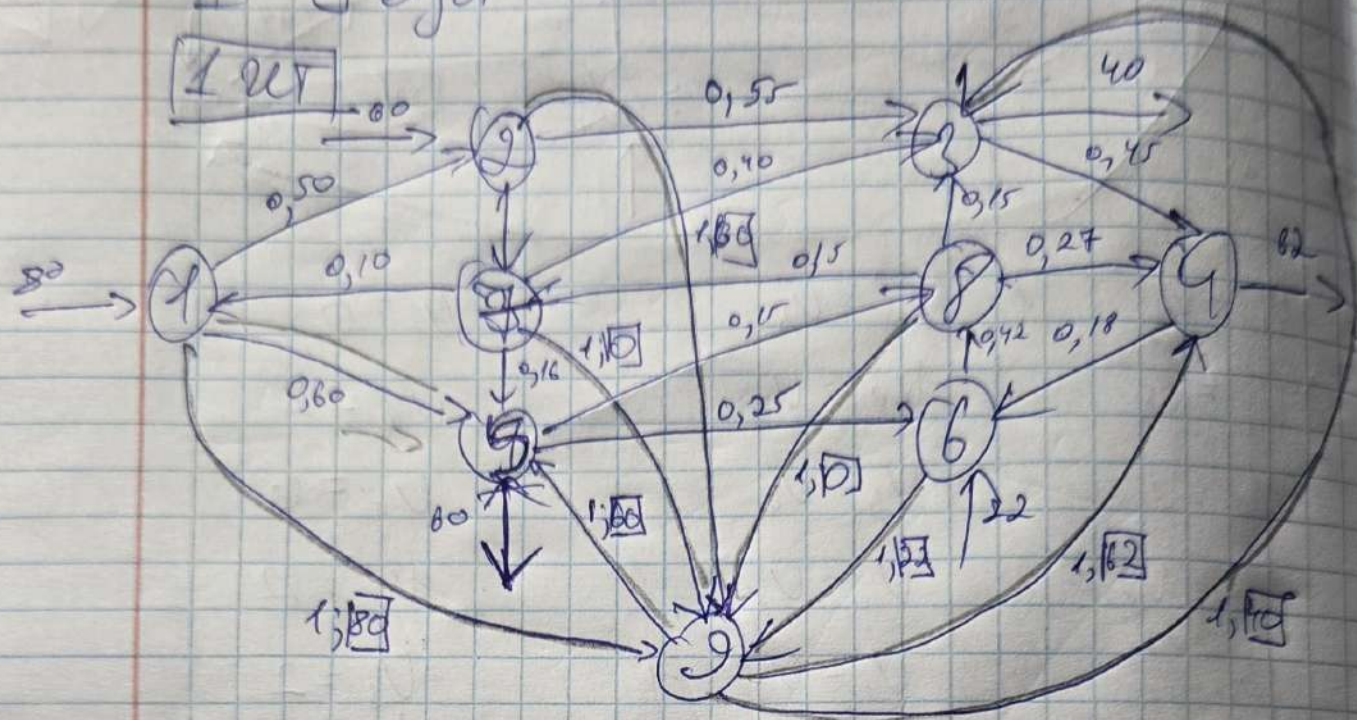Задание 10

а. 4
б. 1

1 Фаза

1) $U_1 - U_9 = -1$ $U_0 = 0$
$U_2 - V_9 = -1$ $U_1 = -1$
$U_9 - U_3 = 1$ $U_2 = -1$
$V_9 - U_4 = -1$ $U_3 = 1$
$U_9 - U_5 = -1$ $U_4 = 1$
$V_6 - U_9 = -1$ $N_5 = 1$
$U_7 - U_9 =$ $V_6 = -1$
$U_8 - U_9 = 0$ $V_7 = 0$
 $V_8 = 0$

6) $X_{15} = 60$
$X_{95} = 0$
$X_{19} = 20$

2) $\Delta_{15} = 2 > 0$ $X_{15} = 0$ —

4) $(i_0, j_0) = (1,5)$

$1 \to 5$

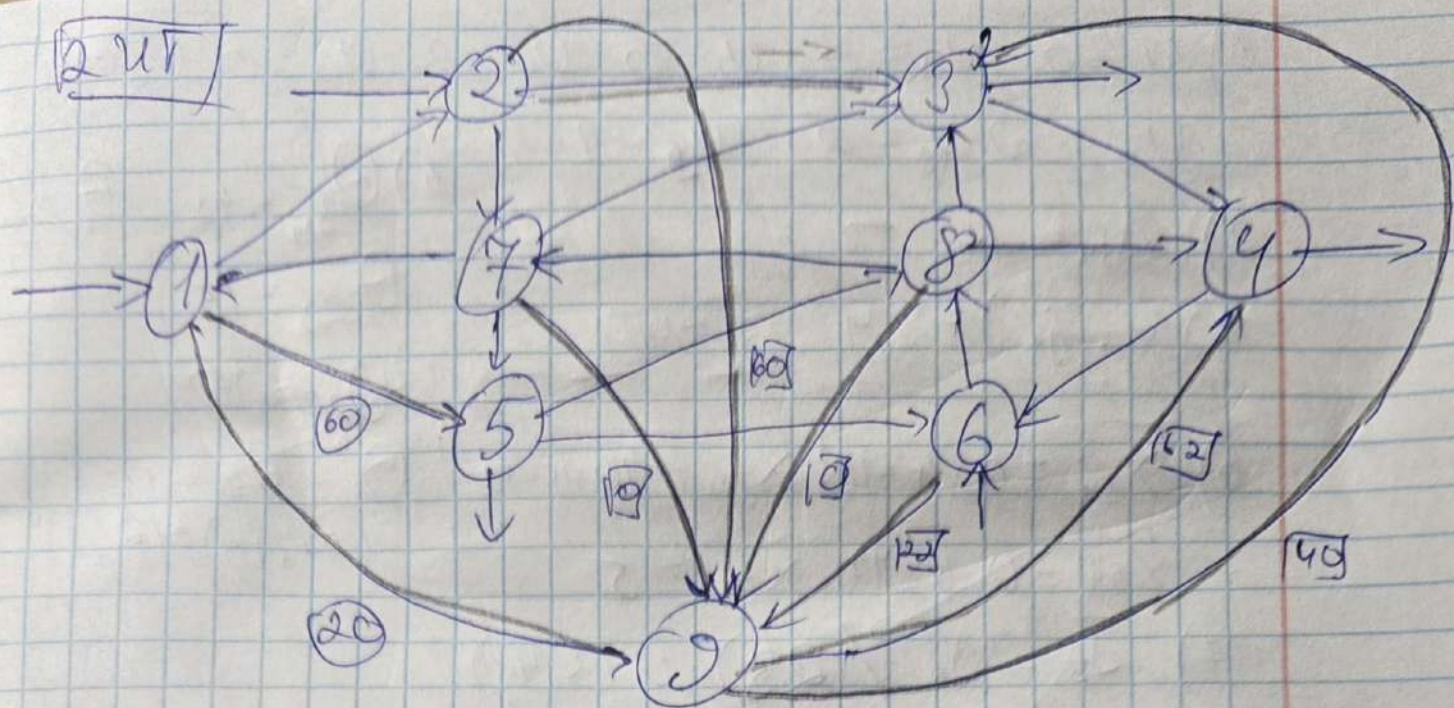5) $\Theta_{15} = 60, \Theta_{95} > 60,$
$\Theta_{91} = 80$

$\Theta^0 = \Theta_{95} = 60$

$(i_x, j_x) = (9,5)$

7) $\overline{J_6} = J_6 \ / (9,5) \cup (1,5)$

1) $U_1 = 0$ $U_5 = 0$
   $U_9 = 1$ $U_2 = 0$
   $U_3 = 2$ $U_4 = 2$
   $U_6 = 0$ $U_7 = 0$
   $U_8 = 0$

2) $\Delta_{23} = 2$ ⊖

4) $(i_0, j_0) = (2,3)$ $2 \to 3$

5) $\Theta_{28} = 55$ $\Theta_{23} = 40$
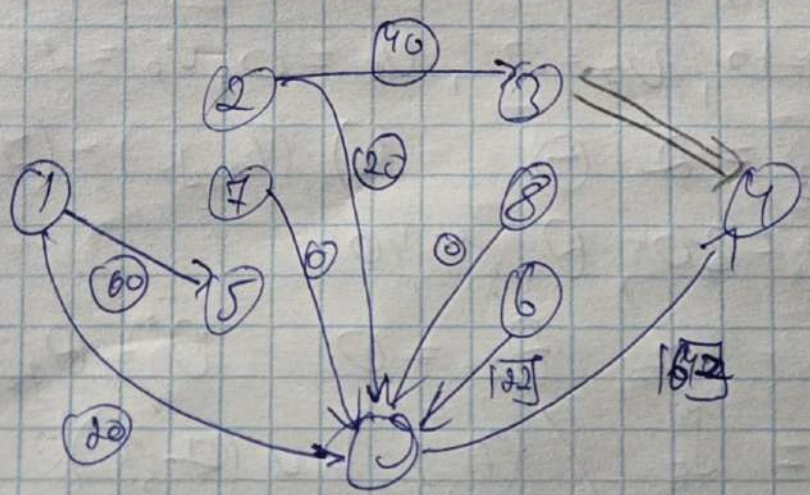
   $\Theta_{23} = 60$; $\Theta^\circ = \Theta_{23} = 40$
   $(i_*, j_*) = (2,3)$

6) $\overline{X}_{23} = 40$, $\widetilde{X}_{23} = 0$, $X_{29} = 20$

7) $J_D = J_B / (2,3) \cup (2,3)$

1) $u_1 = 0$ $v_2 = 0$ $v_3 = 0$ $v_4 = 2$ $v_5 = 0$ $v_6 = 0$

$v_7 = 0$ $v_8 = 0$ $v_9 = 1$

5) $\theta_{34} = 45$ $\theta_{94} = 62$

$\theta_{23} = 15$

2) $\Delta_{34} = 2$ —

$\theta_{29} = 20$

4) $(i_0, j_0) = 3,4$ $3 \to 4$

$\theta^\circ = \theta_{23} = 15$

6) $\tilde{X}_{34} = 0 + 15 = 15$ $\tilde{X}_{23} = 40 + 15 = 55$

$(i_x, j_x) = (2,3)$

$\tilde{X}_{94} = 62 - 15 = 47$ $\tilde{X}_{29} = 5$

7) $\bar{J}_{\overline{b}} = J_{\overline{b}} / (2,3) \cup (3,4)$

$\boxed{4 \text{ ИЗ}}$

1) $v_1 = 0$, $v_2 = 0$, $v_3 = 2$, $v_4 = 2$, $v_5 = 0$,

$v_6 = 0$, $v_7 = 0$, $v_8 = 0$, $v_9 = 1$

2) $\Delta_{73} = 2$ $\ominus$ 4) $(i_0, j_0) = (7,3)$ $7 \to 3$

5) $\theta_{34} = 30$, $\theta_{73} = 40$

$\theta_{94} = 47$, $\theta_{79} = 0$ $\theta^\circ = \theta_{79} = 0$ $(i_x, j_x) = (7,9)$

7) $\bar{J}_{\overline{b}} = J_{\overline{b}} / (7,9) \cup (7,3)$

6) $\tilde{X}_{34} = 15 + 0 \dots$

5 Ч.Т.
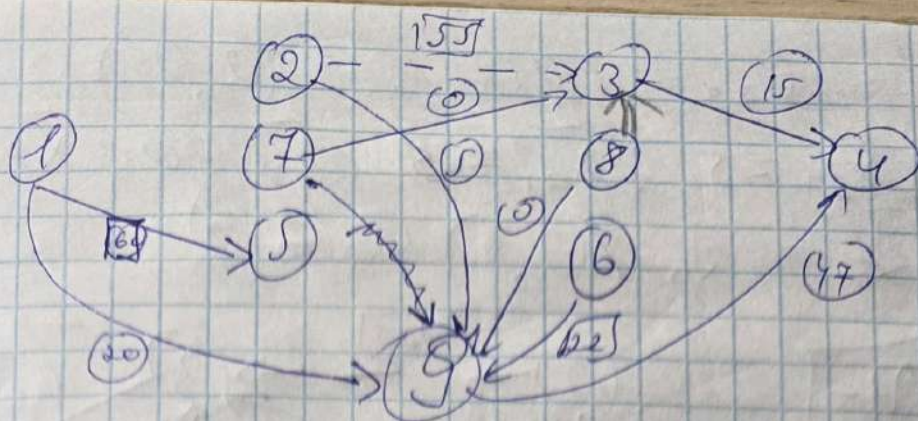
1) $U_1 = 0$ $U_2 = 0$ $U_3 = 2$ $U_4 = 2$ $U_5 = 0$

$U_6 = 0$ $U_7 = 2$ $U_8 = 0$ $U_9 = 1$

2) $\Delta_{83} = 2 \ominus$ 4) $(i_0, j_0) = (8, 3)$ $8 \to 3$

5) $\theta_{83} = 15$, $\theta_{34} = 30$, $\theta_{94} = 47$, $\theta_{89} = 0$

$\theta^0 = 0 = \theta_{89}$ $(i_*, j_*) = 8,9$

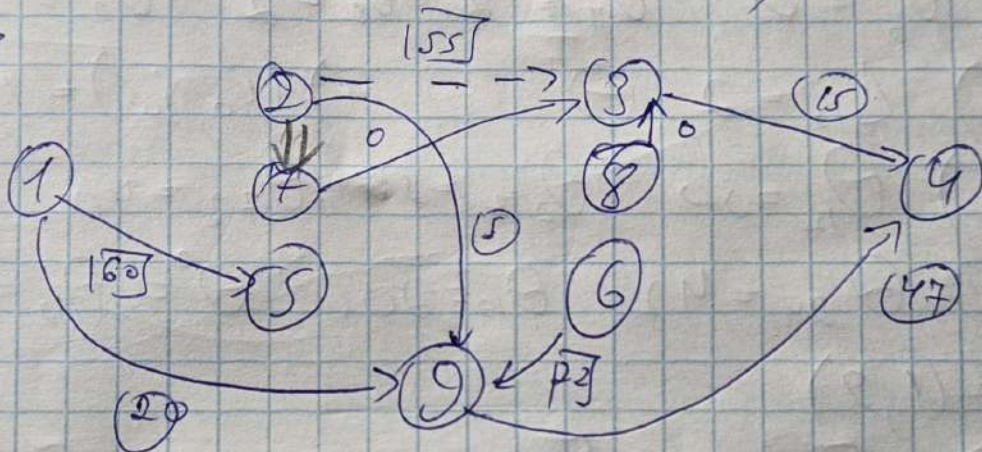7) $J_5 = J_5 \ / \ (8,9) \cup (8,3)$

6 Ч.Т.

1) $U_1 = 0$ $U_2 = 0$ $U_3 = 2$ $U_4 = 2$ $U_5 = 0$

$U_6 = 0$ $U_7 = 2$ $U_8 = 2$ $U_9 = 1$

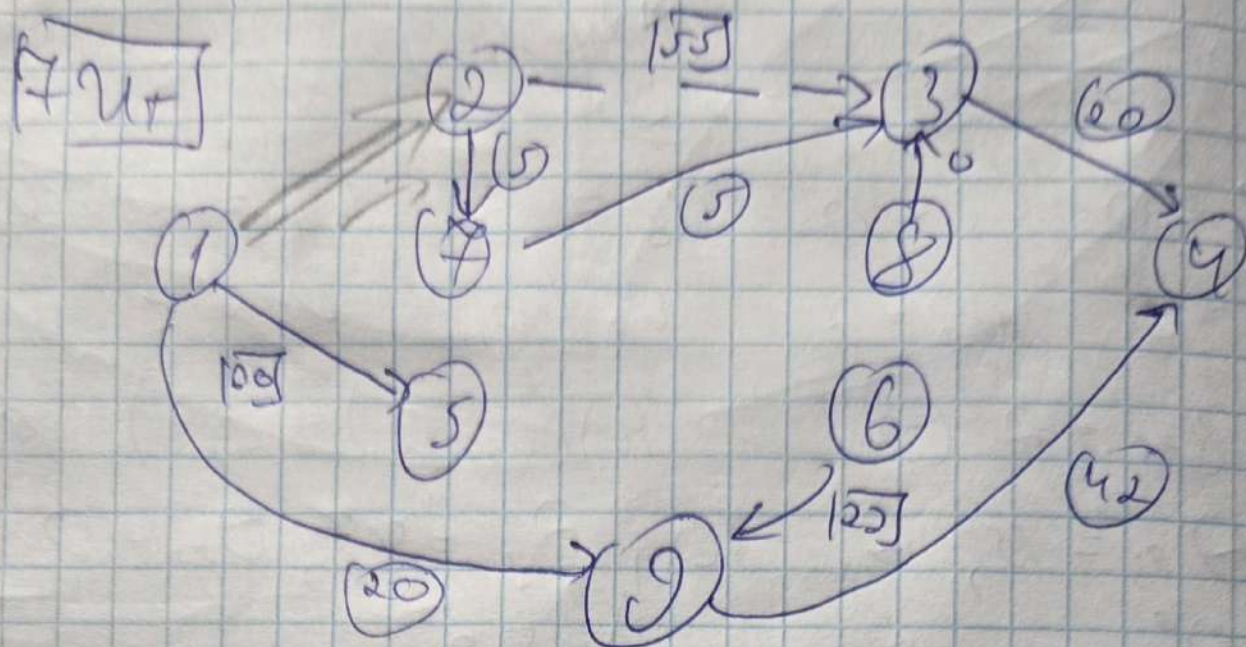2) $\Delta_{27} = 2 \ominus$ 4) $(i_0, j_0) = (2, 7)$ $2 \to 7$

5) $\theta_{27} = 50$, $\theta_{73} = 40$, $\theta_{94} = \cancel{47}$, $\theta_{34} = 30$, $\theta_{29} =$

$\textcircled{5}\ \Theta^\circ = \Theta_{0,9} = 5,\ (i_x, j_x) = (2, 9)$

6) $X_{27} = 5,\ X_{73} = 5,\ X_{34} = 20,\ \bar{X}_{94} = 42,\ \bar{X}_{1,9} = 0$

7) $J_5 = J_5\ /(2,9) \cup (2,7)$

$\boxed{7\ \mathcal{U}_+}$

1) $U_1 = 0 \quad U_2 = 2 \quad U_3 = 2 \quad U_4 = 2 \quad U_5 = 0$

$\quad U_6 = 0 \quad U_7 = 2 \quad U_8 = 2 \quad U_9 = 1$

2) $\Delta_{12} = 2 \ominus$ \hspace{2cm} 4) $(i_0, j_0) = (1,2) \quad 1 \to 2$

5) $\Theta_{12} = 50 \quad \Theta_{27} = 50 \quad \Theta_{73} = 40 \quad \Theta_{34} = 30$

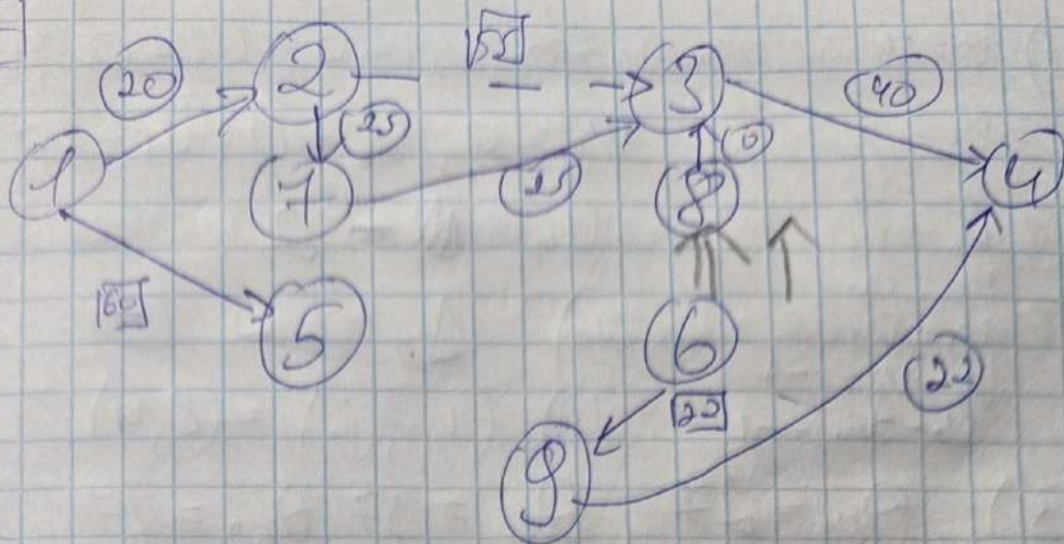$\quad \Theta_{94} = 42 \quad \Theta_{19} = 20 \quad \Theta^\circ = \Theta_{19} = 20\ (i_x, j_x) =$

$= (1,9)$

6) $\bar{X}_{19} = 0,\ \bar{X}_{94} = 22,\ \tilde{X}_{12} = 20,\ \tilde{X}_{27} = 25$

$\quad \tilde{X}_{73} = 25,\ \tilde{X}_{34} = 40$

7) $\bar{J}_5 = J_5 /(1,9) \cup (1,2)$

1) $U_1 = 0$ $V_2 = 0$ $U_3 = 0$ $U_4 = 0$ $U_5 = 0$ $V_6 = -2$

$V_7 = 0$ $U_8 = 0$ $U_9 = -1$

2) $\Delta_{68} = 2$ ⊖   4) $(i_0, j_0) = (6, 8)$ $6 \to 8$
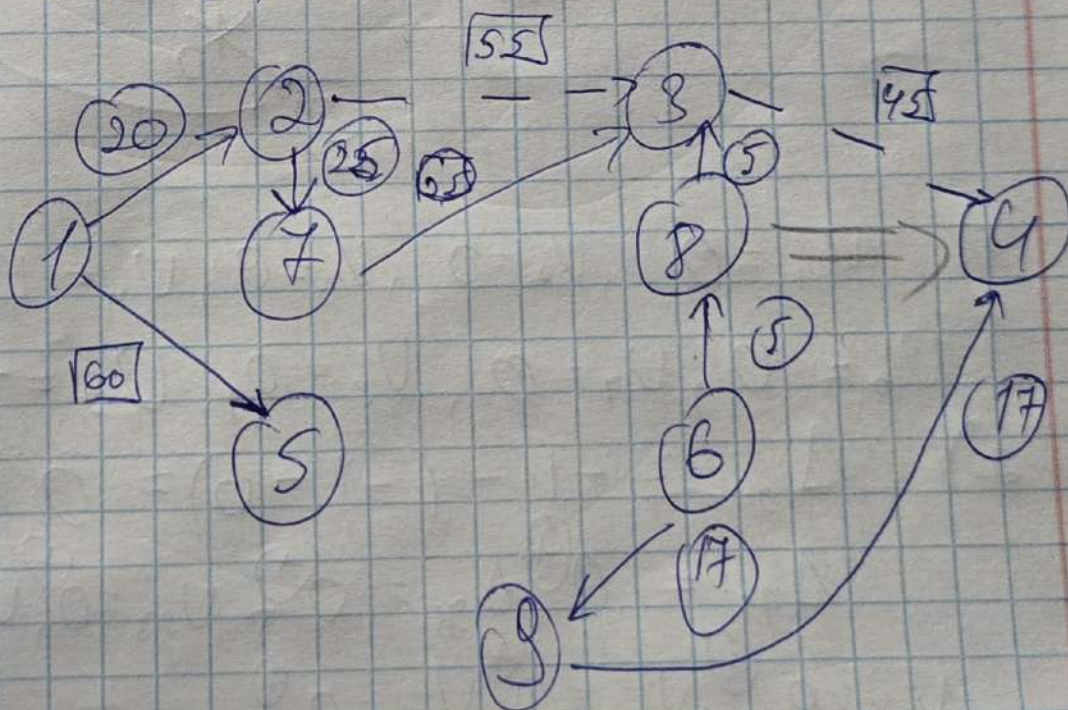
5) $\theta_{69} = 42$ $\theta_{83} = 15$ $\theta_{34} = 5$ $\theta_{94} = 22$

$\theta_{69} = 22$ $\theta^0 = 5 = \theta_{34} \to (i_*, j_*) \neq (3, 4)$

6) $\widetilde{X}_{68} = 5$, $\widetilde{X}_{83} = 5$, $\widetilde{X}_{34} = 45$, $\widetilde{X}_{94} = 17$, $\widetilde{X}_{96} = 17$

7) $\overline{J_5} = \overline{J_5} / (3, 4) \cup (6, 8)$

1) $U_1 = U_2$ $U_1 = 0$, $U_2 = 0$, $U_7 = 0$, $U_3 = 0$,
$U_2 = U_7$ $U_8 = 0$, $U_6 = 0$, $U_5 = 0$, $U_9 = 2$
$U_7 = U_3$
$U_8 = U_3$ $U_4 = \cancel{N}$ или 2
$U_6 = U_8$
$U_1 = U_5$ 2) $\Delta_{84} = 2$ $\ominus$
$U_6 - U_9 = -1$
$U_3 - U_4 = -1$ 4) $(i_0, j_0) = (8, 4)$ $8 \to 4$

5) $\theta_{84} = 27$, $\theta_{68} = 37$, $\theta_{69} = 17$, $\theta_{94} = 17$
$\theta^0 = \theta_{69} = 17$ $(i_*, j_*) = \cancel{(8,4)} (6,9)$

6) $\overline{X}_{68} = 22$, $X_{84} = 17$, $X_{94} = 0$, $X_{69} = 0$

$\boxed{\text{Vout}}$
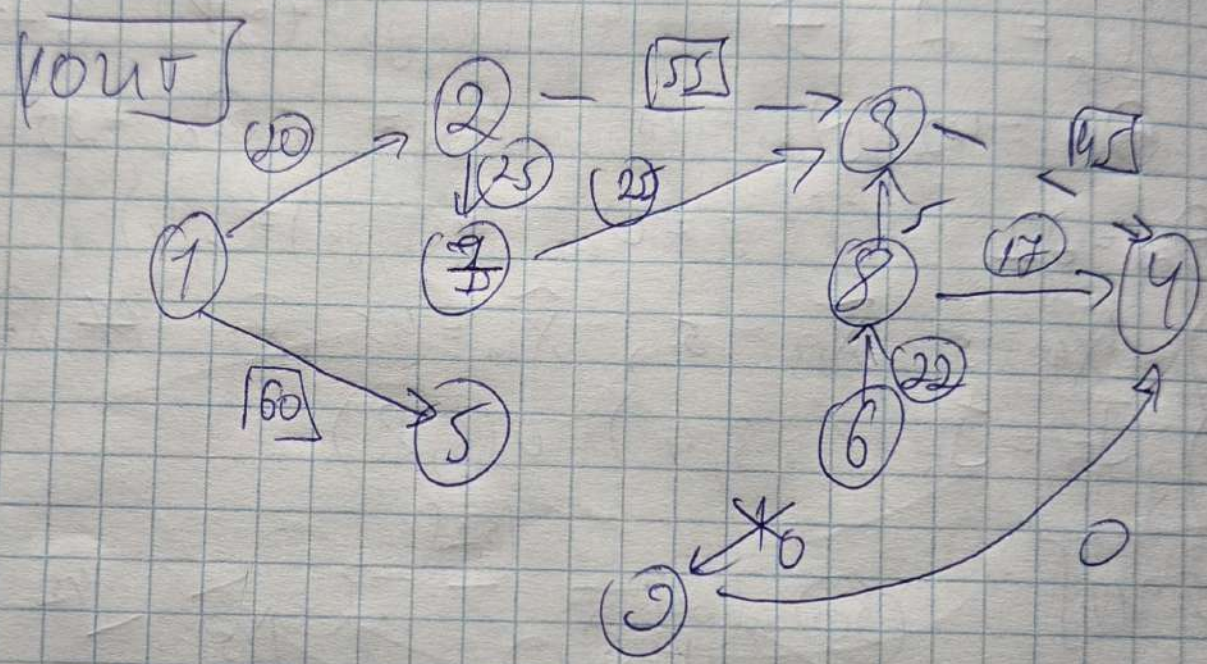
1) $U_1 = 0$, $U_2 = 0$, $U_3 = 0$, $U_4 = 0$, $U_5 = 0$,
$U_6 = 0$, $U_7 = 0$, $U_8 = 0$, $U_9 = -1$

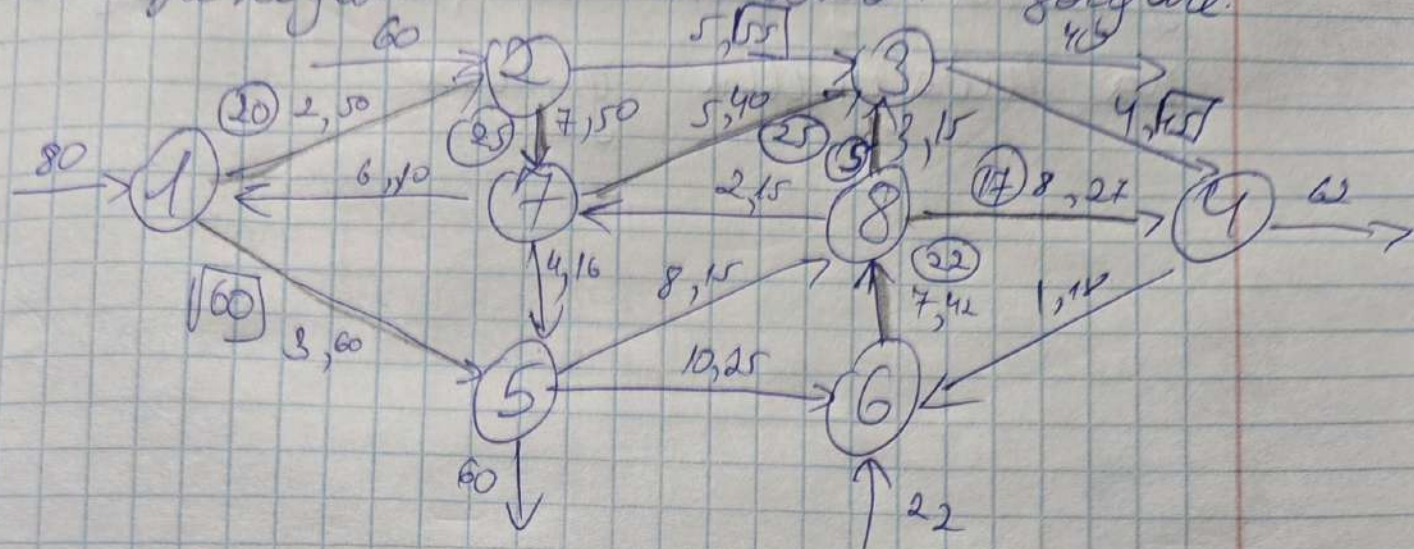2) $\Delta_{94} = -1 - (-1 - 0) = 0$ $\oplus$

$\Delta_{71} = 0 \oplus$, $\Delta_{75} = 0 \oplus$, $U_{23} = 0 \oplus$, $U_{87} = 0 \oplus$, $U_{58} = 0 \oplus$,
$U_{56} = 0 \oplus$, $U_{34} = 0 \oplus$, $U_{46} = 0 \oplus$

Условие оптимальности выполняется, т-ок для искуст. дуг $= 0$.
Переходим к основной задаче:

1) $U_1 - U_5 = -3$

$U_2 - U_7 = -7$

$U_7 - U_3 = -5$

$U_8 - U_3 = -3$

$U_8 - U_4 = -8$

$U_6 - U_8 = -7$

$U_1 - U_2 = -2$

$U_1 = 0, \; U_2 = 2, \; U_5 = 3,$

$U_7 = 9, \; U_3 = 12,$

$U_8 = 9, \; U_4 = 17, \; U_6 = $

$= 2$

2) $\Delta_{23} = -5 - (2-12) = +5 > 0 \; \oplus$

$\Delta_{34} = -4 - (12-17) = 1 > 0 \; \oplus$

$\Delta_{87} = -2 - (9-9) = -2 < 0 \; \oplus$

$\Delta_{46} = -1 - (17-2) = -16 < 0 \; \oplus$

$\Delta_{71} = -6 - (9-0) = -15 < 0 \; \oplus$

$\Delta_{75} = -4 - (9-3) = -10 < 0 \; \oplus$

$\Delta_{58} = -8 - (3-9) = -2 < 0 \; \oplus$

$\Delta_{56} = -10 - (3-2) = -11 < 0 \; \oplus$

Построенный поток являетя оптимальным. Оптимальный поток является единственным, т.к. нет $\Delta_{ij} = 0$ на избранных дугах.