ADENIRAN MOJEEDAT MOREMUKEJI

15/ENG03/002

ENG 382

Assignment 3

$$T_1 + T_2 - 2T_3 + T_4 + 3T_5 - T_6 = 4$$
$$2T_1 + T_2 + T_3 + 2T_4 + T_5 - 3T_6 = 20$$
$$T_1 + 3T_2 - 3T_3 - T_4 + 2T_5 + T_6 = -15$$
$$5T_1 + 2T_2 - T_3 - T_4 + 2T_5 + T_6 = -3$$
$$-3T_1 - T_2 + 2T_3 + 3T_4 + T_5 + 3T_6 = 16$$
$$4T_1 - 3T_2 + T_3 - 6T_4 - 3T_5 - 2T_6 = 27$$

Solution

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

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2 & -1 & -2 & -1 & -2 \\ 0 & -3 & 9 & -6 & -13 & 6 \\ 0 & 2 & -4 & 6 & 10 & 0 \\ 0 & -1 & 9 & 10 & -15 & 2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -19 \\ 23 \\ 28 \\ 43 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2-\frac{2}{3}(3) & -1-\frac{2}{3}(5) & -2-\frac{2}{3}(0) & -1-\frac{2}{3}(-5) & 2-\frac{3}{3}(2) \\ 0 & -3-\frac{(-3)}{2}(-3) & 9-\frac{-3}{3}(5) & -6-\frac{2}{3}(0) & -(3-\frac{3}{3}(-5) & 6-\frac{-3}{3}(-1) \\ 0 & 2-\frac{2}{3}(-3) & -4-\frac{2}{3}(5) & 6-\frac{2}{3}(0) & 10-\frac{2}{3}(-5) & 0-\frac{2}{3}(-1) \\ 0 & -1-\frac{1}{3}(-3) & 9-\frac{1}{3}(5) & -10-\frac{1}{3}(0) & -15-\frac{1}{3}(-5) & 2-\frac{1}{3}(1) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} \begin{bmatrix} 4 \\ 12 \\ -19-\frac{2}{3}(12) \\ 23-\frac{3}{3}(-19) \\ 28-\frac{2}{3}(23) \\ 43-\frac{1}{3}(28) \end{bmatrix}$$

Scanned by CamScanner

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 4 & -6 & -8 & 7 \\ 0 & 0 & -2/3 & 6 & 20/3 & -2/3 \\ 0 & 0 & 22/3 & -10 & -40/3 & 7/3 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -35 \\ 36 \\ -47 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -12/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 35/7 \\ 0 & 0 & 0 & 38/7 & 35/7 & -2/7 \\ 0 & 0 & 0 & -26/7 & 2/7 & -13/7 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ 280/7 \\ -87/7 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/8 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 0 & 38/9 & 29/3 \\ 0 & 0 & 0 & 0 & 10/9 & -199/38/9 \quad -25/3 \quad -199/38/9 \quad (29/3) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ -11/9 \\ 218/9 \quad -149/38/9 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -15/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 53/7 \\ 0 & 0 & 0 & 0 & 38/9 & 29/3 \\ 0 & 0 & 0 & 0 & 0 & -213/16 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ -11/9 \\ 218/9 \end{bmatrix}$$

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

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

$$7/3\,T_3 - 2T_4 - 18/3\,T_5 + 4/3\,T_6 = -11 \quad \text{---} (3)$$

$$-18/7\,T_4 - 4/7\,T_5 + 53/7\,T_6 = 113/7 \quad \text{---}$$

Scanned by CamScanner

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

$$\frac{218}{18}T_6 = \frac{213}{19} \quad \text{--- (6)}$$

From eqn 6

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

$$T_6 = -1$$

Sub $T_6 = -1$ into eqn 5

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

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

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

$$T_5 = 2$$

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

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

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

$$T_4 = 4$$

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

$$\frac{7}{3}T_3 - 2(4) - \frac{18}{3}(2) + \frac{4}{3}(-1) = -11$$

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

$$T_3 = 3$$

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

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

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

$$-3T_2 = 6$$

$$T_2 = \frac{6}{-3} \qquad T_2 = -2$$

Scanned by CamScanner

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

$T_2 = 2$ with eqn 1

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

$$T_1 + (-2) - 2(3) + 4 + 3(2) - (-1) = 4$$

$$T_1 - 2 - 6 + 4 + 6 + 1 = 4$$

$$T_1 = 4 + 2 + 6 - 4 - 6 - 1$$

$$T_1 = 1$$

$T_1 = 1$ $T_2 = -2$ $T_3 = 3$ $T_4 = 4$ $T_5 = 2$

$T_6 = -1$

Scanned by CamScanner