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$$T_1 + T_2 - 2T_3 + T_4 + 3T_5 - T_6 = 4$$

$$2T_1 - T_2 + T_3 + 2T_4 + T_5 - 3T_6 = 20$$

$$T_1 + 3T_2 - 3T_3 - T_4 + 2T_5 + T_6 = -15$$

$$5T_1 + 2T_2 - T_3 - T_4 + 2T_5 + T_6 = -3$$

$$-3T_1 - T_2 + 2T_3 + 3T_4 + T_5 + 3T_6 = 16$$

$$4T_1 - 3T_2 + T_3 - 6T_4 - 3T_5 - 2T_6 = -27$$

Solution

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 2 & -1 & 1 & 2 & 1 & -3 \\ 1 & 3 & -3 & -1 & 2 & 1 \\ 5 & 2 & -1 & -1 & 2 & 1 \\ -3 & -1 & 2 & 3 & 1 & 3 \\ 4 & 3 & 1 & -6 & -3 & -2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 20 \\ -15 \\ -3 \\ 16 \\ 27 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 2 - \frac{2}{1} \times 1 & -1 - \frac{2}{1} \times 1 & 1 - \frac{2}{1} \times (-2) & 2 - \frac{2}{1} \times 1 & 1 - \frac{2}{1} \times 3 & -3 - \frac{2}{1} \times (-1) \\ 1 - \frac{1}{1} \times 1 & 3 - \frac{1}{1} \times 1 & -3 - \frac{1}{1} \times (-2) & -1 - \frac{1}{1} \times 1 & 2 - \frac{1}{1} \times 3 & 1 - \frac{1}{1} \times (-1) \\ 5 - \frac{5}{1} \times 1 & 2 - \frac{5}{1} \times 1 & -1 - \frac{5}{1} \times (-2) & -1 - \frac{5}{1} \times 1 & 2 - \frac{5}{1} \times 3 & 1 - \frac{5}{1} \times (-1) \\ -3 - \frac{(-3)}{1} \times 1 & -1 - \frac{(-3)}{1} \times 1 & 3 - \frac{(-3)}{1} \times (-2) & 3 - \frac{(-3)}{1} \times 1 & 1 - \frac{(-3)}{1} \times 3 & 3 - \frac{(-3)}{1} \times (-1) \\ 4 - \frac{4}{1} \times 1 & 4 - \frac{4}{1} \times 1 & 1 - \frac{4}{1} \times (-2) & -6 - \frac{4}{1} \times 1 & -3 - \frac{4}{1} \times 3 & -2 - \frac{4}{1} \times (-1) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 20 - \frac{2}{1}(4) \\ -15 - \frac{1}{1}(4) \\ -3 - \frac{5}{1}(4) \\ 16 - \frac{(-3)}{1}(4) \\ -27 - \frac{4}{1}(4) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2 & -1 & -2 & -1 & -2 \\ 0 & -3 & 4 & -6 & -13 & 6 \\ 0 & 2 & -14 & 6 & 10 & 0 \\ 0 & -1 & 4 & 10 & -15 & 2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -19 \\ -23 \\ 28 \\ -43 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2 - \frac{2}{3}(-3) & -1 - \frac{2}{3}(5) & -2 - \frac{2}{3}(0) & -1 - \frac{2}{3}(-5) & 2 - \frac{2}{3}(2) \\ 0 & -3 - \frac{(-3)}{3}(-3) & 9 - \frac{-3}{3}(5) & -6 - \frac{-3}{3}(0) & -13 - \frac{-3}{3}(-5) & 6 - \frac{-3}{3}(-1) \\ 0 & 2 - \frac{2}{3}(-3) & -4 - \frac{2}{3}(5) & 6 - \frac{2}{3}(0) & 10 - \frac{2}{3}(-5) & 0 - \frac{2}{3}(-1) \\ 0 & -1 - \frac{-1}{3}(-3) & 9 - \frac{-1}{3}(5) & -10 - \frac{-1}{3}(0) & -15 - \frac{-1}{3}(-5) & 2 - \frac{-1}{3}(-1) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -14 - \frac{2}{3}(12) \\ -23 - \frac{-3}{3}(12) \\ 28 - \frac{2}{3}(12) \\ -48 - \frac{1}{3}(12) \end{bmatrix}$$

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$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 4 & -6 & -8 & 2 \\ 0 & 0 & -2/3 & 6 & 29/3 & -2/3 \\ 0 & 0 & 22/3 & -10 & -40/3 & 7/3 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -35 \\ 36 \\ -42 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 5/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 4 - \frac{4}{3/3}(7/3) & -6 - \frac{4}{7/3}(-2) & -8 - \frac{4}{7/3}(-13/3) & 2 - \frac{4}{7/3}(4/3) \\ 0 & 0 & -\frac{2}{3} - \frac{2/3}{7/3}(7/3) & 6 - \frac{2/3}{7/3}(-2) & \frac{29}{3} - \frac{2/3}{7/3}(-13/3) & -\frac{2}{3} - \frac{2/3}{7/3}(4/3) \\ 0 & 0 & \frac{22}{3} - \frac{22/3}{7/3}(7/3) & -10 - \frac{22/3}{7/3}(-2) & -\frac{40}{3} - \frac{22/3}{7/3}(-13/3) & \frac{7}{3} - \frac{22/3}{7/3}(4/3) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -35 - \frac{4}{7/3}(-11) \\ 36 - \frac{2/3}{7/3}(-11) \\ -42 - \frac{22/3}{7/3}(-11) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 38/7 & 38/7 & -2/7 \\ 0 & 0 & 0 & -26/7 & 2/7 & -83/7 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ \frac{230}{7} \\ -\frac{87}{7} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & \frac{38}{7} - \frac{58}{7} - \frac{18}{7} \left(\frac{-18}{7} \right) & \frac{38}{7} - \frac{38}{7} \left(\frac{-4}{7} \right) - \frac{2}{7} - \frac{58}{7} \left(\frac{32}{7} \right) & \\ 0 & 0 & 0 & \frac{-26}{7} - \left(\frac{38}{7} \right) \left(\frac{-18}{7} \right) & \frac{2}{7} - \frac{26}{7} \left(\frac{-4}{7} \right) - \frac{43}{7} - \frac{26}{7} \left(\frac{38}{7} \right) & \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ \frac{230}{7} - \frac{58}{7} - \frac{18}{7} \left(\frac{-113}{7} \right) \\ \frac{-26}{7} - \frac{26}{7} \left(\frac{-113}{7} \right) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 0 & 38/9 & 29/3 \\ 0 & 0 & 0 & 0 & 10/9 & -26/3 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ -\frac{11}{9} \\ 98/9 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 0 & 38/9 & 29/3 \\ 0 & 0 & 0 & 0 & \frac{10}{9} - \frac{10}{9} \left(\frac{38}{9} \right) & \frac{-26}{3} - \frac{10}{9} \left(\frac{29}{3} \right) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ -\frac{11}{9} \\ \frac{88}{9} - \frac{10}{9} \left(\frac{-11}{9} \right) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 0 & 38/9 & 29/3 \\ 0 & 0 & 0 & 0 & 0 & \frac{-213}{19} \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ -\frac{11}{9} \\ \frac{213}{19} \end{bmatrix}$$

$$T_1 + T_2 - 2T_3 + T_4 + 3T_5 - T_6 = 4 \quad \text{--- (1)}$$

$$-3T_2 + 5T_3 - 5T_5 - T_6 = 12 \quad \text{--- (2)}$$

$$7/6 T_3 - 2T_4 - \frac{13}{3} T_5 + \frac{4}{3} T_6 = -11 \quad \text{--- (3)}$$

$$\frac{-18}{7} T_4 - \frac{4}{7} T_5 + \frac{33}{7} T_6 = \frac{-113}{7} \quad \text{--- (4)}$$

$$\frac{38}{9} T_5 + \frac{29}{3} T_6 = \frac{-11}{9} \quad \text{--- (5)}$$

$$\frac{-213}{19} T_6 = \frac{213}{19} \quad \text{--- (6)}$$

from equation 6

$$\frac{-213}{19} T_6 = \frac{213}{19}$$

$$T_6 = \frac{213 \times -19}{19 \times 213}$$

$$T_6 = -1$$

Sub $T_6 = -1$ into eqn 5

$$\frac{38}{9} T_5 + \frac{29}{3} (-1) = \frac{-11}{9}$$

$$\frac{38}{9} T_5 - \frac{29}{3} = \frac{-11}{9}$$

$$\frac{38}{9} T_5 = \frac{-11}{9} + \frac{29}{3}$$

$$\frac{38 T_5}{9} = \frac{76}{9}$$

$$T_5 = 2$$

Sub $T_6 = -1, T_5 = 2$ into eqn 4

$$\frac{-18}{7} T_4 - \frac{4}{7} (2) + \frac{33}{7} (-1) = \frac{-113}{7}$$

$$\frac{-18}{7} T_4 = \frac{8}{7} - \frac{33}{7} = \frac{-113}{7}$$

$$\frac{-18 T_4}{7} = \frac{-113}{7} + \frac{8}{7} + \frac{33}{7}$$

$$\frac{-18}{7} T_4 = \frac{-92}{7}$$

$$T_4 = 4$$

Sub $T_6 = -1, T_5 = 2, T_4 = 4$ in eqn 3

$$\frac{7}{3} T_3 - 2(4) + \frac{13}{3} (2) + \frac{4}{3} (-1) = -11$$

$$\frac{7}{3} T_3 - 8 - \frac{26}{3} + \frac{4}{3} = -11$$

$$\frac{7}{3} T_3 = -11 + 8 + \frac{26}{3} + \frac{4}{3}$$

$$\frac{7}{3} T_3 = 7$$

$$T_3 = 3$$

Sub $T_6 = -1, T_5 = 2, T_4 = 4, T_3 = 3$ in eqn 2

$$-3T_2 + 5(3) + 0 - 5(2) - (-1) = 12$$

$$-3T_2 + 15 - 10 + 1 = 12$$

$$-3T_2 = 12 - 15 + 10 - 1$$

$$-3T_2 = 6$$

$$T_2 = \frac{6}{-3}$$

$$T_2 = -2$$