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> restart; with(LinearAlgebra) :
> j := 1
                                     j := 1
```

(1)

```
> NumOfVars := 28
                                     NumOfVars := 28
```

(2)

```
> for i from 1 to NumOfVars do
  #Bi := RandomMatrix(3, 1, generator = 1..9) :
end do :
> for i from 1 to NumOfVars do
  A := RandomMatrix(3, 3, generator = 1..9) :
  if Determinant(A) ≠ 0 then Pj := A; j := j + 1; else
end if ;
end do :
```

> Задачи :

> Матрица :

> seq([i, M=P_i], i=1..j-1)

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1, M=  $\begin{bmatrix} 5 & 9 & 1 \\ 9 & 2 & 7 \\ 4 & 4 & 1 \end{bmatrix}$ , 2, M=  $\begin{bmatrix} 9 & 4 & 4 \\ 5 & 7 & 8 \\ 2 & 7 & 8 \end{bmatrix}$ , 3, M=  $\begin{bmatrix} 8 & 9 & 9 \\ 6 & 7 & 6 \\ 5 & 3 & 9 \end{bmatrix}$ , 4, M=  $\begin{bmatrix} 9 & 5 & 6 \\ 8 & 7 & 6 \\ 6 & 4 & 2 \end{bmatrix}$ , 5, M
=  $\begin{bmatrix} 4 & 2 & 6 \\ 4 & 2 & 4 \\ 3 & 8 & 3 \end{bmatrix}$ , 6, M=  $\begin{bmatrix} 4 & 9 & 9 \\ 7 & 6 & 2 \\ 4 & 9 & 7 \end{bmatrix}$ , 7, M=  $\begin{bmatrix} 2 & 3 & 9 \\ 5 & 5 & 4 \\ 3 & 9 & 7 \end{bmatrix}$ , 8, M=  $\begin{bmatrix} 6 & 1 & 8 \\ 4 & 4 & 7 \\ 5 & 8 & 5 \end{bmatrix}$ , 9, M
=  $\begin{bmatrix} 3 & 9 & 7 \\ 6 & 1 & 2 \\ 8 & 7 & 2 \end{bmatrix}$ , 10, M=  $\begin{bmatrix} 7 & 6 & 8 \\ 1 & 4 & 8 \\ 6 & 7 & 7 \end{bmatrix}$ , 11, M=  $\begin{bmatrix} 9 & 9 & 2 \\ 7 & 8 & 3 \\ 3 & 1 & 3 \end{bmatrix}$ , 12, M=  $\begin{bmatrix} 5 & 5 & 9 \\ 3 & 4 & 9 \\ 8 & 9 & 8 \end{bmatrix}$ , 13, M
=  $\begin{bmatrix} 8 & 8 & 5 \\ 8 & 1 & 8 \\ 2 & 6 & 6 \end{bmatrix}$ , 14, M=  $\begin{bmatrix} 8 & 6 & 4 \\ 8 & 6 & 8 \\ 2 & 8 & 4 \end{bmatrix}$ , 15, M=  $\begin{bmatrix} 8 & 4 & 4 \\ 4 & 7 & 7 \\ 3 & 5 & 9 \end{bmatrix}$ , 16, M=  $\begin{bmatrix} 1 & 2 & 3 \\ 5 & 2 & 9 \\ 7 & 2 & 4 \end{bmatrix}$ , 17, M
=  $\begin{bmatrix} 1 & 1 & 2 \\ 6 & 9 & 4 \\ 4 & 9 & 7 \end{bmatrix}$ , 18, M=  $\begin{bmatrix} 4 & 7 & 2 \\ 9 & 5 & 1 \\ 1 & 4 & 8 \end{bmatrix}$ , 19, M=  $\begin{bmatrix} 6 & 1 & 6 \\ 2 & 7 & 4 \\ 7 & 1 & 5 \end{bmatrix}$ , 20, M=  $\begin{bmatrix} 8 & 7 & 5 \\ 9 & 7 & 7 \\ 5 & 7 & 7 \end{bmatrix}$ , 21, M
=  $\begin{bmatrix} 4 & 3 & 1 \\ 5 & 1 & 5 \\ 1 & 5 & 8 \end{bmatrix}$ , 22, M=  $\begin{bmatrix} 9 & 1 & 6 \\ 1 & 8 & 2 \\ 2 & 4 & 7 \end{bmatrix}$ , 23, M=  $\begin{bmatrix} 6 & 3 & 1 \\ 5 & 7 & 9 \\ 6 & 4 & 6 \end{bmatrix}$ , 24, M=  $\begin{bmatrix} 7 & 4 & 9 \\ 4 & 2 & 6 \\ 7 & 7 & 8 \end{bmatrix}$ , 25, M
```

(3)

$$= \begin{bmatrix} 3 & 7 & 6 \\ 6 & 4 & 3 \\ 9 & 3 & 9 \end{bmatrix}, \begin{bmatrix} 26, M = \begin{bmatrix} 7 & 8 & 5 \\ 9 & 6 & 5 \\ 9 & 6 & 6 \end{bmatrix}, \begin{bmatrix} 27, M = \begin{bmatrix} 8 & 5 & 8 \\ 7 & 6 & 7 \\ 2 & 9 & 6 \end{bmatrix} \end{bmatrix}$$

> *Определитель (ответ) :*

> $seq([i, \det(M) = \text{Determinant}(P_i)], i=1..j-1)$

$$[1, \det(M) = 69], [2, \det(M) = -12], [3, \det(M) = -9], [4, \det(M) = -50], [5, \det(M) = 52], [6, \det(M) = 78], [7, \det(M) = 199], [8, \det(M) = -105], [9, \det(M) = 238], [10, \det(M) = -86], [11, \det(M) = 47], [12, \det(M) = -50], [13, \det(M) = -362], [14, \det(M) = -208], [15, \det(M) = 160], [16, \det(M) = 64], [17, \det(M) = 37], [18, \det(M) = -291], [19, \det(M) = -78], [20, \det(M) = -56], [21, \det(M) = -149], [22, \det(M) = 357], [23, \det(M) = 86], [24, \det(M) = -16], [25, \det(M) = -216], [26, \det(M) = -30], [27, \det(M) = 52] \quad (4)$$

> *Обратная матрица (ответ) :*

> $seq([i, M^{-1} = \text{MatrixInverse}(P_i)], i=1..j-1)$

$$\begin{bmatrix} 1, \frac{1}{M} = \begin{bmatrix} -\frac{26}{69} & -\frac{5}{69} & \frac{61}{69} \\ \frac{19}{69} & \frac{1}{69} & -\frac{26}{69} \\ \frac{28}{69} & \frac{16}{69} & -\frac{71}{69} \end{bmatrix}, \begin{bmatrix} 2, \frac{1}{M} = \begin{bmatrix} 0 & \frac{1}{3} & -\frac{1}{3} \\ 2 & -\frac{16}{3} & \frac{13}{3} \\ -\frac{7}{4} & \frac{55}{12} & -\frac{43}{12} \end{bmatrix}, \begin{bmatrix} 3, \frac{1}{M} = \begin{bmatrix} -5 & 6 & 1 \\ \frac{8}{3} & -3 & -\frac{2}{3} \\ \frac{17}{9} & -\frac{7}{3} & -\frac{2}{9} \end{bmatrix}, \begin{bmatrix} 4, \frac{1}{M} = \begin{bmatrix} \frac{1}{5} & -\frac{7}{25} & \frac{6}{25} \\ -\frac{2}{5} & \frac{9}{25} & \frac{3}{25} \\ \frac{1}{5} & \frac{3}{25} & -\frac{23}{50} \end{bmatrix}, \begin{bmatrix} 5, \frac{1}{M} = \begin{bmatrix} -\frac{1}{2} & \frac{21}{26} & -\frac{1}{13} \\ 0 & -\frac{3}{26} & \frac{2}{13} \\ \frac{1}{2} & -\frac{1}{2} & 0 \end{bmatrix}, \begin{bmatrix} 6, \frac{1}{M} = \begin{bmatrix} \frac{4}{13} & \frac{3}{13} & -\frac{6}{13} \\ -\frac{41}{78} & -\frac{4}{39} & \frac{55}{78} \\ \frac{1}{2} & 0 & -\frac{1}{2} \end{bmatrix}, \begin{bmatrix} 7, \frac{1}{M} = \end{bmatrix} \end{bmatrix} \quad (5)$$

$$= \begin{bmatrix} -\frac{1}{199} & \frac{60}{199} & -\frac{33}{199} \\ -\frac{23}{199} & -\frac{13}{199} & \frac{37}{199} \\ \frac{30}{199} & -\frac{9}{199} & -\frac{5}{199} \end{bmatrix}, \quad 8, \quad \frac{1}{M} = \begin{bmatrix} \frac{12}{35} & -\frac{59}{105} & \frac{5}{21} \\ -\frac{1}{7} & \frac{2}{21} & \frac{2}{21} \\ -\frac{4}{35} & \frac{43}{105} & -\frac{4}{21} \end{bmatrix}, \quad 9, \quad \frac{1}{M}$$

$$= \begin{bmatrix} -\frac{6}{119} & \frac{31}{238} & \frac{11}{238} \\ \frac{2}{119} & -\frac{25}{119} & \frac{18}{119} \\ \frac{1}{7} & \frac{3}{14} & -\frac{3}{14} \end{bmatrix}, \quad 10, \quad \frac{1}{M} = \begin{bmatrix} \frac{14}{43} & -\frac{7}{43} & -\frac{8}{43} \\ -\frac{41}{86} & -\frac{1}{86} & \frac{24}{43} \\ \frac{17}{86} & \frac{13}{86} & -\frac{11}{43} \end{bmatrix}, \quad 11, \quad \frac{1}{M}$$

$$= \begin{bmatrix} \frac{21}{47} & -\frac{25}{47} & \frac{11}{47} \\ -\frac{12}{47} & \frac{21}{47} & -\frac{13}{47} \\ -\frac{17}{47} & \frac{18}{47} & \frac{9}{47} \end{bmatrix}, \quad 12, \quad \frac{1}{M} = \begin{bmatrix} \frac{49}{50} & -\frac{41}{50} & -\frac{9}{50} \\ -\frac{24}{25} & \frac{16}{25} & \frac{9}{25} \\ \frac{1}{10} & \frac{1}{10} & -\frac{1}{10} \end{bmatrix}, \quad 13, \quad \frac{1}{M}$$

$$= \begin{bmatrix} \frac{21}{181} & \frac{9}{181} & -\frac{59}{362} \\ \frac{16}{181} & -\frac{19}{181} & \frac{12}{181} \\ -\frac{23}{181} & \frac{16}{181} & \frac{28}{181} \end{bmatrix}, \quad 14, \quad \frac{1}{M} = \begin{bmatrix} \frac{5}{26} & -\frac{1}{26} & -\frac{3}{26} \\ \frac{1}{13} & -\frac{3}{26} & \frac{2}{13} \\ -\frac{1}{4} & \frac{1}{4} & 0 \end{bmatrix}, \quad 15, \quad \frac{1}{M}$$

$$= \begin{bmatrix} \frac{7}{40} & -\frac{1}{10} & 0 \\ -\frac{3}{32} & \frac{3}{8} & -\frac{1}{4} \\ -\frac{1}{160} & -\frac{7}{40} & \frac{1}{4} \end{bmatrix}, \quad 16, \quad \frac{1}{M} = \begin{bmatrix} -\frac{5}{32} & -\frac{1}{32} & \frac{3}{16} \\ \frac{43}{64} & -\frac{17}{64} & \frac{3}{32} \\ -\frac{1}{16} & \frac{3}{16} & -\frac{1}{8} \end{bmatrix}, \quad 17, \quad \frac{1}{M}$$

$$= \begin{bmatrix} \frac{27}{37} & \frac{11}{37} & -\frac{14}{37} \\ -\frac{26}{37} & -\frac{1}{37} & \frac{8}{37} \\ \frac{18}{37} & -\frac{5}{37} & \frac{3}{37} \end{bmatrix}, \quad 18, \quad \frac{1}{M} = \begin{bmatrix} -\frac{12}{97} & \frac{16}{97} & \frac{1}{97} \\ \frac{71}{291} & -\frac{10}{97} & -\frac{14}{291} \\ -\frac{31}{291} & \frac{3}{97} & \frac{43}{291} \end{bmatrix}, \quad 19, \quad \frac{1}{M}$$

$$\begin{aligned}
&= \left[\begin{array}{ccc} -\frac{31}{78} & -\frac{1}{78} & \frac{19}{39} \\ -\frac{3}{13} & \frac{2}{13} & \frac{2}{13} \\ \frac{47}{78} & -\frac{1}{78} & -\frac{20}{39} \end{array} \right], 20, \frac{1}{M} = \left[\begin{array}{ccc} 0 & \frac{1}{4} & -\frac{1}{4} \\ \frac{1}{2} & -\frac{31}{56} & \frac{11}{56} \\ -\frac{1}{2} & \frac{3}{8} & \frac{1}{8} \end{array} \right], 21, \frac{1}{M} \\
&= \left[\begin{array}{ccc} \frac{17}{149} & \frac{19}{149} & -\frac{14}{149} \\ \frac{35}{149} & -\frac{31}{149} & \frac{15}{149} \\ -\frac{24}{149} & \frac{17}{149} & \frac{11}{149} \end{array} \right], 22, \frac{1}{M} = \left[\begin{array}{ccc} \frac{16}{119} & \frac{1}{21} & -\frac{46}{357} \\ -\frac{1}{119} & \frac{1}{7} & -\frac{4}{119} \\ -\frac{4}{119} & -\frac{2}{21} & \frac{71}{357} \end{array} \right], 23, \frac{1}{M} \\
&= \left[\begin{array}{ccc} \frac{3}{43} & -\frac{7}{43} & \frac{10}{43} \\ \frac{12}{43} & \frac{15}{43} & -\frac{49}{86} \\ -\frac{11}{43} & -\frac{3}{43} & \frac{27}{86} \end{array} \right], 24, \frac{1}{M} = \left[\begin{array}{ccc} \frac{13}{8} & -\frac{31}{16} & -\frac{3}{8} \\ -\frac{5}{8} & \frac{7}{16} & \frac{3}{8} \\ -\frac{7}{8} & \frac{21}{16} & \frac{1}{8} \end{array} \right], 25, \frac{1}{M} \\
&= \left[\begin{array}{ccc} -\frac{1}{8} & \frac{5}{24} & \frac{1}{72} \\ \frac{1}{8} & \frac{1}{8} & -\frac{1}{8} \\ \frac{1}{12} & -\frac{1}{4} & \frac{5}{36} \end{array} \right], 26, \frac{1}{M} = \left[\begin{array}{ccc} -\frac{1}{5} & \frac{3}{5} & -\frac{1}{3} \\ \frac{3}{10} & \frac{1}{10} & -\frac{1}{3} \\ 0 & -1 & 1 \end{array} \right], 27, \frac{1}{M} \\
&= \left[\begin{array}{ccc} -\frac{27}{52} & \frac{21}{26} & -\frac{1}{4} \\ -\frac{7}{13} & \frac{8}{13} & 0 \\ \frac{51}{52} & -\frac{31}{26} & \frac{1}{4} \end{array} \right]
\end{aligned}$$

> Приведение матрицы к треугольному виду (ответ) :

> $seq([i, M^{-1} = \text{GaussianElimination}(P_i)], i=1..j-1)$

$$\left[\begin{array}{ccc} 5 & 9 & 1 \\ 0 & -\frac{71}{5} & \frac{26}{5} \\ 0 & 0 & -\frac{69}{71} \end{array} \right], 2, \frac{1}{M} = \left[\begin{array}{ccc} 9 & 4 & 4 \\ 0 & \frac{43}{9} & \frac{52}{9} \\ 0 & 0 & -\frac{12}{43} \end{array} \right], 3, \frac{1}{M} = \left[\begin{array}{ccc} 8 & 9 & 9 \\ 0 & \frac{1}{4} & -\frac{3}{4} \\ 0 & 0 & -\frac{9}{2} \end{array} \right], 4,$$

(6)

$$\begin{aligned}
& \left[\frac{1}{M} = \begin{bmatrix} 9 & 5 & 6 \\ 0 & \frac{23}{9} & \frac{2}{3} \\ 0 & 0 & -\frac{50}{23} \end{bmatrix} \right], \left[5, \frac{1}{M} = \begin{bmatrix} 4 & 2 & 6 \\ 0 & \frac{13}{2} & -\frac{3}{2} \\ 0 & 0 & -2 \end{bmatrix} \right], \left[6, \frac{1}{M} = \begin{bmatrix} 4 & 9 & 9 \\ 0 & -\frac{39}{4} & -\frac{55}{4} \\ 0 & 0 & -2 \end{bmatrix} \right], \left[7, \right. \\
& \left. \frac{1}{M} = \begin{bmatrix} 2 & 3 & 9 \\ 0 & -\frac{5}{2} & -\frac{37}{2} \\ 0 & 0 & -\frac{199}{5} \end{bmatrix} \right], \left[8, \frac{1}{M} = \begin{bmatrix} 6 & 1 & 8 \\ 0 & \frac{10}{3} & \frac{5}{3} \\ 0 & 0 & -\frac{21}{4} \end{bmatrix} \right], \left[9, \frac{1}{M} = \begin{bmatrix} 3 & 9 & 7 \\ 0 & -17 & -12 \\ 0 & 0 & -\frac{14}{3} \end{bmatrix} \right], \\
& \left[10, \frac{1}{M} = \begin{bmatrix} 7 & 6 & 8 \\ 0 & \frac{22}{7} & \frac{48}{7} \\ 0 & 0 & -\frac{43}{11} \end{bmatrix} \right], \left[11, \frac{1}{M} = \begin{bmatrix} 9 & 9 & 2 \\ 0 & 1 & \frac{13}{9} \\ 0 & 0 & \frac{47}{9} \end{bmatrix} \right], \left[12, \frac{1}{M} = \begin{bmatrix} 5 & 5 & 9 \\ 0 & 1 & \frac{18}{5} \\ 0 & 0 & -10 \end{bmatrix} \right], \left[13, \right. \\
& \left. \frac{1}{M} = \begin{bmatrix} 8 & 8 & 5 \\ 0 & -7 & 3 \\ 0 & 0 & \frac{181}{28} \end{bmatrix} \right], \left[14, \frac{1}{M} = \begin{bmatrix} 8 & 6 & 4 \\ 0 & \frac{13}{2} & 3 \\ 0 & 0 & 4 \end{bmatrix} \right], \left[15, \frac{1}{M} = \begin{bmatrix} 8 & 4 & 4 \\ 0 & 5 & 5 \\ 0 & 0 & 4 \end{bmatrix} \right], \left[16, \frac{1}{M} \right. \\
& \left. = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -8 & -6 \\ 0 & 0 & -8 \end{bmatrix} \right], \left[17, \frac{1}{M} = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 3 & -8 \\ 0 & 0 & \frac{37}{3} \end{bmatrix} \right], \left[18, \frac{1}{M} = \begin{bmatrix} 4 & 7 & 2 \\ 0 & -\frac{43}{4} & -\frac{7}{2} \\ 0 & 0 & \frac{291}{43} \end{bmatrix} \right], \left[19, \frac{1}{M} \right. \\
& \left. = \begin{bmatrix} 6 & 1 & 6 \\ 0 & \frac{20}{3} & 2 \\ 0 & 0 & -\frac{39}{20} \end{bmatrix} \right], \left[20, \frac{1}{M} = \begin{bmatrix} 8 & 7 & 5 \\ 0 & -\frac{7}{8} & \frac{11}{8} \\ 0 & 0 & 8 \end{bmatrix} \right], \left[21, \frac{1}{M} = \begin{bmatrix} 4 & 3 & 1 \\ 0 & -\frac{11}{4} & \frac{15}{4} \\ 0 & 0 & \frac{149}{11} \end{bmatrix} \right], \left[22, \right. \\
& \left. \frac{1}{M} = \begin{bmatrix} 9 & 1 & 6 \\ 0 & \frac{71}{9} & \frac{4}{3} \\ 0 & 0 & \frac{357}{71} \end{bmatrix} \right], \left[23, \frac{1}{M} = \begin{bmatrix} 6 & 3 & 1 \\ 0 & \frac{9}{2} & \frac{49}{6} \\ 0 & 0 & \frac{86}{27} \end{bmatrix} \right], \left[24, \frac{1}{M} = \begin{bmatrix} 7 & 4 & 9 \\ 0 & -\frac{2}{7} & \frac{6}{7} \\ 0 & 0 & 8 \end{bmatrix} \right], \left[25, \right.
\end{aligned}$$

$$\frac{1}{M} = \begin{bmatrix} 3 & 7 & 6 \\ 0 & -10 & -9 \\ 0 & 0 & \frac{36}{5} \end{bmatrix}, \quad 26, \frac{1}{M} = \begin{bmatrix} 7 & 8 & 5 \\ 0 & -\frac{30}{7} & -\frac{10}{7} \\ 0 & 0 & 1 \end{bmatrix}, \quad 27, \frac{1}{M} = \begin{bmatrix} 8 & 5 & 8 \\ 0 & \frac{13}{8} & 0 \\ 0 & 0 & 4 \end{bmatrix}$$

> for i from 1 to $NumOfVars$ do
 $B_i := RandomMatrix(3, 1, generator = 1..9)$:
end do :

> Решение системы уравнений методом исключений Гаусса :

> *Основная матрица :*

> $seq([i, M=P_i], i=1..j-1)$

$$\begin{aligned} & \left[\begin{matrix} 1, M = \begin{bmatrix} 5 & 9 & 1 \\ 9 & 2 & 7 \\ 4 & 4 & 1 \end{bmatrix}, 2, M = \begin{bmatrix} 9 & 4 & 4 \\ 5 & 7 & 8 \\ 2 & 7 & 8 \end{bmatrix}, 3, M = \begin{bmatrix} 8 & 9 & 9 \\ 6 & 7 & 6 \\ 5 & 3 & 9 \end{bmatrix}, 4, M = \begin{bmatrix} 9 & 5 & 6 \\ 8 & 7 & 6 \\ 6 & 4 & 2 \end{bmatrix}, 5, M \\ & = \begin{bmatrix} 4 & 2 & 6 \\ 4 & 2 & 4 \\ 3 & 8 & 3 \end{bmatrix}, 6, M = \begin{bmatrix} 4 & 9 & 9 \\ 7 & 6 & 2 \\ 4 & 9 & 7 \end{bmatrix}, 7, M = \begin{bmatrix} 2 & 3 & 9 \\ 5 & 5 & 4 \\ 3 & 9 & 7 \end{bmatrix}, 8, M = \begin{bmatrix} 6 & 1 & 8 \\ 4 & 4 & 7 \\ 5 & 8 & 5 \end{bmatrix}, 9, M \\ & = \begin{bmatrix} 3 & 9 & 7 \\ 6 & 1 & 2 \\ 8 & 7 & 2 \end{bmatrix}, 10, M = \begin{bmatrix} 7 & 6 & 8 \\ 1 & 4 & 8 \\ 6 & 7 & 7 \end{bmatrix}, 11, M = \begin{bmatrix} 9 & 9 & 2 \\ 7 & 8 & 3 \\ 3 & 1 & 3 \end{bmatrix}, 12, M = \begin{bmatrix} 5 & 5 & 9 \\ 3 & 4 & 9 \\ 8 & 9 & 8 \end{bmatrix}, 13, M \\ & = \begin{bmatrix} 8 & 8 & 5 \\ 8 & 1 & 8 \\ 2 & 6 & 6 \end{bmatrix}, 14, M = \begin{bmatrix} 8 & 6 & 4 \\ 8 & 6 & 8 \\ 2 & 8 & 4 \end{bmatrix}, 15, M = \begin{bmatrix} 8 & 4 & 4 \\ 4 & 7 & 7 \\ 3 & 5 & 9 \end{bmatrix}, 16, M = \begin{bmatrix} 1 & 2 & 3 \\ 5 & 2 & 9 \\ 7 & 2 & 4 \end{bmatrix}, 17, M \\ & = \begin{bmatrix} 1 & 1 & 2 \\ 6 & 9 & 4 \\ 4 & 9 & 7 \end{bmatrix}, 18, M = \begin{bmatrix} 4 & 7 & 2 \\ 9 & 5 & 1 \\ 1 & 4 & 8 \end{bmatrix}, 19, M = \begin{bmatrix} 6 & 1 & 6 \\ 2 & 7 & 4 \\ 7 & 1 & 5 \end{bmatrix}, 20, M = \begin{bmatrix} 8 & 7 & 5 \\ 9 & 7 & 7 \\ 5 & 7 & 7 \end{bmatrix}, 21, M \\ & = \begin{bmatrix} 4 & 3 & 1 \\ 5 & 1 & 5 \\ 1 & 5 & 8 \end{bmatrix}, 22, M = \begin{bmatrix} 9 & 1 & 6 \\ 1 & 8 & 2 \\ 2 & 4 & 7 \end{bmatrix}, 23, M = \begin{bmatrix} 6 & 3 & 1 \\ 5 & 7 & 9 \\ 6 & 4 & 6 \end{bmatrix}, 24, M = \begin{bmatrix} 7 & 4 & 9 \\ 4 & 2 & 6 \\ 7 & 7 & 8 \end{bmatrix}, 25, M \\ & = \begin{bmatrix} 3 & 7 & 6 \\ 6 & 4 & 3 \\ 9 & 3 & 9 \end{bmatrix}, 26, M = \begin{bmatrix} 7 & 8 & 5 \\ 9 & 6 & 5 \\ 9 & 6 & 6 \end{bmatrix}, 27, M = \begin{bmatrix} 8 & 5 & 8 \\ 7 & 6 & 7 \\ 2 & 9 & 6 \end{bmatrix} \end{aligned} \quad (7)$$

> Правая часть уравнения : $Mx = F$:

> $seq([i, F=B_i], i=1..j-1)$

$$\begin{aligned}
& \left[\begin{array}{c} 1, F = \begin{bmatrix} 7 \\ 2 \\ 2 \end{bmatrix}, 2, F = \begin{bmatrix} 1 \\ 6 \\ 3 \end{bmatrix}, 3, F = \begin{bmatrix} 9 \\ 1 \\ 7 \end{bmatrix}, 4, F = \begin{bmatrix} 3 \\ 8 \\ 4 \end{bmatrix}, 5, F = \begin{bmatrix} 9 \\ 4 \\ 9 \end{bmatrix}, 6, F = \begin{bmatrix} 8 \\ 9 \\ 7 \end{bmatrix}, 7, F \\ \\ = \begin{bmatrix} 1 \\ 9 \\ 8 \end{bmatrix}, 8, F = \begin{bmatrix} 9 \\ 7 \\ 1 \end{bmatrix}, 9, F = \begin{bmatrix} 3 \\ 2 \\ 5 \end{bmatrix}, 10, F = \begin{bmatrix} 8 \\ 7 \\ 1 \end{bmatrix}, 11, F = \begin{bmatrix} 2 \\ 3 \\ 5 \end{bmatrix}, 12, F = \begin{bmatrix} 1 \\ 4 \\ 8 \end{bmatrix}, \\ \\ 13, F = \begin{bmatrix} 5 \\ 5 \\ 9 \end{bmatrix}, 14, F = \begin{bmatrix} 7 \\ 1 \\ 2 \end{bmatrix}, 15, F = \begin{bmatrix} 2 \\ 9 \\ 6 \end{bmatrix}, 16, F = \begin{bmatrix} 7 \\ 1 \\ 4 \end{bmatrix}, 17, F = \begin{bmatrix} 6 \\ 5 \\ 7 \end{bmatrix}, 18, F \\ \\ = \begin{bmatrix} 9 \\ 9 \\ 4 \end{bmatrix}, 19, F = \begin{bmatrix} 4 \\ 2 \\ 3 \end{bmatrix}, 20, F = \begin{bmatrix} 7 \\ 4 \\ 1 \end{bmatrix}, 21, F = \begin{bmatrix} 1 \\ 8 \\ 8 \end{bmatrix}, 22, F = \begin{bmatrix} 2 \\ 1 \\ 9 \end{bmatrix}, 23, F = \begin{bmatrix} 5 \\ 9 \\ 4 \end{bmatrix}, \\ \\ 24, F = \begin{bmatrix} 1 \\ 7 \\ 6 \end{bmatrix}, 25, F = \begin{bmatrix} 3 \\ 2 \\ 8 \end{bmatrix}, 26, F = \begin{bmatrix} 6 \\ 1 \\ 7 \end{bmatrix}, 27, F = \begin{bmatrix} 7 \\ 1 \\ 4 \end{bmatrix} \end{array} \right] \quad (8)
\end{aligned}$$

> OTBET:

> $seq([i, x = \text{ReducedRowEchelonForm}(\langle P_i | B_i \rangle)], i = 1 .. j - 1)$

$$\begin{aligned}
& \left[\begin{array}{c} 1, x = \begin{bmatrix} 1 & 0 & 0 & -\frac{70}{69} \\ 0 & 1 & 0 & \frac{83}{69} \\ 0 & 0 & 1 & \frac{86}{69} \end{bmatrix}, 2, x = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -17 \\ 0 & 0 & 1 & 15 \end{bmatrix}, 3, x = \begin{bmatrix} 1 & 0 & 0 & -32 \\ 0 & 1 & 0 & \frac{49}{3} \\ 0 & 0 & 1 & \frac{118}{9} \end{bmatrix}, 4, x \\ \\ = \begin{bmatrix} 1 & 0 & 0 & -\frac{17}{25} \\ 0 & 1 & 0 & \frac{54}{25} \\ 0 & 0 & 1 & -\frac{7}{25} \end{bmatrix}, 5, x = \begin{bmatrix} 1 & 0 & 0 & -\frac{51}{26} \\ 0 & 1 & 0 & \frac{12}{13} \\ 0 & 0 & 1 & \frac{5}{2} \end{bmatrix}, 6, x = \begin{bmatrix} 1 & 0 & 0 & \frac{17}{13} \\ 0 & 1 & 0 & -\frac{5}{26} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}, 7, x \\ \\ = \begin{bmatrix} 1 & 0 & 0 & \frac{275}{199} \\ 0 & 1 & 0 & \frac{156}{199} \\ 0 & 0 & 1 & -\frac{91}{199} \end{bmatrix}, 8, x = \begin{bmatrix} 1 & 0 & 0 & -\frac{64}{105} \\ 0 & 1 & 0 & -\frac{11}{21} \\ 0 & 0 & 1 & \frac{173}{105} \end{bmatrix}, 9, x = \begin{bmatrix} 1 & 0 & 0 & \frac{81}{238} \\ 0 & 1 & 0 & \frac{46}{119} \\ 0 & 0 & 1 & -\frac{3}{14} \end{bmatrix}, 10, x \end{array} \right] \quad (9)
\end{aligned}$$

$$\begin{aligned}
&= \begin{bmatrix} 1 & 0 & 0 & \frac{55}{43} \\ 0 & 1 & 0 & -\frac{287}{86} \\ 0 & 0 & 1 & \frac{205}{86} \end{bmatrix}, \quad 11, x = \begin{bmatrix} 1 & 0 & 0 & \frac{22}{47} \\ 0 & 1 & 0 & -\frac{26}{47} \\ 0 & 0 & 1 & \frac{65}{47} \end{bmatrix}, \quad 12, x = \begin{bmatrix} 1 & 0 & 0 & -\frac{187}{50} \\ 0 & 1 & 0 & \frac{112}{25} \\ 0 & 0 & 1 & -\frac{3}{10} \end{bmatrix}, \quad 13, x \\
&= \begin{bmatrix} 1 & 0 & 0 & -\frac{231}{362} \\ 0 & 1 & 0 & \frac{93}{181} \\ 0 & 0 & 1 & \frac{217}{181} \end{bmatrix}, \quad 14, x = \begin{bmatrix} 1 & 0 & 0 & \frac{14}{13} \\ 0 & 1 & 0 & \frac{19}{26} \\ 0 & 0 & 1 & -\frac{3}{2} \end{bmatrix}, \quad 15, x = \begin{bmatrix} 1 & 0 & 0 & -\frac{11}{20} \\ 0 & 1 & 0 & \frac{27}{16} \\ 0 & 0 & 1 & -\frac{7}{80} \end{bmatrix}, \quad 16, x \\
&= \begin{bmatrix} 1 & 0 & 0 & -\frac{3}{8} \\ 0 & 1 & 0 & \frac{77}{16} \\ 0 & 0 & 1 & -\frac{3}{4} \end{bmatrix}, \quad 17, x = \begin{bmatrix} 1 & 0 & 0 & \frac{119}{37} \\ 0 & 1 & 0 & -\frac{105}{37} \\ 0 & 0 & 1 & \frac{104}{37} \end{bmatrix}, \quad 18, x = \begin{bmatrix} 1 & 0 & 0 & \frac{40}{97} \\ 0 & 1 & 0 & \frac{313}{291} \\ 0 & 0 & 1 & -\frac{26}{291} \end{bmatrix}, \quad 19, x \\
&= \begin{bmatrix} 1 & 0 & 0 & -\frac{2}{13} \\ 0 & 1 & 0 & -\frac{2}{13} \\ 0 & 0 & 1 & \frac{11}{13} \end{bmatrix}, \quad 20, x = \begin{bmatrix} 1 & 0 & 0 & \frac{3}{4} \\ 0 & 1 & 0 & \frac{83}{56} \\ 0 & 0 & 1 & -\frac{15}{8} \end{bmatrix}, \quad 21, x = \begin{bmatrix} 1 & 0 & 0 & \frac{57}{149} \\ 0 & 1 & 0 & -\frac{93}{149} \\ 0 & 0 & 1 & \frac{200}{149} \end{bmatrix}, \quad 22, x \\
&= \begin{bmatrix} 1 & 0 & 0 & -\frac{43}{51} \\ 0 & 1 & 0 & -\frac{3}{17} \\ 0 & 0 & 1 & \frac{83}{51} \end{bmatrix}, \quad 23, x = \begin{bmatrix} 1 & 0 & 0 & -\frac{8}{43} \\ 0 & 1 & 0 & \frac{97}{43} \\ 0 & 0 & 1 & -\frac{28}{43} \end{bmatrix}, \quad 24, x = \begin{bmatrix} 1 & 0 & 0 & -\frac{227}{16} \\ 0 & 1 & 0 & \frac{75}{16} \\ 0 & 0 & 1 & \frac{145}{16} \end{bmatrix}, \quad 25, x \\
&= \begin{bmatrix} 1 & 0 & 0 & \frac{11}{72} \\ 0 & 1 & 0 & -\frac{3}{8} \\ 0 & 0 & 1 & \frac{31}{36} \end{bmatrix}, \quad 26, x = \begin{bmatrix} 1 & 0 & 0 & -\frac{44}{15} \\ 0 & 1 & 0 & -\frac{13}{30} \\ 0 & 0 & 1 & 6 \end{bmatrix}, \quad 27, x = \begin{bmatrix} 1 & 0 & 0 & -\frac{199}{52} \\ 0 & 1 & 0 & -\frac{41}{13} \\ 0 & 0 & 1 & \frac{347}{52} \end{bmatrix}
\end{aligned}$$

> Решение той же системы уравнений с помощью обратной матрицы $x = M^{-1}$

$F:$

> OTBET:

> seq([i, x = MatrixInverse(P_i).B_i], i = 1 .. j - 1)

$$\begin{aligned}
 & \left[1, x = \begin{bmatrix} -\frac{70}{69} \\ \frac{83}{69} \\ \frac{86}{69} \end{bmatrix}, \left[2, x = \begin{bmatrix} 1 \\ -17 \\ 15 \end{bmatrix}, \left[3, x = \begin{bmatrix} -32 \\ \frac{49}{3} \\ \frac{118}{9} \end{bmatrix}, \left[4, x = \begin{bmatrix} -\frac{17}{25} \\ \frac{54}{25} \\ -\frac{7}{25} \end{bmatrix}, \left[5, x = \begin{bmatrix} -\frac{51}{26} \\ \frac{12}{13} \\ \frac{5}{2} \end{bmatrix}, \right. \\
 & \left. \left[6, x = \begin{bmatrix} \frac{17}{13} \\ -\frac{5}{26} \\ \frac{1}{2} \end{bmatrix}, \left[7, x = \begin{bmatrix} \frac{275}{199} \\ \frac{156}{199} \\ -\frac{91}{199} \end{bmatrix}, \left[8, x = \begin{bmatrix} -\frac{64}{105} \\ -\frac{11}{21} \\ \frac{173}{105} \end{bmatrix}, \left[9, x = \begin{bmatrix} \frac{81}{238} \\ \frac{46}{119} \\ -\frac{3}{14} \end{bmatrix}, \left[10, x = \right. \right. \\
 & \left. \left. = \begin{bmatrix} \frac{55}{43} \\ -\frac{287}{86} \\ \frac{205}{86} \end{bmatrix}, \left[11, x = \begin{bmatrix} \frac{22}{47} \\ -\frac{26}{47} \\ \frac{65}{47} \end{bmatrix}, \left[12, x = \begin{bmatrix} -\frac{187}{50} \\ \frac{112}{25} \\ -\frac{3}{10} \end{bmatrix}, \left[13, x = \begin{bmatrix} -\frac{231}{362} \\ \frac{93}{181} \\ \frac{217}{181} \end{bmatrix}, \left[14, x = \right. \right. \\
 & \left. \left. = \begin{bmatrix} \frac{14}{13} \\ \frac{19}{26} \\ -\frac{3}{2} \end{bmatrix}, \left[15, x = \begin{bmatrix} -\frac{11}{20} \\ \frac{27}{16} \\ -\frac{7}{80} \end{bmatrix}, \left[16, x = \begin{bmatrix} -\frac{3}{8} \\ \frac{77}{16} \\ -\frac{3}{4} \end{bmatrix}, \left[17, x = \begin{bmatrix} \frac{119}{37} \\ -\frac{105}{37} \\ \frac{104}{37} \end{bmatrix}, \left[18, x = \right. \right. \\
 & \left. \left. = \begin{bmatrix} \frac{40}{97} \\ \frac{313}{291} \\ -\frac{26}{291} \end{bmatrix}, \left[19, x = \begin{bmatrix} -\frac{2}{13} \\ -\frac{2}{13} \\ \frac{11}{13} \end{bmatrix}, \left[20, x = \begin{bmatrix} \frac{3}{4} \\ \frac{83}{56} \\ -\frac{15}{8} \end{bmatrix}, \left[21, x = \begin{bmatrix} \frac{57}{149} \\ -\frac{93}{149} \\ \frac{200}{149} \end{bmatrix}, \left[22, x = \right. \right. \\
 \end{aligned} \tag{10}$$

$$= \begin{bmatrix} -\frac{43}{51} \\ -\frac{3}{17} \\ \frac{83}{51} \end{bmatrix}, \quad 23, x = \begin{bmatrix} -\frac{8}{43} \\ \frac{97}{43} \\ -\frac{28}{43} \end{bmatrix}, \quad 24, x = \begin{bmatrix} -\frac{227}{16} \\ \frac{75}{16} \\ \frac{145}{16} \end{bmatrix}, \quad 25, x = \begin{bmatrix} \frac{11}{72} \\ -\frac{3}{8} \\ \frac{31}{36} \end{bmatrix}, \quad 26, x$$

$$= \begin{bmatrix} -\frac{44}{15} \\ -\frac{13}{30} \\ 6 \end{bmatrix}, \quad 27, x = \begin{bmatrix} -\frac{199}{52} \\ -\frac{41}{13} \\ \frac{347}{52} \end{bmatrix}$$

