



$$\begin{aligned}
& \left[ \left[ \left[ \begin{array}{ccc} -\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{array} \right] \right], \left[ \left[ \begin{array}{ccc} 0 & \frac{1}{3} & -\frac{1}{3} \\ 2 & -\frac{16}{3} & \frac{13}{3} \\ -\frac{7}{4} & \frac{55}{12} & -\frac{43}{12} \end{array} \right] \right], \left[ \left[ \begin{array}{c} 1, \frac{1}{M} \\ 3, \frac{1}{M} \end{array} \right] \right] \\
& = \left[ \left[ \left[ \begin{array}{ccc} -5 & 6 & 1 \\ \frac{8}{3} & -3 & -\frac{2}{3} \\ \frac{17}{9} & -\frac{7}{3} & -\frac{2}{9} \end{array} \right] \right], \left[ \left[ \begin{array}{ccc} \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{array} \right] \right], \left[ \left[ \begin{array}{c} 4, \frac{1}{M} \\ 5, \frac{1}{M} \end{array} \right] \right] \\
& = \left[ \left[ \left[ \begin{array}{ccc} -\frac{1}{2} & \frac{21}{26} & -\frac{1}{13} \\ 0 & -\frac{3}{26} & \frac{2}{13} \\ \frac{1}{2} & -\frac{1}{2} & 0 \end{array} \right] \right], \left[ \left[ \begin{array}{ccc} \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{array} \right] \right], \left[ \left[ \begin{array}{c} 6, \frac{1}{M} \\ 7, \frac{1}{M} \end{array} \right] \right] \\
& = \left[ \left[ \left[ \begin{array}{ccc} -\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{array} \right] \right], \left[ \left[ \begin{array}{ccc} \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{array} \right] \right], \left[ \left[ \begin{array}{c} 8, \frac{1}{M} \\ 9, \frac{1}{M} \end{array} \right] \right] \\
& = \left[ \left[ \left[ \begin{array}{ccc} -\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{array} \right] \right], \left[ \left[ \begin{array}{ccc} \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{array} \right] \right], \left[ \left[ \begin{array}{c} 10, \frac{1}{M} \\ 11, \frac{1}{M} \end{array} \right] \right] \\
& = \left[ \left[ \left[ \begin{array}{ccc} \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{array} \right] \right], \left[ \left[ \begin{array}{ccc} \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{array} \right] \right], \left[ \left[ \begin{array}{c} 12, \frac{1}{M} \\ 13, \frac{1}{M} \end{array} \right] \right]
\end{aligned}
\tag{5}$$

$$= \begin{bmatrix} \frac{21}{181} & \frac{9}{181} & -\frac{59}{362} \\ \frac{16}{181} & -\frac{19}{181} & \frac{12}{181} \\ -\frac{23}{181} & \frac{16}{181} & \frac{28}{181} \end{bmatrix}, \quad 14, \frac{1}{M} = \begin{bmatrix} \frac{5}{26} & -\frac{1}{26} & -\frac{3}{26} \\ \frac{1}{13} & -\frac{3}{26} & \frac{2}{13} \\ -\frac{1}{4} & \frac{1}{4} & 0 \end{bmatrix}, \quad 15, \frac{1}{M} = \begin{bmatrix} \frac{7}{40} & -\frac{1}{10} & 0 \\ -\frac{3}{32} & \frac{3}{8} & -\frac{1}{4} \\ -\frac{1}{160} & -\frac{7}{40} & \frac{1}{4} \end{bmatrix}$$

> Приведение матрицы к треугольному виду (ответ) :

> seq([ i, M<sup>-1</sup> = GaussianElimination(P<sub>i</sub>), i = 1 .. j - 1)

$$\begin{aligned} & \left[ 1, \frac{1}{M} = \begin{bmatrix} 5 & 9 & 1 \\ 0 & -\frac{71}{5} & \frac{26}{5} \\ 0 & 0 & -\frac{69}{71} \end{bmatrix} \right], \left[ 2, \frac{1}{M} = \begin{bmatrix} 9 & 4 & 4 \\ 0 & \frac{43}{9} & \frac{52}{9} \\ 0 & 0 & -\frac{12}{43} \end{bmatrix} \right], \left[ 3, \frac{1}{M} = \begin{bmatrix} 8 & 9 & 9 \\ 0 & \frac{1}{4} & -\frac{3}{4} \\ 0 & 0 & -\frac{9}{2} \end{bmatrix} \right], \left[ 4, \right. \\ & \left. \frac{1}{M} = \begin{bmatrix} 9 & 5 & 6 \\ 0 & \frac{23}{9} & \frac{2}{3} \\ 0 & 0 & -\frac{50}{23} \end{bmatrix} \right], \left[ 5, \frac{1}{M} = \begin{bmatrix} 4 & 2 & 6 \\ 0 & \frac{13}{2} & -\frac{3}{2} \\ 0 & 0 & -2 \end{bmatrix} \right], \left[ 6, \frac{1}{M} = \begin{bmatrix} 4 & 9 & 9 \\ 0 & -\frac{39}{4} & -\frac{55}{4} \\ 0 & 0 & -2 \end{bmatrix} \right], \left[ 7, \right. \\ & \left. \frac{1}{M} = \begin{bmatrix} 2 & 3 & 9 \\ 0 & -\frac{5}{2} & -\frac{37}{2} \\ 0 & 0 & -\frac{199}{5} \end{bmatrix} \right], \left[ 8, \frac{1}{M} = \begin{bmatrix} 6 & 1 & 8 \\ 0 & \frac{10}{3} & \frac{5}{3} \\ 0 & 0 & -\frac{21}{4} \end{bmatrix} \right], \left[ 9, \frac{1}{M} = \begin{bmatrix} 3 & 9 & 7 \\ 0 & -17 & -12 \\ 0 & 0 & -\frac{14}{3} \end{bmatrix} \right], \\ & \left[ 10, \frac{1}{M} = \begin{bmatrix} 7 & 6 & 8 \\ 0 & \frac{22}{7} & \frac{48}{7} \\ 0 & 0 & -\frac{43}{11} \end{bmatrix} \right], \left[ 11, \frac{1}{M} = \begin{bmatrix} 9 & 9 & 2 \\ 0 & 1 & \frac{13}{9} \\ 0 & 0 & \frac{47}{9} \end{bmatrix} \right], \left[ 12, \frac{1}{M} = \begin{bmatrix} 5 & 5 & 9 \\ 0 & 1 & \frac{18}{5} \\ 0 & 0 & -10 \end{bmatrix} \right], \left[ 13, \right. \end{aligned} \quad (6)$$

$$\frac{1}{M} = \begin{bmatrix} 8 & 8 & 5 \\ 0 & -7 & 3 \\ 0 & 0 & \frac{181}{28} \end{bmatrix}, 14, \frac{1}{M} = \begin{bmatrix} 8 & 6 & 4 \\ 0 & \frac{13}{2} & 3 \\ 0 & 0 & 4 \end{bmatrix}, 15, \frac{1}{M} = \begin{bmatrix} 8 & 4 & 4 \\ 0 & 5 & 5 \\ 0 & 0 & 4 \end{bmatrix}$$

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

> Решение системы уравнений методом исключения Гаусса :

> Основная матрица :

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

$$\begin{aligned} & \left[ \begin{matrix} 1, M = \begin{bmatrix} 5 & 9 & 1 \\ 9 & 2 & 7 \\ 4 & 4 & 1 \end{bmatrix}, 2, M = \begin{bmatrix} 9 & 4 & 4 \\ 5 & 7 & 8 \\ 2 & 7 & 8 \end{bmatrix}, 3, M = \begin{bmatrix} 8 & 9 & 9 \\ 6 & 7 & 6 \\ 5 & 3 & 9 \end{bmatrix}, 4, M = \begin{bmatrix} 9 & 5 & 6 \\ 8 & 7 & 6 \\ 6 & 4 & 2 \end{bmatrix}, 5, M \\ & = \begin{bmatrix} 4 & 2 & 6 \\ 4 & 2 & 4 \\ 3 & 8 & 3 \end{bmatrix}, 6, M = \begin{bmatrix} 4 & 9 & 9 \\ 7 & 6 & 2 \\ 4 & 9 & 7 \end{bmatrix}, 7, M = \begin{bmatrix} 2 & 3 & 9 \\ 5 & 5 & 4 \\ 3 & 9 & 7 \end{bmatrix}, 8, M = \begin{bmatrix} 6 & 1 & 8 \\ 4 & 4 & 7 \\ 5 & 8 & 5 \end{bmatrix}, 9, M \\ & = \begin{bmatrix} 3 & 9 & 7 \\ 6 & 1 & 2 \\ 8 & 7 & 2 \end{bmatrix}, 10, M = \begin{bmatrix} 7 & 6 & 8 \\ 1 & 4 & 8 \\ 6 & 7 & 7 \end{bmatrix}, 11, M = \begin{bmatrix} 9 & 9 & 2 \\ 7 & 8 & 3 \\ 3 & 1 & 3 \end{bmatrix}, 12, M = \begin{bmatrix} 5 & 5 & 9 \\ 3 & 4 & 9 \\ 8 & 9 & 8 \end{bmatrix}, 13, M \\ & = \begin{bmatrix} 8 & 8 & 5 \\ 8 & 1 & 8 \\ 2 & 6 & 6 \end{bmatrix}, 14, M = \begin{bmatrix} 8 & 6 & 4 \\ 8 & 6 & 8 \\ 2 & 8 & 4 \end{bmatrix}, 15, M = \begin{bmatrix} 8 & 4 & 4 \\ 4 & 7 & 7 \\ 3 & 5 & 9 \end{bmatrix} \end{matrix} \right] \quad (7)$$

> Правая часть уравнения :  $Mx = F$  :

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

$$\begin{aligned} & \left[ \begin{matrix} 1, F = \begin{bmatrix} 3 \\ 9 \\ 4 \end{bmatrix}, 2, F = \begin{bmatrix} 2 \\ 2 \\ 2 \end{bmatrix}, 3, F = \begin{bmatrix} 1 \\ 5 \\ 7 \end{bmatrix}, 4, F = \begin{bmatrix} 2 \\ 4 \\ 7 \end{bmatrix}, 5, F = \begin{bmatrix} 1 \\ 9 \\ 9 \end{bmatrix}, 6, F = \begin{bmatrix} 1 \\ 6 \\ 4 \end{bmatrix}, 7, F \\ & = \begin{bmatrix} 2 \\ 1 \\ 8 \end{bmatrix}, 8, F = \begin{bmatrix} 7 \\ 5 \\ 4 \end{bmatrix}, 9, F = \begin{bmatrix} 4 \\ 9 \\ 1 \end{bmatrix}, 10, F = \begin{bmatrix} 6 \\ 4 \\ 5 \end{bmatrix}, 11, F = \begin{bmatrix} 1 \\ 7 \\ 1 \end{bmatrix}, 12, F = \begin{bmatrix} 6 \\ 2 \\ 7 \end{bmatrix}, \\ & 13, F = \begin{bmatrix} 5 \\ 7 \\ 7 \end{bmatrix}, 14, F = \begin{bmatrix} 7 \\ 7 \\ 7 \end{bmatrix}, 15, F = \begin{bmatrix} 8 \\ 9 \\ 5 \end{bmatrix} \end{matrix} \right] \quad (8)$$

> ОТВЕТ:



$$\begin{aligned}
 & \left[ \left[ \begin{array}{c} \frac{121}{69} \\ -\frac{38}{69} \\ -\frac{56}{69} \end{array} \right] \right], \left[ \begin{array}{c} 0 \\ 2 \\ -\frac{3}{2} \end{array} \right], \left[ \begin{array}{c} 32 \\ -17 \\ -\frac{34}{3} \end{array} \right], \left[ \begin{array}{c} \frac{24}{25} \\ \frac{37}{25} \\ -\frac{117}{50} \end{array} \right], \left[ \begin{array}{c} \frac{79}{13} \\ \frac{9}{26} \\ -4 \end{array} \right], \\
 & \left[ \begin{array}{c} -\frac{2}{13} \\ \frac{131}{78} \\ -\frac{3}{2} \end{array} \right], \left[ \begin{array}{c} -\frac{206}{199} \\ \frac{237}{199} \\ \frac{11}{199} \end{array} \right], \left[ \begin{array}{c} \frac{19}{35} \\ -\frac{1}{7} \\ \frac{17}{35} \end{array} \right], \left[ \begin{array}{c} \frac{121}{119} \\ -\frac{199}{119} \\ \frac{16}{7} \end{array} \right], \\
 & = \left[ \begin{array}{c} \frac{16}{43} \\ -\frac{5}{43} \\ \frac{22}{43} \end{array} \right], \left[ \begin{array}{c} -\frac{143}{47} \\ \frac{122}{47} \\ \frac{118}{47} \end{array} \right], \left[ \begin{array}{c} \frac{149}{50} \\ -\frac{49}{25} \\ \frac{1}{10} \end{array} \right], \left[ \begin{array}{c} -\frac{77}{362} \\ \frac{31}{181} \\ \frac{193}{181} \end{array} \right], \\
 & = \left[ \begin{array}{c} \frac{7}{26} \\ \frac{21}{26} \\ 0 \end{array} \right], \left[ \begin{array}{c} \frac{1}{2} \\ \frac{11}{8} \\ -\frac{3}{8} \end{array} \right],
 \end{aligned}
 \tag{10}$$

