Pb1

Variante corecte

a, d, f, g, i, j

	C_1	C_2	C_3	
D_1	[1] *	[1] *	[0] 8	~~8~~ 0 ! verificare !
D_2	[2] *	[3] 7	[0] *	~~7~~ 0
D_3	[3] 5	[4] 4	[0] 1	~~10~~ ~~9~~ ~~4~~ 0
	~~5~~ 0	~~11~~ ~~4~~ 0	~~9~~ ~~1~~ 0	

$8+7+10 = x+11+5$

$25 = x+16$

$\boxed{x=9}$

$\overline{x_0} = (0,0,8,0,7,0,5,4,1) \in \mathbb{R}^9$ - S.B.Ned.

$f(\overline{x_0}) = 8\cdot0 + 7\cdot3 + 5\cdot3 + 4\cdot4 + 1\cdot0 = 52$ (u.m).

$\delta_{11} = -1+0-0+3 = 2>0$

$\delta_{12} = -1+4-0+0 = 3>0$

$\delta_{21} = -2+3-4+3 = 0$

$\delta_{23} = -0+3-4+0 = -1$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{x_0}$ nu este soluție optimă

$\delta_{ke} = \max\{\delta_{11}; \delta_{12}\} = \{\delta_{12}\} \Rightarrow x_{12} \downarrow$

$$\begin{tikzcd}
\overset{4}{+(1,2)} \arrow[d] & \overset{\cancel{8}\;4}{(1,3)}^{4} \arrow[l] \\
\underset{\cancel{4}\,*}{-\,2\,(3,2)} \arrow[r] & \underset{\cancel{1}\,5}{(3,3)} \arrow[u]
\end{tikzcd}$$

$\Theta = \min\{(3,2);(1,3)\} = (3,2) \Rightarrow$

$\Rightarrow x_{32} \rightarrow$

$\Theta = 4$

	C_1	C_2	C_3	
D_1	$\boxed{1}$ *	$\boxed{1}$ 4	$\boxed{0}$ 4	8
D_2	$\boxed{2}$ *	$\boxed{3}$ 7	$\boxed{0}$ *	7
D_3	$\boxed{3}$ 5	$\boxed{4}$ *	$\boxed{0}$ 5	10
	5	11	9	

! verificare !

$\overline{x_1} = (0,4,4,0,7,0,5,0,5) \in R^9$ - S.B. Ned.

$f(\overline{x_1}) = 4\cdot 1 + 4\cdot 0 + 7\cdot 3 + 5\cdot 3 + 5\cdot 0 = 40\,(u.m.) \leq f(\overline{x_0})$? Da

$\delta_{11} = -1+0-0+3 = 2 > 0$

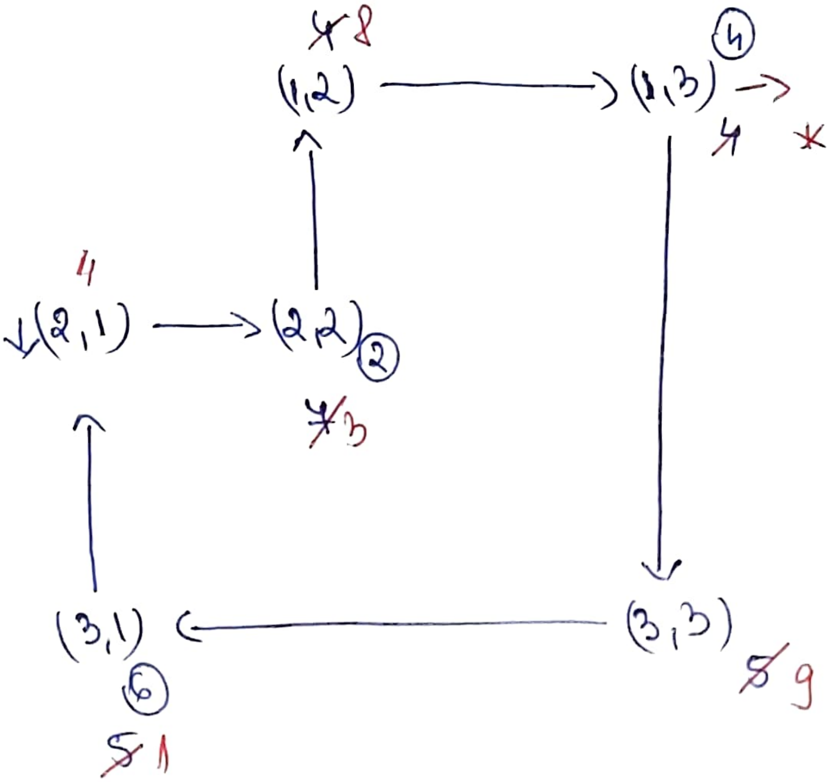
$\delta_{21} = -2+3-0+0-1+3 = 3 > 0$

$\delta_{23} = -0+3-1+0 = 2 > 0$

$\delta_{32} = -4+0-0+1 = -3$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{x_1}$ nu este s. optimă.

$SKe = \max\{\delta_{11}; \delta_{21}; \delta_{23}\} = \{\delta_{21}\} \Rightarrow x_{21} \downarrow$



$\Theta = \min\{(2,2); (1,3); (3,1)\} = (1,3) \Rightarrow x_{13} \rightarrow$

$\Theta = 4$

	C_1	C_2	C_3	
D_1	$\boxed{1}$ *	$\boxed{1}$ 8	$\boxed{0}$ *	8
D_2	$\boxed{2}$ 4	$\boxed{3}$ 3	$\boxed{0}$ *	7
D_3	$\boxed{3}$ 1	$\boxed{4}$ *	$\boxed{0}$ 9	10
	5	11	9	

! verificare !

$\overline{x_2} = (0,8,0,4,3,0,1,0,9) \in \mathbb{R}^9$ – S.B.Ned.

$f(\overline{x_2}) = 8\cdot 1 + 4\cdot 2 + 3\cdot 3 + 1\cdot 3 + 9\cdot 0 = \boxed{28}$ (u.m). $\leq f(\overline{x_1})$? Da

$\delta_{11} = -1+2-3+1 = -1$

$\delta_{13} = -0+1-3+2-3+0 = -3$

$\delta_{23} = -0+2-3+0 = -1$

$\delta_{32} = -4+3-2+3 = 0$

$\Rightarrow$ toți $\delta_{ij} \leq 0 \Rightarrow \overline{x_2}$ este s. optimă neunică

Concluzia pt. P.T.E.

$$\begin{cases} x_{optim}^{echilibrat} = (0,8,0,4,3,0,1,0,9) \\ \min f = 28 \text{ (u.m)} \end{cases}$$

Pb 2

Variante corecte

a, c, f, g, k, e

	C_1	C_2	C_3	
D_1	[2] 4	[2] *	[5] *	~~4~~ 0
D_2	[3] 1	[3] 4	[4] 7	~~12~~ ~~11~~ ~~7~~ 0
D_3	[0] *	[0] 6	[0] *	~~6~~ 0
	~~5~~ ~~1~~ 0	~~10~~ ~~4~~ 0	~~7~~ 0	

! verificare !

$5+10+7=7+12+x$

$22=16+x$

$\boxed{x=6}$

$\overline{x_0}=(4,0,0,1,4,7,0,6,0)\in R^9$ – S.B. Ned.

$f(\overline{x_0})=4\cdot2+1\cdot3+4\cdot3+7\cdot4+6\cdot0=51$ (u.m.)

$\delta_{12}=-2+3-3+2=0$

$\delta_{13}=-5+4-3+2=-2$

$\delta_{31}=-0+3-3+0=0$

$\delta_{33}=-0+0-3+4=1>0$

$\Rightarrow \exists\ \delta_{ij}>0 \Rightarrow \overline{x_0}$ nu este s. optimă

$SKe=\max\{\delta_{33}\}=\delta_{33}\Rightarrow x_{33}\downarrow$

$$\begin{tikzcd}
\overset{\cancel{4}\ 10}{(2,2)} \arrow[r] & \overset{1\ \cancel{7}\ 4}{(2,3)} \arrow[d] \\
2 \Leftarrow \underset{\cancel{6}\ *}{(3,2)} \arrow[u] & \underset{6}{(3,3)\downarrow} \arrow[l]
\end{tikzcd}$$

$\Theta = \min\{(3,2); (2,3)\} = (3,2) \Rightarrow$

$\Rightarrow x_{32} \rightarrow$

$\Theta = 6$

	C_1	C_2	C_3	
S_1	$\boxed{2}$ 4	$\boxed{2}$ *	$\boxed{5}$ *	4
S_2	$\boxed{3}$ 1	$\boxed{3}$ 10	$\boxed{4}$ 1	12
S_3	$\boxed{0}$ *	$\boxed{0}$ *	$\boxed{0}$ 6	6
	5	10	7	

! verificare !

$\overline{x_1} = (4,0,0,1,10,1,0,0,6) \in \mathbb{R}^9$ – S.B. Ned.

$f(\overline{x_1}) = 4\cdot 2 + 1\cdot 3 + 10\cdot 3 + 4\cdot 1 + 6\cdot 0 = 45$ (u.m) $\leq f(\overline{x_0})$? Da

$\delta_{12} = -2+3-3+2 = 0$

$\delta_{13} = -5+4-3+2 = -2$

$\delta_{31} = -0+3-4+0 = -1$

$\delta_{32} = -0+3-4+0 = -1$

$\Rightarrow$ toți $\delta_{ij} \leq 0 \Rightarrow \overline{x_1}$ este s. optimă neunică

Concluzia pt. P.T.E.:

$$\begin{cases} x_{optim}^{echilibrat} = (4,0,0,1,10,1,0,0,6) \\ \min f = 45 \text{ (u.m.)} \end{cases}$$

Pb 3

	C_1	C_2	C_3	
D_1	[3] 7	[1] 1	[0] *	$\cancel{8}\ \cancel{1}\ 0$
D_2	[1] *	[4] 8	[0] 4	$\cancel{12}\ \cancel{4}\ 0$
D_3	[2] *	[2] *	[0] 10	$\cancel{10}\ 0$
	$\cancel{7}\ 0$	$\cancel{9}\ \cancel{8}\ 0$	$\cancel{14}\ \cancel{10}\ 0$	

! verificare !

$7+9+x = 8+12+10$

$16+x = 30$

$\boxed{x = 14}$

$\overline{x_0} = (7,1,0,0,8,4,0,0,10) \in R^9$ - s.B.Ned.

$f(\overline{x_0}) = 7\cdot3+1\cdot1+8\cdot4+4\cdot0+10\cdot0 = 54$ (u.m.)

$\delta_{13} = -0+1-4+0 = -3$

$\delta_{21} = -1+4-1+3 = 5 > 0$

$\delta_{31} = -2+3-1+4-0+0 = 4 > 0$

$\delta_{32} = -2+4-0+0 = 2 > 0$

$\Rightarrow \exists \delta_{ij} > 0 \Rightarrow \overline{x_0}$ nu este s. optimă.

$\delta_{ke} = \max\{\delta_{21}; \delta_{31}; \delta_{32}\} = \delta_{21} \Rightarrow x_{21} \downarrow$

$\cancel{7}$ * $\qquad\qquad$ $\cancel{x}$ 8

$$\begin{tikzcd} ④ \; (1,1) \arrow[d] & (1,2) \arrow[l] \\ (2,1) \arrow[r] & (2,2) \; ② \end{tikzcd}$$

7 $\qquad\qquad$ $\cancel{8}$ 1

$\Theta = \min\{(2,2);(1,1)\} = (1,1) \Rightarrow x_{11} \to$

$\Theta = 7$

	C_1	C_2	C_3	
D_1	$\boxed{3}$ *	$\boxed{1}$ 8	$\boxed{0}$ *	8
D_2	$\boxed{1}$ 7	$\boxed{4}$ 1	$\boxed{0}$ 4	12 ! <u>verificare</u> !
D_3	$\boxed{2}$ *	$\boxed{2}$ *	$\boxed{0}$ 10	10
	7	9	14	

$\overline{x}_1 = (0,8,0,7,1,4,0,0,10) \in \mathbb{R}^9$ – S.B.Ned.

$f(\overline{x}_1) = 8\cdot 1 + 7\cdot 1 + 1\cdot 4 + 4\cdot 0 + 10\cdot 0 = 19 \underset{(u.m)}{\leq} f(x_0)$? <u>Da</u>

$\delta_{11} = -3+1-4+1 = -5$

$\delta_{13} = -0+0-4+1 = -3$

$\delta_{31} = -2+1-0+0 = -1$

$\delta_{32} = -2+4-0+0 = 2 > 0$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{x}_1$ nu este s. optimă

$SKe = \max\{\delta_{32}\} = \delta_{32} \Rightarrow x_{32} \downarrow$

$$\begin{tikzcd} \textcircled{2}\ \cancel{1}\ *\ (2,2) \arrow[r] & (2,3)\ \cancel{4}\ 5 \arrow[d] \\ (3,2)\ 1 \arrow[u] & (3,3)\ \textcircled{4}\ \cancel{10}\ 9 \arrow[l] \end{tikzcd}$$

$\theta = \min\{(2,2);(3,3)\} = (2,2) \Rightarrow x_{22} \rightarrow$

$\theta = 1$

	C_1	C_2	C_3	
D_1	$\boxed{3}$ *	$\boxed{1}$ 8	$\boxed{0}$ *	8
D_2	$\boxed{1}$ 7	$\boxed{4}$ *	$\boxed{0}$ 5	12
D_3	$\boxed{2}$ *	$\boxed{2}$ 1	$\boxed{0}$ 9	10
	7	9	14	

! verificare !

$\overline{x_2} = (0,8,0,7,0,5,0,1,9) \in R^9$ - S.B.Ned.

$f(\overline{x_2}) = 8\cdot 1 + 7\cdot 1 + 5\cdot 0 + 1\cdot 2 + 9\cdot 0 = 17 \le f(\overline{x_1})$? Da (u.m.)

$\delta_{11} = -3+2-2+1 = -2$

$\delta_{13} = -0+1-2+0 = -1$

$\delta_{22} = -4+2-0+0 = -2$

$\delta_{31} = -2+1-0+0 = -1$

$\Rightarrow$ toți $\delta_{ij} \le 0 \Rightarrow \overline{x_2}$ este soluție optimă unică

Concluzia pt. P.T.E.:

$$\begin{cases} x_{optim}^{echilibrat} = (0, 8, 0, 7, 0, 5, 0, 1, 9) \\ \min f = 17 \text{ (u.m.)} \end{cases}$$

Pb4

! verificare !

	C_1	C_2	C_3	
D_1	$\boxed{2}$ 7	$\boxed{1}$ 1	$\boxed{3}$ *	8
D_2	$\boxed{1}$ *	$\boxed{3}$ 6	$\boxed{2}$ 2	8
D_3	$\boxed{0}$ *	$\boxed{0}$ *	$\boxed{0}$ 8	8
	7	7	10	

$7+7+10 = 8+8+x$

$24 = 16+x$

$\boxed{x=8}$

$\overline{x_0} = (7,1,0,0,6,2,0,0,8) \in R^9$ – s.B.Ned

$f(\overline{x_0}) = 7\cdot 2 + 1\cdot 1 + 6\cdot 3 + 2\cdot 2 + 8\cdot 0 = 37$ (u.m.)

$\delta_{13} = -3+2-3+1 = -3$

$\delta_{21} = -1+3-1+2 = 3>0$

$\delta_{31} = -0+2-1+3-2+0 = 2>0$

$\delta_{32} = -0+3-2+0 = 1>0$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{x_0}$ nu este s. optimă.

$Ske = \max\{\delta_{21}; \delta_{31}; \delta_{32}\} = \delta_{21} \Rightarrow x_{21} \downarrow$

$$\begin{array}{ccc}
\overset{\cancel{7}\ 1}{②(1,1)} & \longrightarrow & \overset{\cancel{1}\ 7}{(1,2)} \\
\uparrow & & \downarrow \\
\underset{6}{\downarrow (2,1)} & \longleftarrow & \underset{\cancel{6}\ *}{(2,2)\ \overset{\rightarrow}{⑤}}
\end{array}$$

$\theta = \min\{(1,1);(2,2)\} = (2,2) \Rightarrow$

$\Rightarrow x_{22} \rightarrow$

$\theta = 6$

	C_1	C_2	C_3	
D_1	[2] 1	[1] 7	[3] *	8
D_2	[1] 6	[3] *	[2] 2	8
D_3	[0] *	[0] *	[0] 8	8
	7	7	10	

! verificare !

$\bar{x}_1 = (1,7,0,6,0,2,0,0,8) \in \mathbb{R}^9$ – S.B. Ned.

$f(\bar{x}_1) = 1\cdot 2 + 7\cdot 1 + 6\cdot 1 + 2\cdot 2 + 8\cdot 0 = 19$ (u.m.) $\le f(\bar{x}_0)$? Da

$\delta_{13} = -3+2-1+2=0$

$\delta_{22} = -3+1-2+1=-3$

$\delta_{31} = -0+1-2+0=-1$

$\delta_{32} = -0+1-2+1-2+0=-2$

$\Rightarrow$ toate $\delta_{ij} \le 0 \Rightarrow \bar{x}_1$ este soluție optimă neunică

Concluzia pt. P.T.E.:

$$\begin{cases} \text{echilibrat} \\ x_{optim} = (1,7,0,6,0,2,0,0,8) \\ \min f = 19 \text{ (u.m.)} \end{cases}$$

Pb 5

Variante corecte

a

	C_1	C_2	C_3	
D_1	[2] 5	[1] *	[0] 9	$\cancel{14}\ \cancel{5}\ 0$
D_2	[3] 4	[2] 2	[0] *	$6\ \cancel{2}\ 0$
D_3	[1] *	[2] 5	[0] *	$\cancel{5}\ 0$
	$\cancel{9}\ \cancel{4}\ 0$	$\cancel{7}\ \cancel{5}\ 0$	$\cancel{9}\ 0$	

! verificare !

$9+7+x = 14+6+5$

$16+x = 25$

$\boxed{x=9}$

$\overline{X_0} = (5,0,9,4,2,0,0,5,0) \in \mathbb{R}^9$ – S.B.Ned.

$f(\overline{X_0}) = 5\cdot 2 + 9\cdot 0 + 4\cdot 3 + 2\cdot 2 + 5\cdot 2 = 36$ (u.m.)

$\delta_{12} = -1+2-3+2 = 0$

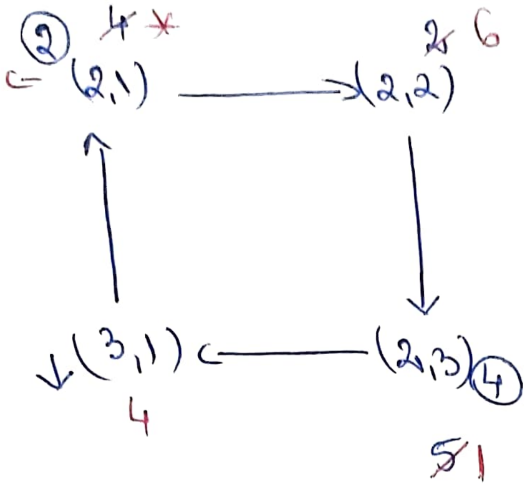
$\delta_{23} = -0+0-2+3 = 1 > 0$

$\delta_{31} = -1+3-2+2 = 2 > 0$

$\delta_{33} = -0+2-2+3-2+0 = 1 > 0$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{X_0}$ nu este s. optimă

$S_{Ke} = \max\{\delta_{23}; \delta_{31}; \delta_{33}\} = \delta_{31} \Rightarrow x_{31} \downarrow$



$\theta = \min\{(2,1);(2,3)\} = (2,1) \Rightarrow x_{21} \to$

$\theta = 4$

	C_1	C_2	C_3	
D_1	5 [2]	* [1]	9 [0]	14
D_2	* [3]	6 [2]	* [0]	6
D_3	4 [1]	1 [2]	* [0]	5
	9	7	9	

! verificare !

$\overline{x}_1 = (5,0,9,0,6,0,4,1,0) \in \mathbb{R}^9$ – S.B. Ned.

$f(\overline{x}_1) = 5\cdot 2 + 9\cdot 0 + 6\cdot 2 + 4\cdot 1 + 1\cdot 2 = 28$ (u.m.) $\leq f(\overline{x}_0)$? Da

$\delta_{12} = -1+2-1+2 = 2 > 0$

$\delta_{21} = -3+2-2+1 = -2$

$\delta_{23} = -0+2-2+1-2+0 = -1$

$\delta_{33} = -0+1-2+0 = -1$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{x}_1$ nu este s. optimă

$S.k.e. = \max\{\delta_{12}\} = \delta_{12} \Rightarrow x_{12} \downarrow$

$$\begin{tikzcd}[column sep=huge, row sep=huge]
4\ (1,1)^{\cancel{5}\,4} \arrow[r] & (1,2)^{1}\downarrow \arrow[d] \\
(3,1)_{\cancel{4}\,5} \arrow[u] & (3,2)_{\cancel{1}\,*} \Rightarrow 2 \arrow[l]
\end{tikzcd}$$

$\theta = \min\{(1,1);(3,2)\} = (3,2) \Rightarrow x_{32} \Rightarrow$

$\theta = 1$

	C_1	C_2	C_3	
D_1	$\boxed{2}$ 4	$\boxed{1}$ 1	$\boxed{0}$ 9	14
D_2	$\boxed{3}$ *	$\boxed{2}$ 6	$\boxed{0}$ *	6
D_3	$\boxed{1}$ 5	$\boxed{2}$ *	$\boxed{0}$ *	5
	9	7	9	

! verificare !

$\overline{x}_2 = (4,1,9,0,6,0,5,0,0) \in R^9$ – s.B.Ned.

$f(\overline{x}_2) = 4\cdot 2 + 1\cdot 1 + 9\cdot 0 + 6\cdot 2 + 5\cdot 1 = 26$ (u.m.) $\leq f(\overline{x}_1)$? Da

$\delta_{21} = -3+2-1+2 = 0$

$\delta_{23} = -0+2-1+0 = 1 > 0$

$\delta_{32} = -2+1-2+1 = -2$

$\delta_{33} = -0+0-2+1 = -1$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{x}_2$ nu este s. optimă

$Sk_e = \max\{\delta_{23}\} = \delta_{23} \Rightarrow x_{23} \downarrow$

$$
\begin{tikzcd}
\overset{\cancel{1}\ 7}{(1,2)} \arrow[r] & \overset{\cancel{9}\ 3}{(1,3)}\ 4 \arrow[d] \\
\leftarrow 2\ \underset{\cancel{6}\ *}{(2,2)} \arrow[u] & \underset{6}{(2,3)\downarrow} \arrow[l]
\end{tikzcd}
$$

$\theta = \min\{(2,2);(1,3)\} = (2,2) \Rightarrow$

$\Rightarrow x_{22} \rightarrow$

$\theta = 6$

	C_1	C_2	C_3	
D_1	4 $\boxed{2}$	7 $\boxed{1}$	3 $\boxed{0}$	14
D_2	* $\boxed{3}$	* $\boxed{2}$	6 $\boxed{0}$	6
D_3	5 $\boxed{1}$	* $\boxed{2}$	* $\boxed{0}$	5
	9	7	9	

! verificare !

$\bar{x}_3 = (4,7,3,0,0,6,5,0,0) \in R$ - S.B.Ned.

$f(\bar{x}_3) = 4\cdot2 + 7\cdot1 + 3\cdot0 + 6\cdot0 + 5\cdot1 = 20$ (u.m.) $\leq f(\bar{x}_2)$? Da

$\delta_{21} = -3+2-0+0 = -1$

$\delta_{22} = -2+1-0+0 = -1$

$\delta_{32} = -2+1-2+1 = -2$

$\delta_{33} = -0+0-2+1 = -1$

$\Rightarrow$ toate $\delta_{ij} \leq 0 \Rightarrow \bar{x}_3$ este soluție optimă unică

Concluzia pt P.T.E.:

$$\begin{cases} \text{echilibrat} \\ x_{optim} = (4,7,3,0,0,6,5,0,0) \\ \min f = 210 \ (\text{u.m.}) \end{cases}$$

Pb 6

Variante corecte

b, e

	C_1	C_2	C_3	
D_1	[3] 7	[2] 1	[1] *	~~8~~ ~~1~~ 0
D_2	[1] *	[3] 6	[2] 4	~~10~~ ~~4~~ 0
D_3	[0] *	[0] *	[0] 6	~~6~~ 0
	~~7~~ 0	~~7~~ ~~6~~ 0	~~10~~ ~~6~~ 0	

! verificare !

$7+7+10 = 8+x+6$

$24 = 14+x$

$\boxed{x=10}$

$\overline{x_0} = (7,1,0,0,6,4,0,0,6) \in \mathbb{R}^9$ – S.B.Ned.

$f(\overline{x_0}) = 7\cdot 3 + 1\cdot 2 + 6\cdot 3 + 4\cdot 2 + 6\cdot 0 = 49$ (u.m.)

$\delta_{13} = -1+2-3+2 = 0$

$\delta_{21} = -1+3-2+3 = 3 > 0$

$\delta_{31} = -0+3-2+3-2+0 = 2 > 0$

$\delta_{32} = -0+3-2+0 = 1 > 0$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{x_0}$ nu este s. optimă

$\text{Ske} = \max\{\delta_{21}; \delta_{31}; \delta_{32}\} = \delta_{21} \Rightarrow x_{21} \downarrow$

$$\begin{array}{ccc} \overset{\cancel{7}\ 1}{②\,(1,1)} & \longrightarrow & \overset{\cancel{1}\ 7}{(1,2)} \\ \uparrow & & \downarrow \\ \underset{6}{\downarrow (2,1)} & \longleftarrow & \underset{\cancel{6}}{(2,2)\,④ \to} \end{array}$$

*

$\Theta = \min\{(1,1); (2,2)\} = (2,2) \Rightarrow$

$\Rightarrow x_{22} \to$

$\Theta = 6$

Pg 1

	C_1	C_2	C_3	
D_1	$\boxed{3}$ 1	$\boxed{2}$ 7	$\boxed{1}$ *	8
D_2	$\boxed{1}$ 6	$\boxed{3}$ *	$\boxed{2}$ 4	10
D_3	$\boxed{0}$ *	$\boxed{0}$ *	$\boxed{0}$ 6	6
	7	7	10	

! verificare !

$\bar{x}_1 = (1,7,0,6,0,4,0,0,6) \in R^9$ – S.B.Ned.

$f(\bar{x}_1) = 1\cdot 3 + 7\cdot 2 + 6\cdot 1 + 4\cdot 2 + 6\cdot 0 = 31$ u.m. $\le f(\bar{x}_0)$? Da

$\delta_{13} = -1+3-1+2 = 3 > 0$

$\delta_{22} = -3+2-3+1 = -3$

$\delta_{31} = -0+1-2+0 = -1$

$\delta_{32} = -0+2-3+1-2+0 = -2$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \bar{x}_1$ nu este s. optimă

$S_{ke} = \max\{\delta_{13}\} \Rightarrow x_{13} \downarrow$

$$\begin{tikzcd}
\underset{\cancel{1}\ *}{\overset{2}{(1,1)}} \arrow[d] & \overset{1}{(1,3)\downarrow} \arrow[l] \\
\underset{\cancel{6}\ 7}{(2,1)} \arrow[r] & \underset{\cancel{4}\ 3}{(2,3)}\ 4 \arrow[u]
\end{tikzcd}$$

$\theta = \min\{(1,1);(2,3)\} = (1,1) \Rightarrow$

$\Rightarrow x_{11} \Rightarrow$

$\theta = 1$

	C_1	C_2	C_3	
D_1	$\boxed{3}$ *	$\boxed{2}$ 7	$\boxed{1}$ 1	8
D_2	$\boxed{1}$ 7	$\boxed{3}$ *	$\boxed{2}$ 3	10
D_3	$\boxed{0}$ *	$\boxed{0}$ *	$\boxed{0}$ 6	6
	7	7	10	

! verificare !

$\overline{x}_2 = (0,7,1,7,0,3,0,0,6) \in \mathbb{R}^9$ – S.B. Ned.

$f(\overline{x}_2) = 7\cdot 2 + 1\cdot 1 + 7\cdot 1 + 3\cdot 2 + 6\cdot 0 = 28$ (u.m.) $\leq f(\overline{x}_1)$? Da

$\delta_{11} = -3+1-2+1 = -3$

$\delta_{22} = -3+2-1+2 = 0$

$\delta_{31} = -0+1-2+0 = -1$

$\delta_{32} = -0+2-1+0 = 1 > 0$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{x}_2$ nu este s. optimă

$SKe = \max\{\delta_{32}\} = \delta_{32} \Rightarrow x_{32} \downarrow$

$$\begin{tikzcd}
② \ \overset{\cancel{7}\ 1}{(1,2)} \arrow[r] & \overset{\cancel{1}\ 7}{(1,3)} \arrow[d] \\
\downarrow \underset{6}{(3,2)} \arrow[u] & \underset{\cancel{6}\ *}{(3,3)} \rightarrow ④ \arrow[l]
\end{tikzcd}$$

$\theta = \min\{(1,2); (3,3)\} = (3,3) \Rightarrow$

$\Rightarrow x_{33} \rightarrow$

$\theta = 6$

Pg3

	C_1	C_2	C_3	
D_1	$\boxed{3}$ *	$\boxed{2}$ 1	$\boxed{1}$ 7	8
D_2	$\boxed{1}$ 7	$\boxed{3}$ *	$\boxed{2}$ 3	10
D_3	$\boxed{0}$ *	$\boxed{0}$ 6	$\boxed{0}$ *	6
	7	7	10	

! verificare !

$\overline{x_3} = (0,1,7,7,0,3,0,6,0) \in \mathbb{R}^9$ – S.B. Ned.

$f(\overline{x_3}) = 1\cdot 2 + 7\cdot 1 + 7\cdot 1 + 3\cdot 2 + 6\cdot 0 = 22$ (u.m.) $\le f(\overline{x_2})$? Da

$\delta_{11} = -3+1-2+1 = -3$

$\delta_{22} = -3+2-1+2 = 0$

$\delta_{31} = -0+1-2+1-2+0 = -2$

$\delta_{33} = -0+1-2+0 = -1$

$\Rightarrow$ toți $\delta_{ij} \le 0 \Rightarrow \overline{x_3}$ este soluție optimă nenulă.

Concluzia pt. P.T.E.:

$$\begin{cases} \text{echilibrat} \\ x_{optim} = (0,1,7,7,0,3,0,6,0) \\ \min f = 22 \text{ (u.m.)} \end{cases}$$

Pb 7

variante corecte c, d, e, f, h, i

	C_1	C_2	C_3	
D_1	$\boxed{1}$ 4	$\boxed{2}$ 1	$\boxed{0}$ *	$\cancel{5}\ \cancel{1}\ 0$
D_2	$\boxed{1}$ *	$\boxed{2}$ 4	$\boxed{0}$ 6	$\cancel{10}\ \cancel{4}\ 0$
D_3	$\boxed{4}$ *	$\boxed{3}$ 7	$\boxed{0}$ *	$\cancel{7}\ 0$
	$\cancel{4}\ 0$	$\cancel{12}\ \cancel{11}\ \cancel{7}\ 0$	$\cancel{6}\ 0$	

! verificare !

$4+12+6 = 5+10+7$

$16 + x = 22$ $\boxed{x = 6}$

$\overline{x_0} = (4,1,0,0,4,6,0,7,0) \in R^9$ – s.B. Ned.

$f(\overline{x_0}) = 4\cdot 1 + 1\cdot 2 + 4\cdot 2 + 6\cdot 0 + 7\cdot 3 = 35$ u.m.

$\delta_{13} = -0+0-2+2 = 0$

$\delta_{21} = -1+1-2+2 = 0$

$\delta_{31} = -4+1-2+3 = -2$

$\delta_{33} = -0+3-2+0 = 1 > 0$

$\Rightarrow \exists\, \delta_{ij} > 0 \Rightarrow \overline{x_0}$ nu este s. optimă

$SKe = \max\{\delta_{33}\} = \delta_{33} \Rightarrow x_{33}\downarrow$

$$\begin{tikzcd}
\overset{\cancel{4}\ 10}{(2,2)} \arrow[r] & \overset{\cancel{6}\ *}{(2,3)}\ 4 \rightarrow \arrow[d] \\
\underset{2\ \ \cancel{*}\,1}{(3,2)} \arrow[u] & \underset{6}{(3,3)\downarrow} \arrow[l]
\end{tikzcd}$$

$\Theta = \min\{(3,2);(2,3)\} = (2,3) \Rightarrow$

$\Rightarrow x_{23} \rightarrow$

$\Theta = 6$

	C_1	C_2	C_3	
D_1	$\boxed{1}$ 4	$\boxed{2}$ 1	$\boxed{0}$ *	5
D_2	$\boxed{1}$ *	$\boxed{2}$ 10	$\boxed{0}$ *	10
D_3	$\boxed{4}$ *	$\boxed{3}$ 1	$\boxed{0}$ 6	7
	4	12	6	

!verificare!

$\bar{x}_1 = (4,1,0,0,10,0,0,1,6) \in R^9$ - S.B.Ned.

$f(\bar{x}_1) = 4\cdot 1 + 1\cdot 2 + 10\cdot 2 + 1\cdot 3 + 6\cdot 0 = 29$ (u.m.) $\leq f(\bar{x}_0)$? Da

$\delta_{13} = -0+0-3+2 = -1$

$\delta_{21} = -1+2-2+1 = 0$

$\delta_{23} = -0+2-3+0 = -1$

$\delta_{31} = -4+1-2+3 = -2$

$\Rightarrow$ toți $\delta_{ij} \leq 0 \Rightarrow \bar{x}_1$ este soluție optimă neunică

Concluzia pt P.T.E.:

$$\begin{cases} \text{echilibrat} \\ x_{optim} = (4,1,0,0,10,0,0,1,6) \\ \min f = 29 \text{ (u.m.)} \end{cases}$$