
- 2 DOKLER obstaja mogoča operacija POTISNI ali POVIŠAJ
- 3 izvedi mogočo operacijo

Operacija POTISNI

POTISNI (u , v)

```
1  // Potisnemo lahko, če je  $e(u) > 0$ ,  
2  //  $c_f(u,v) > 0$  in  $h(u) = h(v) + 1$ .  
3   $\text{delta} = \min\{ e(u), c(u,v) - f(u,v) \}$   
4   $f(u,v) += \text{delta}$   
5   $f(v,u) -= \text{delta}$   
6   $e(u) -= \text{delta}$   
7   $e(v) += \text{delta}$ 
```

Operacija POVIŠAJ

POVIŠAJ (u)

```
1  // Vozlišče  $u$  povišamo, če je  $e(u) > 0$  in
2  // za vsak  $v$  iz  $V$ ,  $(u,v) \in E_f$ , velja  $h(u) \leq h(v)$ .
3   $h(u) = \min\{ h(v) : (u,v) \in E_f \} + 1$ 
```

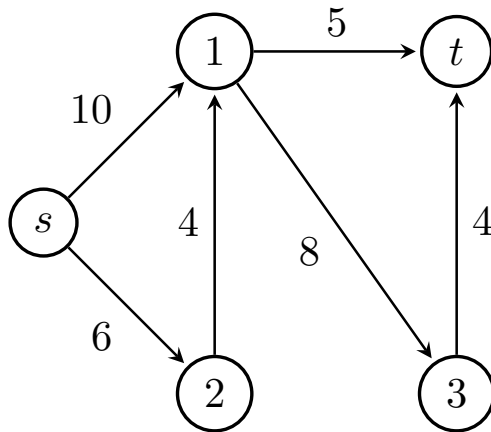
Operacija INICIALIZIRAJ_PREDPRETOK

```

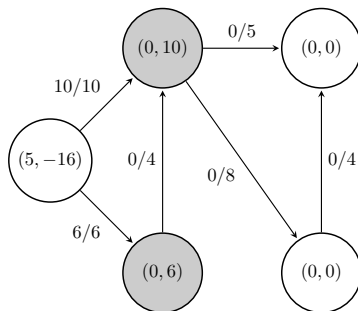
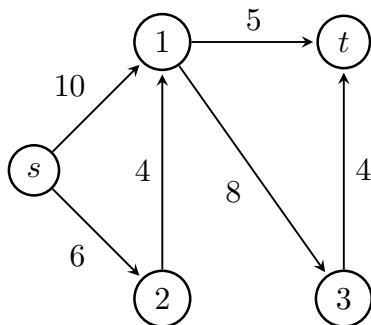
INICIALIZIRAJ_PREDPRETOK(G,s)
1  // V grafu G z izbranim izvirom s
2  // inicializiramo predpretok.
3  ZA vsak v v V(G)
4      h(v) = 0
5      e(v) = 0
6  ZA vsak (u,v) v E(G)
7      f(u,v) = 0
8  h(s) = |V|
9  ZA vsak v, za katerega obstaja (s,v) v E(G)
10     f(s,v) = c(s,v)
11     f(v,s) = -f(s,v)
12     e(v) = f(s,v)

```

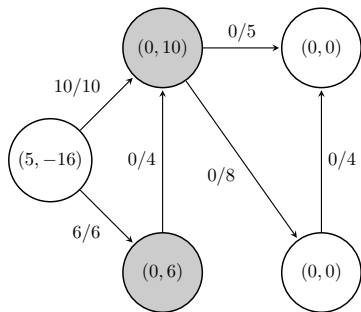
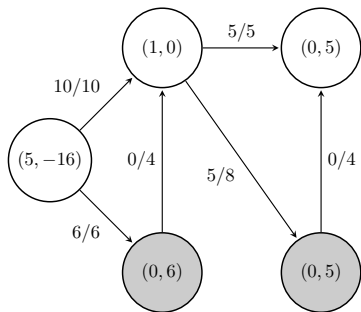
Začetno omrežje



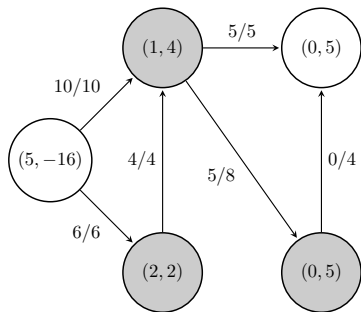
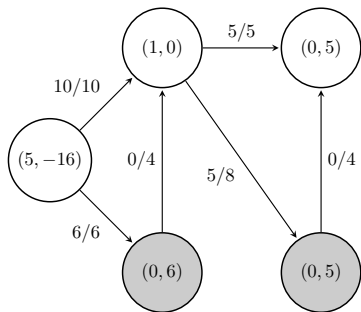
Inicializacija predpretoka



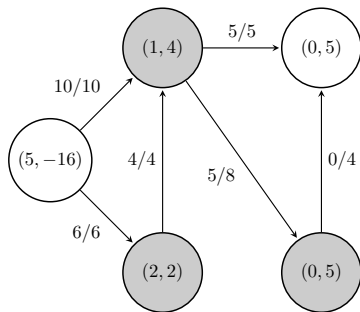
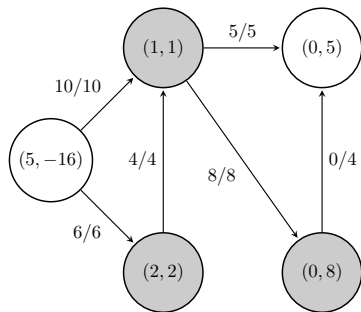
Korak 1



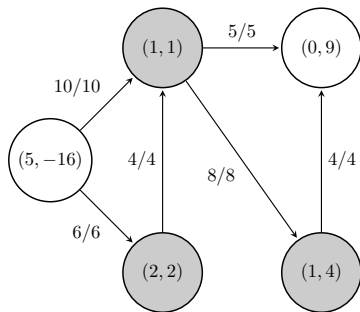
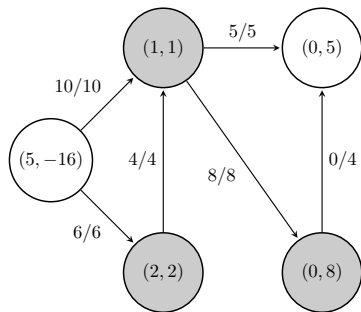
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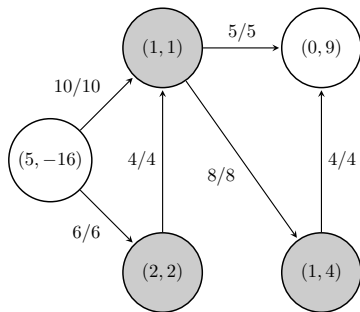
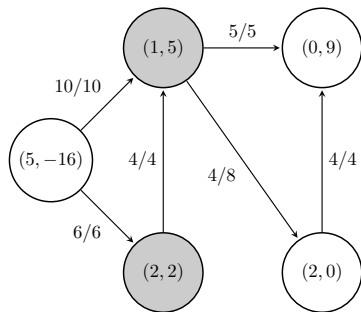
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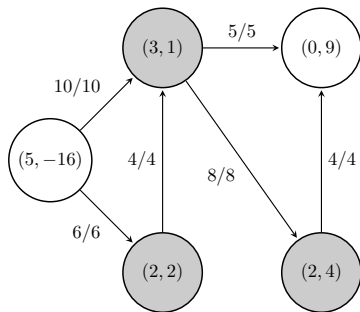
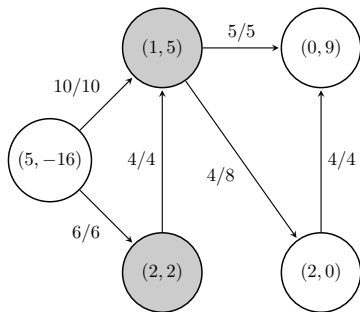
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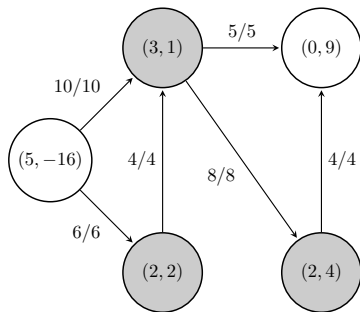
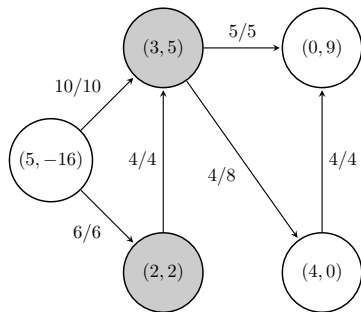
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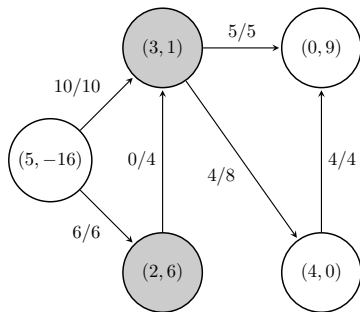
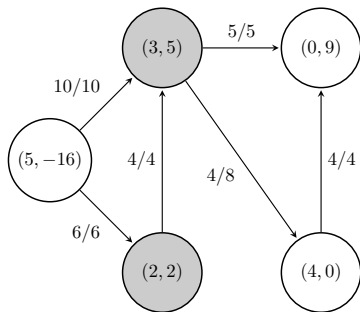
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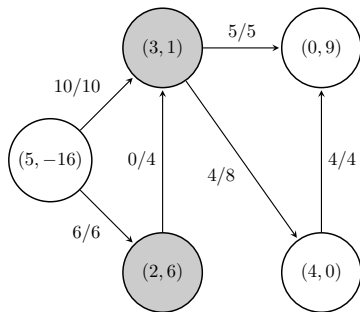
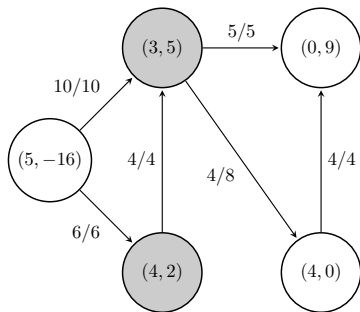
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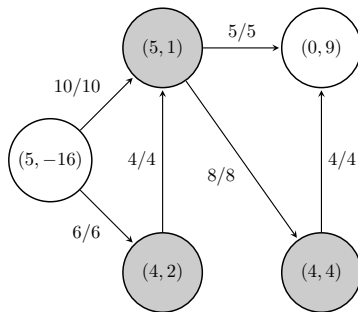
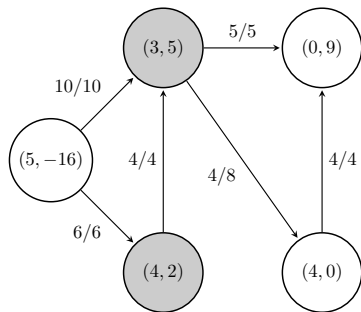
Korak 8



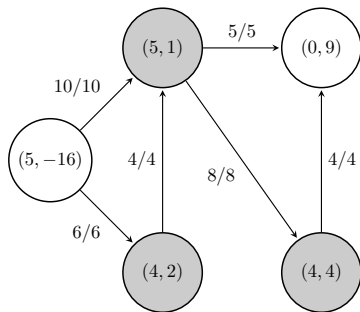
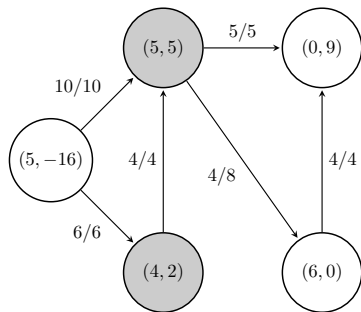
Korak 9



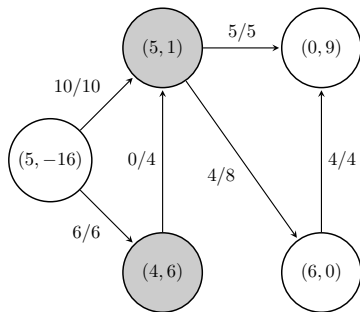
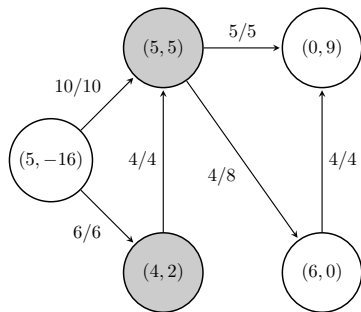
Korak 10



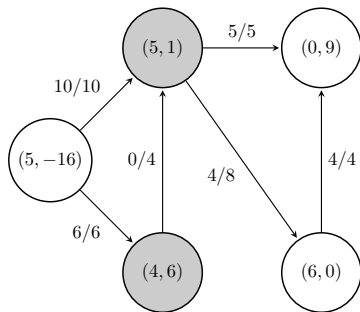
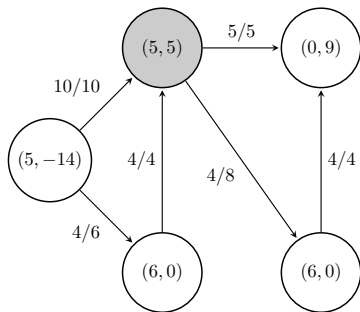
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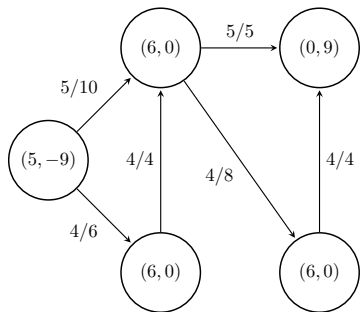
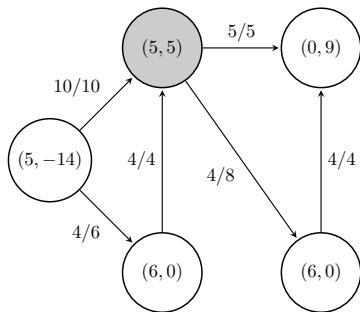
Korak 12



Korak 13



Korak 14



Časovna zahtevnost

Število operacij

- POTISNI je kvečjemu $2|V||E| + 4|V|^2(|V| + |E|)$;
- POVIŠAJ je kvečjemu $2|V|^2$.

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Izrek

Časovna zahtevnost algoritma POTISNI-POVIŠAJ je $\mathcal{O}(V^2E)$.