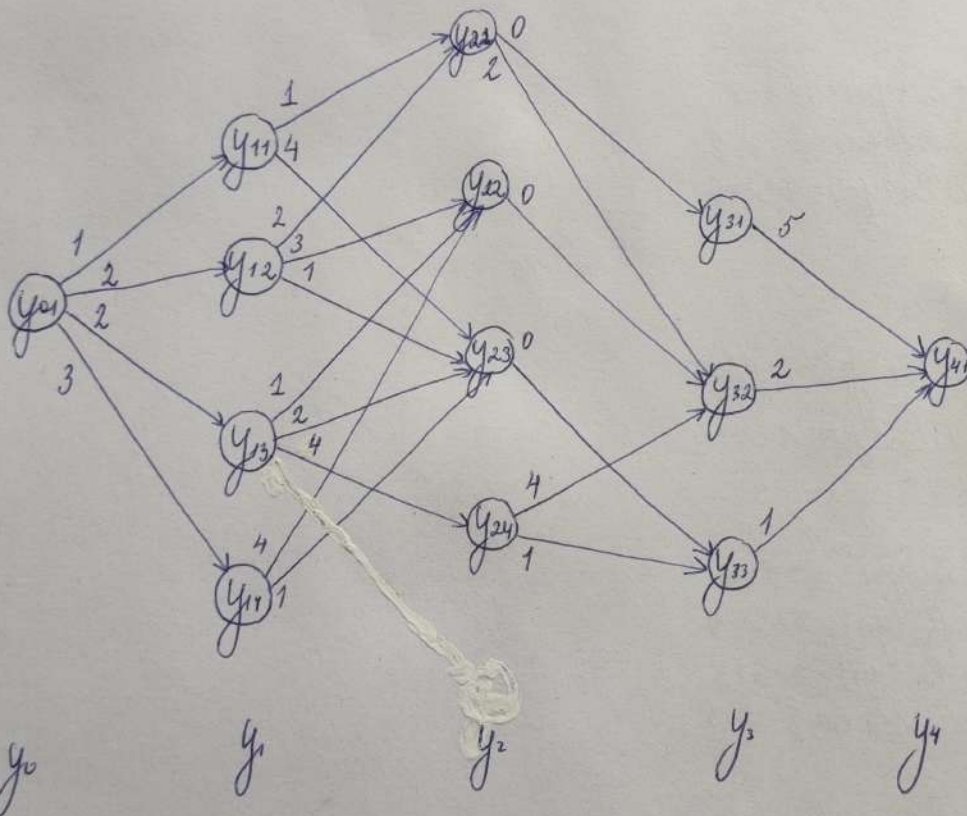
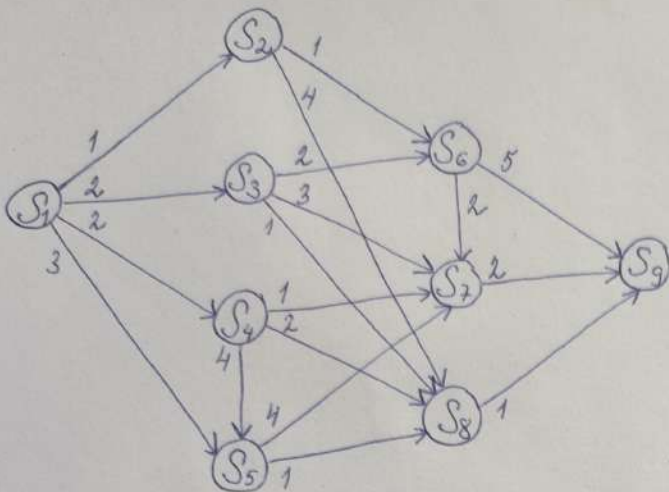


Математическая экономика  
Курсовая работа  
№ 2 (МЭТ)

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$$\begin{aligned} y_0 &= S_1 \\ y_1 &= (S_2, S_3, S_4, S_5) \\ y_2 &= (S_6, S_7, S_8, S_9) \\ y_3 &= (S_6, S_7, S_8) \\ y_4 &= S_9 \end{aligned}$$

$$\begin{aligned} y_0 &\in R' \\ y_1 &\in R'' \\ y_2 &\in R'' \\ y_3 &\in R' \\ y_4 &\in R' \end{aligned}$$

I)  $n=3$

$$\begin{aligned} u_3(y_{31}) &= y_{41} \\ u_3(y_{32}) &= y_{41} \\ u_3(y_{33}) &= y_{41} \end{aligned}$$

$$\begin{aligned} B_3(y_{31}) &= 5 \\ B_3(y_{32}) &= 2 \\ B_3(y_{33}) &= 1 \end{aligned}$$

II)  $n=2$

$$\begin{aligned} u_2(y_{21}) &= y_{31} \\ u_2(y_{22}) &= y_{32} \\ u_2^*(y_{21}) &= y_{32} \end{aligned}$$

$$\begin{aligned} \psi(y_{21}, y_{31}) + B_3(y_{31}) &= 0 + 5 = 5 \\ \psi(y_{21}, y_{32}) + B_3(y_{32}) &= 2 + 2 = 4 \\ B_2(y_{21}) &= 4 \end{aligned}$$

$$u_2^*(y_{22}) = y_{32}$$

$$u_2^*(y_{23}) = y_{33}$$

$$u_2(y_{24}) = y_{32}$$

$$u_2(y_{24}) = y_{33}$$

$$u_2^*(y_{24}) = y_{33}$$

$$B_2(y_{22}) = \psi(y_{22}, y_{32}) + B_3(y_{32}) = 0 + 2 = 2$$

$$B_2(y_{23}) = \psi(y_{23}, y_{33}) + B_3(y_{33}) = 0 + 1 = 1$$

$$\psi(y_{24}, y_{32}) + B_3(y_{32}) = 4 + 2 = 6$$

$$\psi(y_{24}, y_{33}) + B_3(y_{33}) = 1 + 1 = 2$$

$$B_2(y_{24}) = 2$$

III)  $n=1$

$$u_1(y_{11}) = y_{21}$$

$$u_1(y_{11}) = y_{23}$$

$$[u_1^*(y_{11}) = y_{21}$$

$$u_1^*(y_{11}) = y_{23}]$$

$$\psi(y_{11}, y_{21}) + B_2(y_{21}) = 1 + 4 = 5$$

$$\psi(y_{11}, y_{23}) + B_2(y_{23}) = 4 + 1 = 5$$

$$B_1(y_{11}) = 5$$

$$u_1(y_{12}) = y_{21}$$

$$u_1(y_{12}) = y_{22}$$

$$u_1(y_{12}) = y_{23}$$

$$u_1^*(y_{12}) = y_{23}$$

$$\psi(y_{12}, y_{21}) + B_2(y_{21}) = 2 + 4 = 6$$

$$\psi(y_{12}, y_{22}) + B_2(y_{22}) = 3 + 2 = 5$$

$$\psi(y_{12}, y_{23}) + B_2(y_{23}) = 1 + 1 = 2$$

$$B_1(y_{12}) = 2$$

$$u_1(y_{13}) = y_{22}$$

$$u_1(y_{13}) = y_{23}$$

$$u_1(y_{13}) = y_{24}$$

$$[u_1^*(y_{13}) = y_{22}$$

$$u_1^*(y_{13}) = y_{23}]$$

$$\psi(y_{13}, y_{22}) + B_2(y_{22}) = 1 + 2 = 3$$

$$\psi(y_{13}, y_{23}) + B_2(y_{23}) = 2 + 1 = 3$$

$$\psi(y_{13}, y_{24}) + B_2(y_{24}) = 4 + 2 = 6$$

$$B_1(y_{13}) = 3$$

$$u_1(y_{14}) = y_{22}$$

$$u_1(y_{14}) = y_{23}$$

$$u_1^*(y_{14}) = y_{23}$$

$$\psi(y_{14}, y_{22}) + B_2(y_{22}) = 4 + 2 = 6$$

$$\psi(y_{14}, y_{23}) + B_2(y_{23}) = 1 + 1 = 2$$

$$B_1(y_{14}) = 2$$

IV)  $n=0$

$$u_0(v) = y_{11}$$

$$u_0(v) = y_{12}$$

$$u_0(v) = y_{13}$$

$$u_0(v) = y_{14}$$

$$u_0^*(v) = y_{12}$$

$$y_0^* = v$$

$$y_1^* = u_0^*(v) = y_{12}$$

$$y_2^* = u_1^*(y_{12}) = y_{23}$$

$$y_3^* = u_2^*(y_{23}) = y_{33}$$

$$y_4^* = u_3^*(y_{33}) = y_4$$

$$\psi(v, y_{11}) + B_1(y_{11}) = 1 + 5 = 6$$

$$\psi(v, y_{12}) + B_1(y_{12}) = 2 + 2 = 4$$

$$\psi(v, y_{13}) + B_1(y_{13}) = 2 + 3 = 5$$

$$\psi(v, y_{14}) + B_1(y_{14}) = 3 + 2 = 5$$

$$B_0(v) = 4$$

Оптимальная

траектория:  $S_1 \rightarrow S_3 \rightarrow S_8 \rightarrow S_9$

$$J^* = B_0(y_{01}) = 4$$



### №3 (Game)

$$1) \begin{matrix} & B \\ A & \begin{pmatrix} -1 & -2 & 2 \\ 1 & 2 & 1 \\ 1 & 3 & -3 \end{pmatrix} \\ \max \uparrow & \begin{matrix} \textcircled{1} & 3 & 2 \\ \min \end{matrix} \end{matrix} \quad \begin{matrix} \min \\ -2 \\ \textcircled{1} - \max \\ -3 \end{matrix}$$

$$\min \max = \max \min = 1 - \text{цена игры}$$

Максимальная стратегия первого игрока - вторая чистая стратегия.

Минимальная стратегия второго игрока - первая чистая стратегия.

$$2) \begin{matrix} & B \\ A & \begin{pmatrix} 8 & 12 \\ 10 & 8 \end{pmatrix} \\ \max \uparrow & \begin{matrix} \textcircled{10} & 12 \\ \min \end{matrix} \end{matrix} \quad \begin{matrix} \min \\ \textcircled{8} - \max \\ 8 \end{matrix}$$

$$\min \max = 10 \neq \max \min = 8$$

Ищем решение в смешанных стратегиях.

$$I: \begin{cases} 8p_1 + 10p_2 = y \\ 12p_1 + 8p_2 = y \\ p_1 + p_2 = 1 \end{cases}$$

$$II: \begin{cases} 8q_1 + 12q_2 = y \\ 10q_1 + 8q_2 = y \\ q_1 + q_2 = 1 \end{cases}$$

$$\begin{cases} p_1 = 1 - p_2 \\ 8p_1 + 10p_2 = 12p_1 + 8p_2 \end{cases}$$

$$\begin{cases} q_1 = 1 - q_2 \\ 8q_1 + 12q_2 = 10q_1 + 8q_2 \end{cases}$$

$$\begin{cases} p_1 = 1 - p_2 \\ 2p_1 = p_2 \end{cases}$$

$$\begin{cases} q_1 = 1 - q_2 \\ q_1 = 2q_2 \end{cases}$$

$$3p_1 = 1$$

$$3q_2 = 1$$

$$p_1 = \frac{1}{3} \quad p_2 = \frac{2}{3}$$

$$q_2 = \frac{1}{3} \quad q_1 = \frac{2}{3}$$

$$y = \frac{28}{3}$$

$$y = \frac{28}{3}$$

$$P = \left( \frac{1}{3}; \frac{2}{3} \right)$$

$$Q = \left( \frac{2}{3}; \frac{1}{3} \right)$$

Вероятность выбора I-ым игроком 1-ой стратегии:  $\frac{1}{3}$   
2-ой стратегии:  $\frac{2}{3}$

— " — " — II-ым игроком 1-ой стратегии:  $\frac{2}{3}$   
2-ой стратегии:  $\frac{1}{3}$

$$\text{Цена игры: } \frac{28}{3} = 9 \frac{1}{3}$$