

$$\frac{26}{5} + \frac{14}{4.4} \left(\frac{22}{5} \right) = \frac{29}{3}$$

$$\frac{12}{5} + \frac{14}{4.4} \left(-\frac{132}{5} \right) = -\frac{11}{9}$$

STEP 14 [Row 6 + $\frac{14}{22/5}$ Row 5]

$$22/5 = 4.4$$

$$-14 + 14/4.4 \times 4.4 = 0$$

$$-44/3 + 14/4.4 \left(\frac{26}{5} \right) = \frac{62}{33}$$

$$-12 + 14/4.4 \left(\frac{8}{5} \right) = -\frac{76}{11}$$

$$-\frac{220}{5} + \frac{14}{4.4} \left(\frac{132}{5} \right) = \frac{32}{3}$$

Modifying the matrix again

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 & -11 \\ 0 & 0 & 0 & -18/7 & -4/7 & 34/7 & -107/7 \\ 0 & 0 & 0 & 0 & 28/9 & 22/3 & -11/9 \\ 0 & 0 & 0 & 0 & 62/33 & -76/11 & 32/3 \end{bmatrix}$$

STEP 15 [Row 6 - $\frac{93}{209}$ Row 5]

$$62/3 - \frac{93}{209} \left(\frac{28}{9} \right) = 0$$

$$-76/11 - \frac{93}{209} \left(\frac{22}{3} \right) = -\frac{213}{19}$$

$$\frac{12}{3} + \frac{93}{209} \left(-\frac{11}{9} \right) = \frac{213}{19}$$

Modifying Matrix again

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 & -11 \\ 0 & 0 & 0 & -18/7 & -4/7 & 34/7 & -107/7 \\ 0 & 0 & 0 & 0 & 78/19 & 22/3 & -11/9 \\ 0 & 0 & 0 & 0 & 0 & -24/19 & 213/19 \end{bmatrix}$$

from the matrix values of T_1, T_2, T_3, T_4, T_5

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

$$T_6 = -1$$

$$\text{To get } T_5$$

$$\frac{22}{3} T_5 + \frac{22}{3} T_6 = -\frac{11}{9}$$

$$\frac{38}{9} T_5 - \frac{22}{3} = -\frac{11}{9}$$

$$\frac{38}{9} T_5 = -\frac{11}{9} + \frac{22}{3}$$

$$\frac{38}{9} T_5 = \frac{26}{9}$$

$$T_5 = \frac{26}{9} \times \frac{9}{38}$$

$$T_5 = 2/3$$

To get T_4 (values of T_6 and T_5 substituted directly)

$$-\frac{18}{7} T_4 - \frac{4}{7} (2) + \frac{34}{7} (-1) = -\frac{113}{7}$$

$$-\frac{18}{7} T_4 - \frac{8}{7} - \frac{34}{7} = -\frac{113}{7}$$

$$-\frac{18}{7} T_4 - \frac{42}{7} = -\frac{113}{7}$$

multiply through by 7

$$-18 T_4 - 42 = -113$$

$$-18 T_4 = -113 + 42$$

$$T_4 = \frac{-71}{18}$$

$$-18$$

$$T_4 = 4$$

To get T_3

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

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

$$\frac{7}{3} T_3 - 18 = -11$$

for T_2

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

$$-3T_2 + 16 = 12$$

$$-3T_2 = -4$$

$$T_2 = 2$$

for T_1

$$T_1 (1) - 2(1) + 1(4) + 13(2) + 1 = 4$$

$$T_1 = 4 - 3$$

$$T_1 = 1$$

Modifying Row 4 Again

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 & -11 \\ 0 & 0 & 15/2 & -9 & -29/2 & 9 & -103/2 \\ 0 & 2 & -4 & 6 & 10 & 0 & 28 \\ 0 & -1 & 9 & 10 & -15 & 2 & -43 \end{bmatrix}$$

STEP 8 [Row 5 - (-2/3) Row 4]

$$2 + \frac{2}{3}(-3) = 0$$

$$-4 + \frac{2}{3}(9) = 2$$

$$6 + \frac{2}{3}(-6) = 2$$

$$10 + \frac{2}{3}(-13) = \frac{4}{3}$$

$$0 + \frac{2}{3}(6) = 4$$

$$28 + \frac{2}{3}(-23) = \frac{38}{3}$$

STEP 9 [Row 6 - (-1/2) Row 5]

$$-1 + \frac{1}{2}(2) = 0$$

$$9 + \frac{1}{2}(-4) = 7$$

$$-10 + \frac{1}{2}(6) = -7$$

$$-15 + \frac{1}{2}(10) = -10$$

$$2 + \frac{1}{2}(0) = 2$$

$$-43 + \frac{1}{2}(28) = -29$$

Modifying the matrix again:

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 & -11 \\ 0 & 0 & 15/2 & -9 & -29/2 & 9 & -103/2 \\ 0 & 0 & 2 & 2 & 4/3 & 4 & 38/3 \\ 0 & 0 & 7 & -7 & -10 & 2 & -29 \end{bmatrix}$$

STEP 10 [Row 7 - 45/14 Row 3]

$$15/2 - \frac{45}{14}(\frac{7}{3}) = 8$$

$$-9 - \frac{45}{14}(-2) = -\frac{18}{7}$$

$$-29/2 - \frac{45}{14}(-13/3) = -\frac{9}{7}$$

$$9 - \frac{45}{14}(\frac{4}{3}) = \frac{57}{14}$$

$$-103/2 - \frac{45}{14}(-103/2) = -\frac{113}{14}$$

STEP 11 [Row 5 - 4/15 Row 4]

$$2 - \frac{4}{15}(\frac{15}{2}) = 0$$

$$2 - \frac{4}{15}(-9) = \frac{22}{5}$$

$$4/3 - \frac{4}{15}(-29/2) = \frac{26}{5}$$

$$4 - \frac{4}{15}(9) = \frac{8}{5}$$

$$\frac{38}{3} - \frac{4}{15}(-\frac{103}{2}) = \frac{132}{5}$$

STEP 12 [Row 6 - 7/2 Row 5]

$$7 - \frac{7}{2}(2) = 0$$

$$-7 - \frac{7}{2}(2) = -14$$

$$-10 - \frac{7}{2}(\frac{4}{3}) = -\frac{44}{3}$$

$$2 - \frac{7}{2}(\frac{22}{5}) = -\frac{12}{5}$$

$$-29 - \frac{7}{2}(\frac{132}{5}) = -\frac{220}{5}$$

Modifying the matrix again

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 & -11 \\ 0 & 0 & 0 & -18/7 & -4/3 & 38/7 & -113/7 \\ 0 & 0 & 0 & 22/5 & 26/5 & 8/5 & 132/5 \\ 0 & 0 & 0 & -14 & -44/3 & -12 & -220/3 \end{bmatrix}$$

STEP 13 [Row 5 + 77/45 Row 4]

$$\frac{22}{5} + \frac{77}{45}(-\frac{18}{7}) = 8$$

$$\frac{26}{5} + \frac{77}{45}(-\frac{4}{3}) = \frac{38}{9}$$

$$\frac{8}{5} + \frac{77}{45}(\frac{38}{7}) = \frac{38}{9}$$

Modifying Row 4

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 2 & -1 & -2 & -1 & 2 & -19 \\ 0 & -3 & 9 & -6 & -13 & 6 & -23 \\ -3 & -1 & 2 & 3 & 1 & 3 & 16 \\ 4 & 3 & 1 & -6 & -3 & -2 & -27 \end{bmatrix}$$

Modifying Row 6

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 2 & -1 & -2 & -1 & 2 & -19 \\ 0 & -3 & 9 & -6 & -13 & 6 & -23 \\ 0 & 2 & -4 & 6 & 10 & 0 & 28 \\ 0 & -1 & 9 & -10 & -15 & 2 & -43 \end{bmatrix}$$

STEP 4 [Row 5 - $(-\frac{2}{1})$ Row 1]

$$-3 + 3 \times 1 = 0$$

$$-1 + 3 \times 1 = 2$$

$$2 + 3 \times -2 = -4$$

$$3 + 3(1) = 6$$

$$1 + 3 \times 3 = 10$$

$$3 + 3(-1) = 0$$

$$16 + 3(4) = 24$$

STEP 6 [Row 3 + $\frac{2}{3}$ Row 2]

$$2 + \frac{2}{3}(-3) = 0$$

$$-1 + \frac{2}{3}(5) = \frac{7}{3}$$

$$-2 + \frac{2}{3}(0) = -2$$

$$-1 + \frac{2}{3}(-5) = -\frac{13}{3}$$

$$2 + \frac{2}{3}(-1) = \frac{4}{3}$$

$$-19 + \frac{2}{3}(12) = -11$$

Modifying Row 5

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 2 & -1 & -2 & -1 & 2 & -19 \\ 0 & -3 & 9 & -6 & -13 & 6 & -23 \\ 0 & 2 & -4 & 6 & 10 & 0 & 28 \\ 4 & 3 & 1 & -6 & -3 & -2 & -27 \end{bmatrix}$$

Modifying Row 3 Again

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 0 & \frac{7}{3} & -2 & -\frac{13}{3} & \frac{4}{3} & -11 \\ 0 & -3 & 9 & -6 & -13 & 6 & -23 \\ 0 & 2 & -4 & 6 & 10 & 0 & 28 \\ 0 & -1 & 9 & 10 & -15 & 2 & -43 \end{bmatrix}$$

STEP 5 [Row 6 - $\frac{4}{1}$ Row 1]

$$4 - 4(1) = 0$$

$$3 - 4(1) = -1$$

$$1 - 4(-2) = 9$$

$$-6 - 4(1) = -10$$

$$-3 - 4(3) = -15$$

$$-2 - 4(-1) = 2$$

$$-27 - 4(4) = -43$$

STEP 7 [Row 4 - $(-\frac{2}{3})$ Row 3]

$$-3 + \frac{2}{3}(\frac{7}{3}) = 0$$

$$9 + \frac{2}{3}(-\frac{13}{3}) = \frac{15}{2}$$

$$-6 + \frac{2}{3}(-2) = -9$$

$$-13 + \frac{2}{3}(\frac{4}{3}) = -\frac{29}{2}$$

$$6 + \frac{2}{3}(2) = 9$$

$$-23 + \frac{2}{3}(-11) = -\frac{103}{2}$$

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Solution

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

Augmented form of matrix above

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 2 & -1 & 1 & 2 & 1 & -3 & 20 \\ 1 & 3 & -3 & -1 & 2 & 1 & -15 \\ 5 & 2 & -1 & -1 & 2 & 1 & -3 \\ -3 & -1 & 2 & 3 & 1 & 3 & 16 \\ 4 & 3 & 1 & -6 & -3 & -2 & -27 \end{bmatrix}$$

STEP 1 [Row 2 - $\frac{2}{1}$ Row 1]

$$2 - \frac{2}{1} \times 1 = 0$$

$$-1 - 2 \times 1 = -3$$

$$1 - 2 \times -2 = 5$$

$$2 - 2 \times 1 = 0$$

$$1 - 2 \times 3 = -5$$

$$-3 - 2 \times -1 = -1$$

$$20 - 2 \times 4 = 12$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 1 & 3 & -3 & -1 & 2 & 1 & -15 \\ 5 & 2 & -1 & -1 & 2 & 1 & -3 \\ -3 & -1 & 2 & 3 & 1 & 3 & 16 \\ 4 & 3 & 1 & -6 & -3 & -2 & -27 \end{bmatrix}$$

STEP 2 [Row 3 - $\frac{1}{1}$ Row 1]

$$1 - 1 \times 1 = 0$$

$$3 - 1 \times 1 = 2$$

$$-3 - 1 \times -2 = -1$$

$$-1 - 1 \times 1 = -2$$

$$2 - 1 \times 3 = -1$$

$$1 - 1 \times -1 = 2$$

$$-15 - 1 \times 4 = -19$$

Modifying Row 3

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 2 & -1 & -2 & -1 & 2 & -19 \\ 5 & 2 & -1 & -1 & 2 & 1 & -3 \\ -3 & -1 & 2 & 3 & 1 & 3 & 16 \\ 4 & 3 & 1 & -6 & -3 & -2 & -27 \end{bmatrix}$$

STEP 3 [Row 4 - $\frac{5}{1}$ Row 1]

$$5 - 5 \times 1 = 0$$

$$2 - 5 \times 1 = -3$$

$$-1 - 5 \times -2 = 9$$

$$-1 - 5 \times 1 = -6$$

$$2 - 5 \times 3 = -13$$

$$1 - 5 \times -1 = 6$$

$$-3 - 5 \times 4 = -23$$