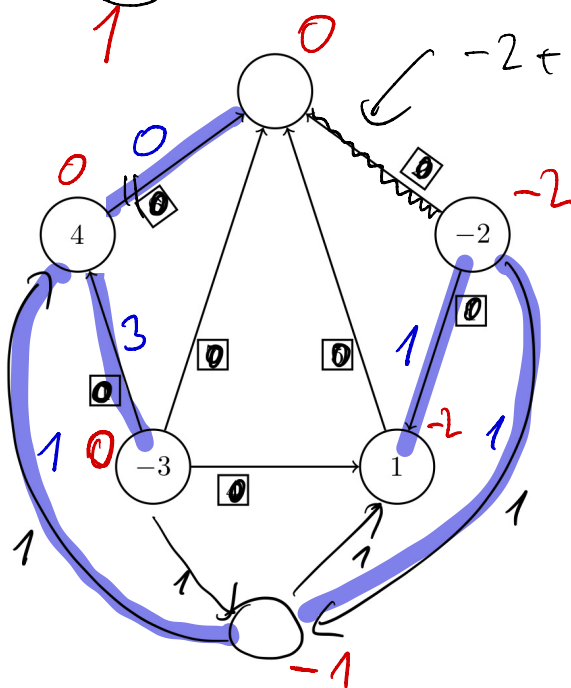
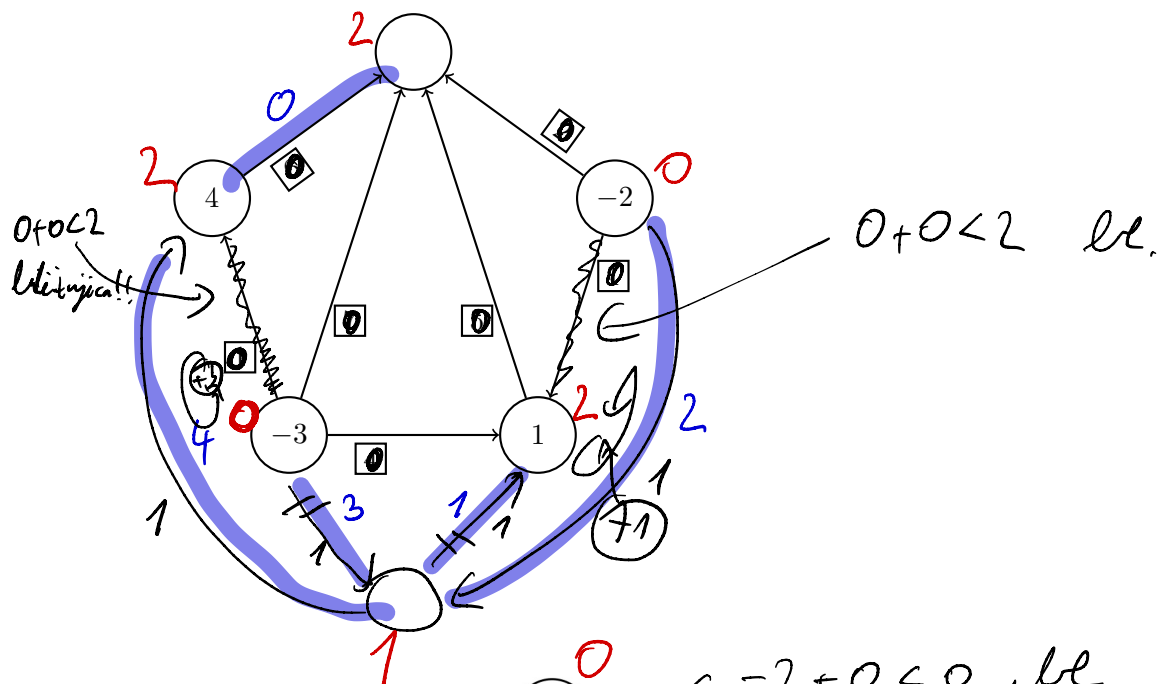
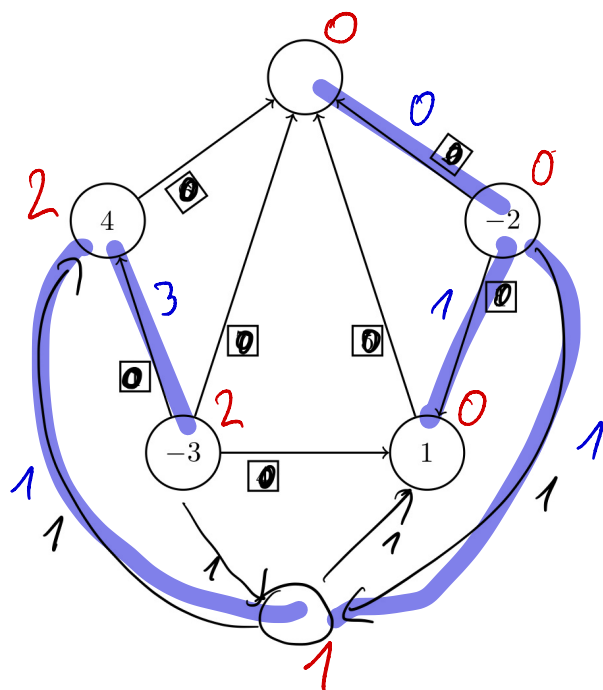


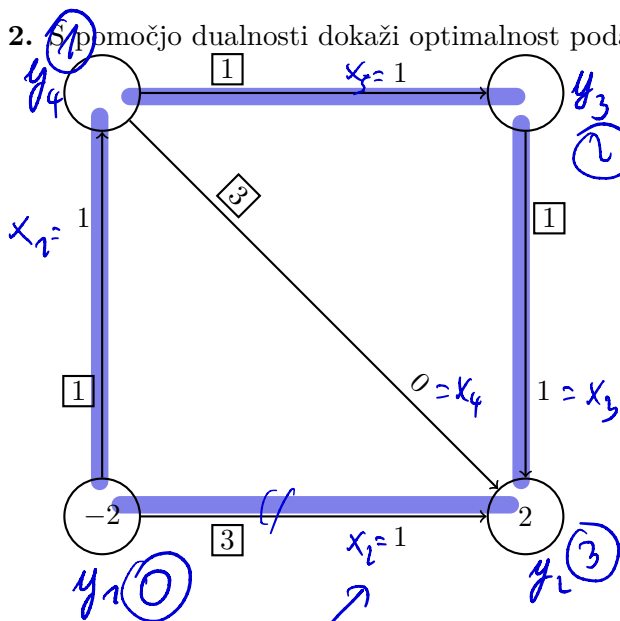
1. Pokaži, da problem razvoza nima dopustne rešitve.



Ne kličijice, to je opt.
Ker upravljanje kličijice
točka (oz. ker cena $\neq 0$),
omoni problem nima
dopustne rešitve!!



2. S pomočjo dualnosti dokaži optimalnost podanega razvoja.



LP.: $\min (1 \cdot x_1 + 3 \cdot x_2 + 1 \cdot x_3 + 3x_4 + 1x_5)$
 $\max (-x_1 - 3x_2 - x_3 - 3x_4 - x_5)$

P.P.: $x_1 + x_2 + 2 = 0$
 $-x_2 - x_3 - x_4 + 2 = 0$
 $x_3 - x_5 + 0 = 0$
 $-x_1 + x_4 + x_5 + 0 = 0$
 $x_1, x_2, x_3, x_4, x_5 \geq 0$

Dual: $\min (2y_1 - 2y_2)$

P.P.: $y_1 - y_4 \geq -1$
 $y_1 - y_2 \geq -3$
 $-y_2 + y_3 \geq -1$
 $-y_2 + y_4 \geq -3$
 $-y_3 + y_4 \geq -1$
 $y_1, y_2, y_3, y_4 \in \mathbb{R}$

Prvini vsiter

$f = -1 - 3 - 1 - 3 \cdot 0 - 1 = -6$

prgi: $1+1=2 \checkmark$
 $1+1+0=2 \checkmark$
 $1=1 \checkmark$
 $1=0+1 \checkmark$

Dop vs. !!

"Resim" dual.

$x_1 \neq 0 \Rightarrow y_1 - y_4 = -1 \rightarrow y_4 = y_1 + 1$
 $y_1 - y_2 = -3 \rightarrow y_2 = y_1 + 3$
 $-y_2 + y_3 = -1 \rightarrow y_3 = y_2 - 1 = y_1 + 3 - 1 = y_1 + 2$

$x_4 = 0$

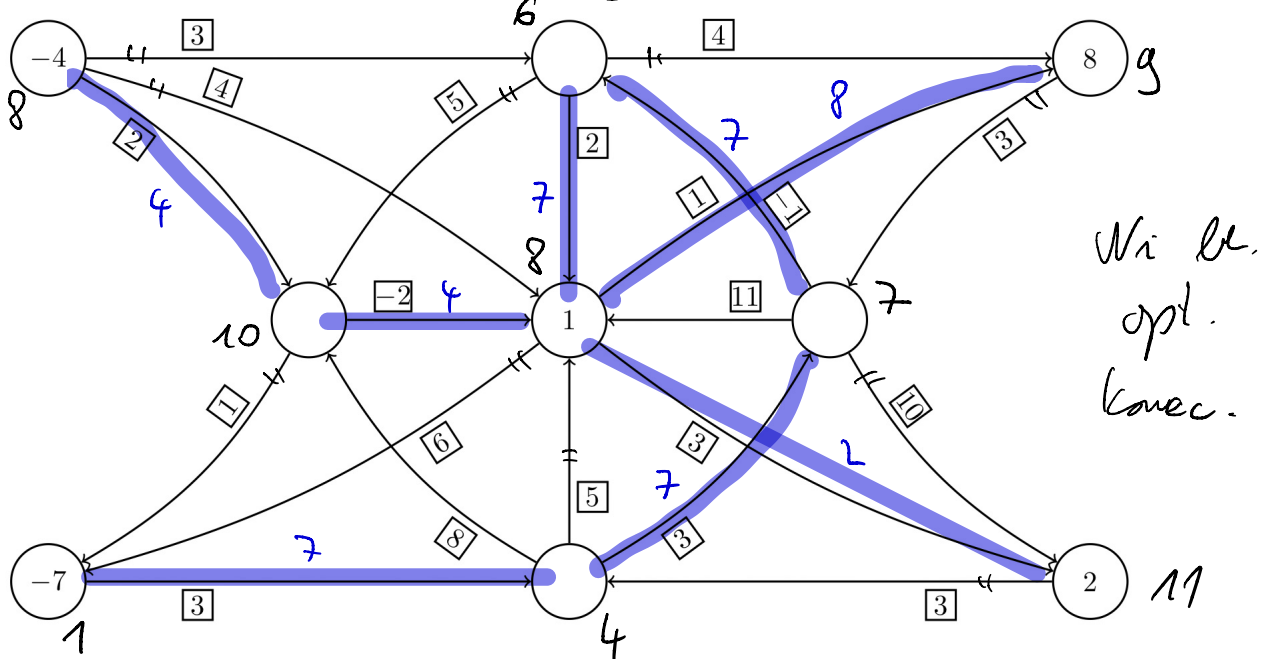
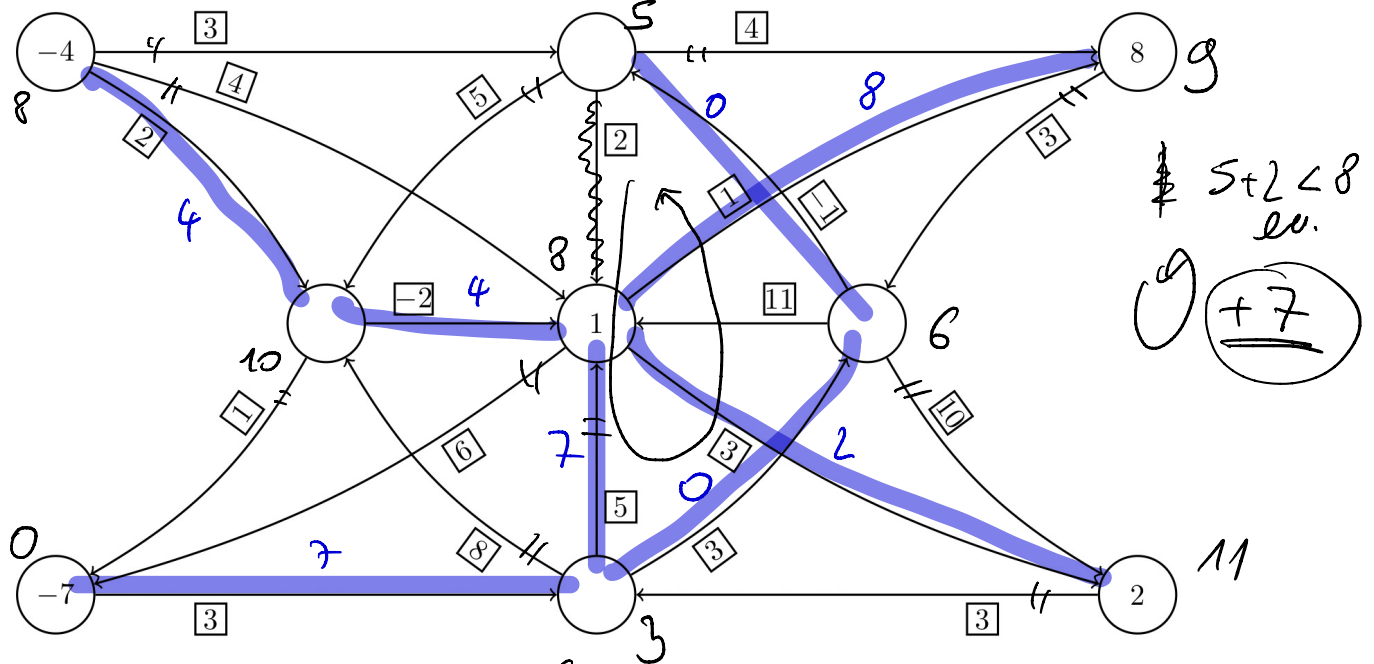
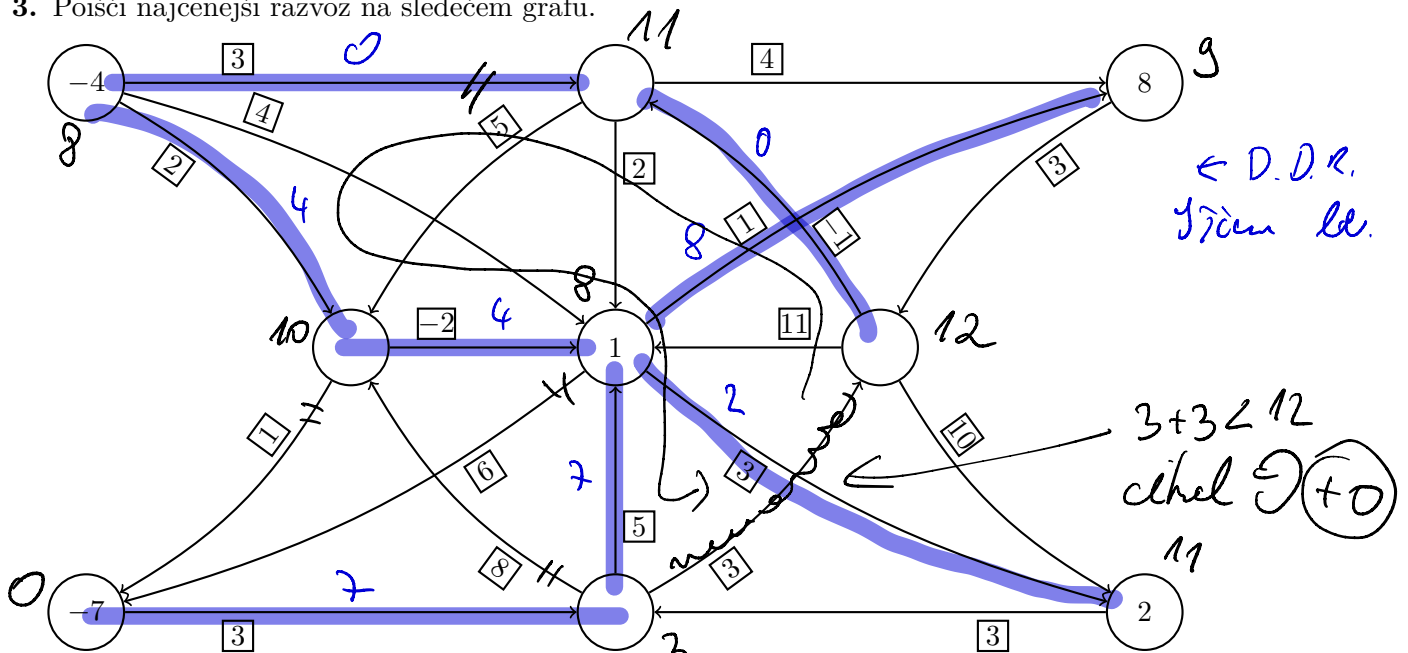
$-y_3 + y_4 = -1 \rightarrow -(y_1 + 2) + y_1 + 1 = -1 \checkmark$

$y_1 \in \mathbb{R}$, lahko baki!!

Ena od vsiter: $y_1 = 0, y_2 = 3, y_3 = 2, y_4 = 1$

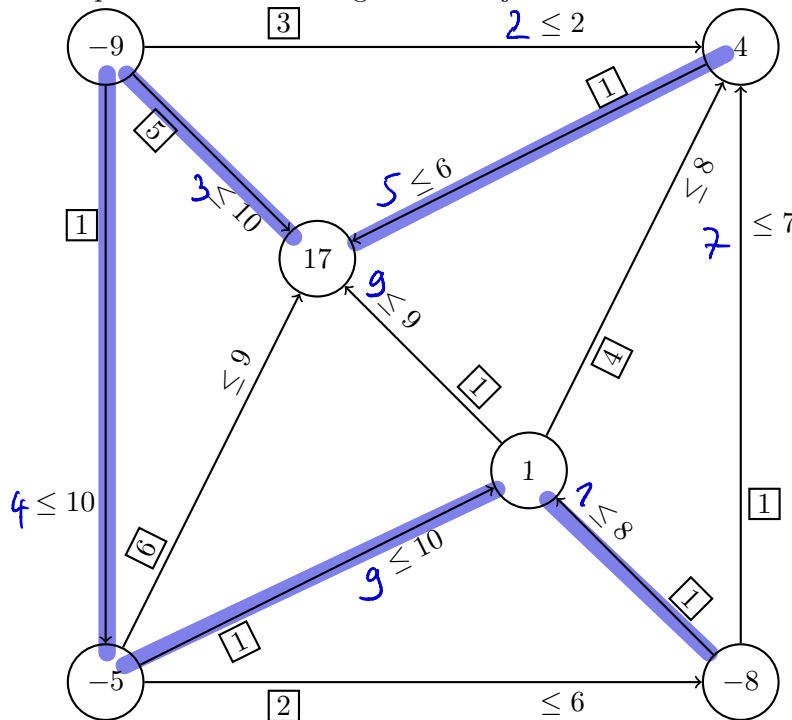
Prvini: $-3 + 1 \geq -3 \checkmark \checkmark$ $f = 2 \cdot 0 - 2 \cdot 3 = -6$

3. Poišči najcenejši razvoz na sledečem grafu.



$$Cena = 4 \cdot 2 + 4 \cdot (-2) + 7 \cdot 3 + 7 \cdot 2 + 7 \cdot 8 + 7 \cdot (-1) + 3 \cdot 2 + 7 \cdot 3 = 63 \quad O.K. \checkmark$$

4. Reši problem razvoja na grafu z omejitvami.

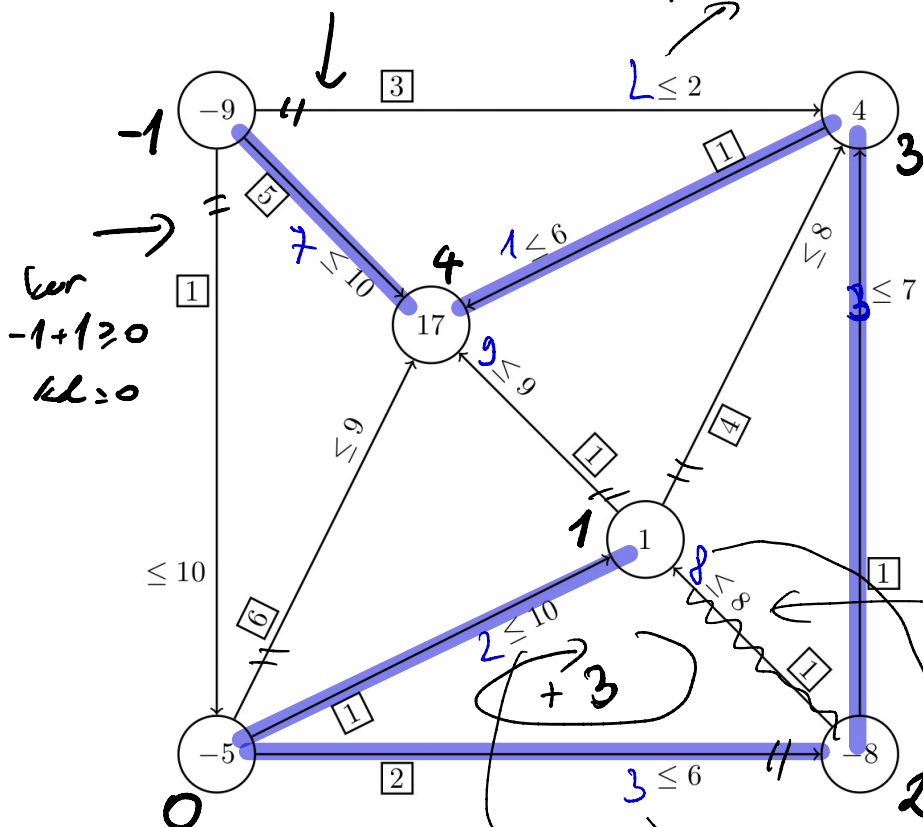


Omejitev: izven druge je ključna 0 ali max

D.D.R. !!

$$\text{Cena} = 2 \cdot 3 + 3 \cdot 5 + 4 \cdot 1 + 5 \cdot 1 + 9 \cdot 1 + 7 \cdot 4 + 9 \cdot 1 + 1 \cdot 1 = \underline{\underline{56}}$$

ker $-1 + 3 \leq 3$, $\text{kol} = \text{max}$



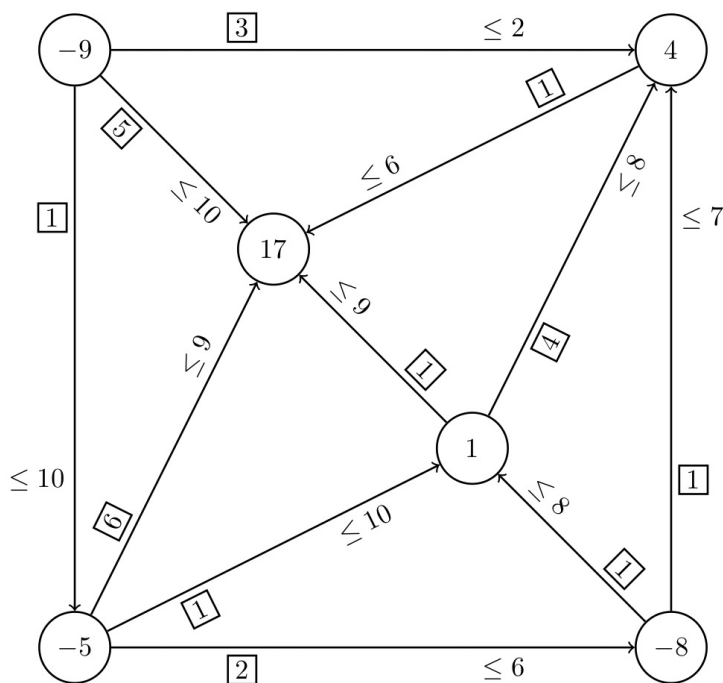
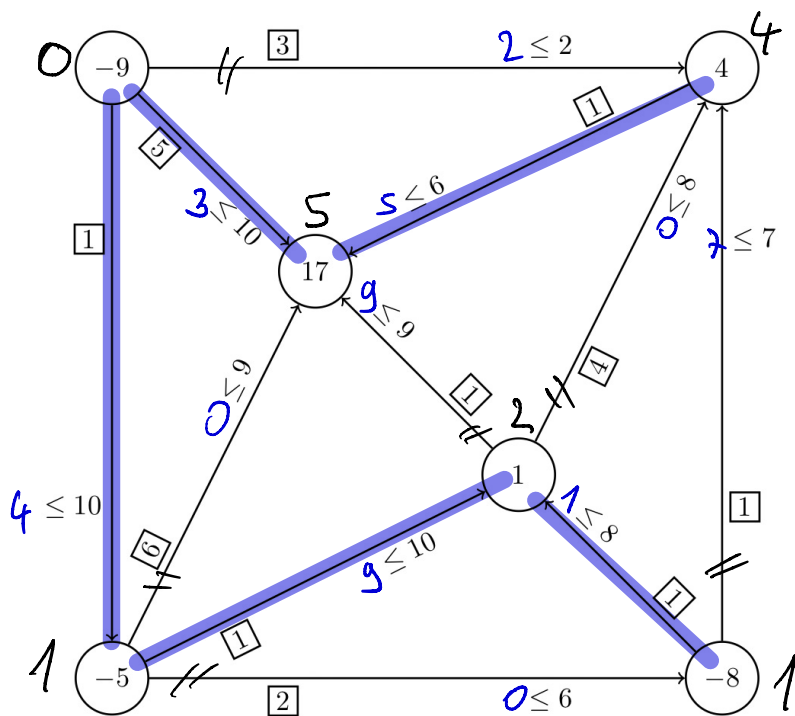
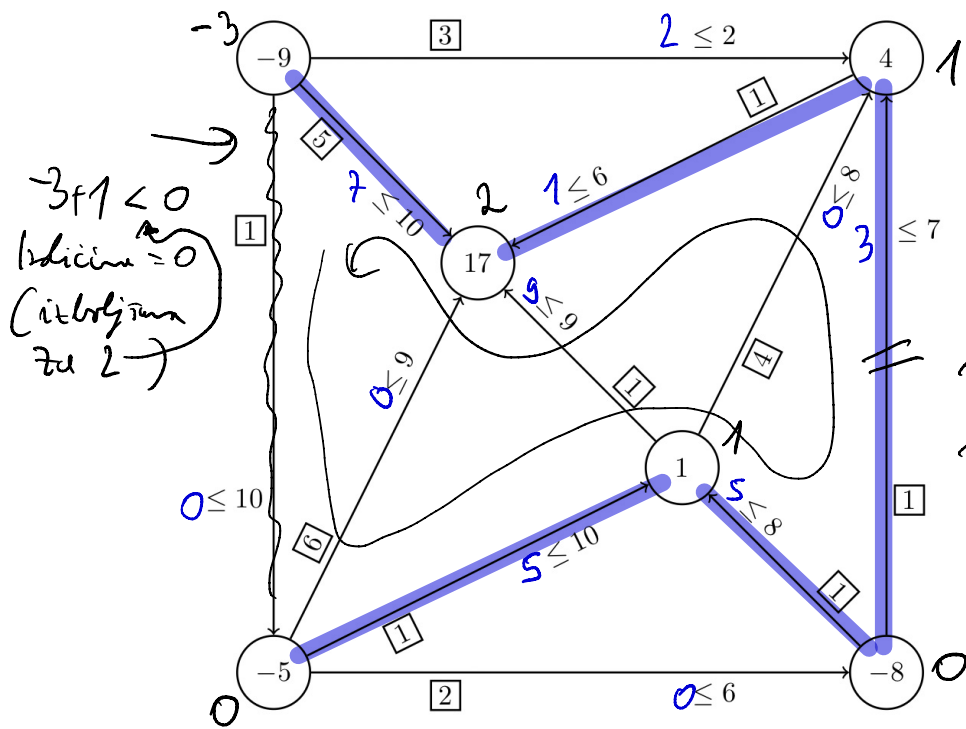
$$\text{Cena} = 2 \cdot 3 + 5 \cdot 7 + 4 \cdot 1 + 9 \cdot 1 + 3 \cdot 1 + 8 \cdot 1 + 2 \cdot 1 + 3 \cdot 2 = \underline{\underline{70}}$$

D.D.R., izboljšaj!!

ker je $\text{kol} = \text{max}$,
in $2 + 1 > 1 \Rightarrow \text{konk.}$

$$\min(8, 3, 8) = 3$$

$$\text{spremenjena cena} = 2 \cdot 3 = 6$$



(To se dă bil meș
 povi - 700 de
 ugi).
 $Cost = 64 - 8 = \underline{\underline{56}}$

Wi obținem,
optimal!!