

# Assignment 3

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

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

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

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

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

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

Soln

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

$$T_1 = 2/1 = 2$$

$$T_2 = 1/1 = 1$$

$$T_3 = 5/1 = 5$$

$$T_4 = -3/1 = -3$$

$$T_5 = 4/1 = 4$$

$$\begin{bmatrix} 1 & 1 & 2 & 1 & 3 & 1 \\ 2-2(1) & -1-2(1) & 1-2(-2) & 2-2(1) & 1-2(3) & -3-2(-1) \\ 1-1(1) & 3-1(1) & -3-1(-2) & -1-1(1) & 2-1(3) & 1-1(-1) \\ 5-3(1) & 2-5(1) & -1-5(-2) & -1-5(1) & 2-5(3) & 1-5(-1) \\ -3+3(1) & -1+3(1) & 2+3(-2) & 3+3(1) & 1+3(3) & 3+3(-1) \\ 4-4(1) & 3-4(1) & 1-4(-2) & -6-4(1) & -3-4(3) & -2-4(-2) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix}$$

$$= \begin{bmatrix} 4 \\ 20-2(4) \\ -15-1(4) \\ -3-5(4) \\ 11+3(4) \\ -27-4(4) \end{bmatrix}$$

Ques 2

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

$$f_1 = -2/3$$

$$f_2 = -3/-3 = 1$$

$$f_3 = -2/3$$

$$f_4 = -1/-3 = 1/3$$

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

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 4 & -6 & -8 & 7 \\ 0 & 0 & -2/3 & 6 & 20/3 & -2/3 \\ 0 & 0 & 22/3 & -10 & -44/3 & 7/3 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -35 \\ 36 \\ 47 \end{bmatrix}$$

$$f_1 = \frac{4 \times 3}{7} = 12/7$$

$$f_2 = \frac{-2 \times 3}{3 \times 7} = -2/7$$

$$f_3 = \frac{22 \times 3}{3 \times 7} = 22/7$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -6 - \frac{12}{7}(-2) & -8 - \frac{12}{7}(-\frac{13}{3}) & 7 - \frac{12}{7}(\frac{4}{3}) \\ 0 & 0 & 0 & 6 + \frac{2}{7}(-2) & \frac{20}{3} + \frac{2}{7}(-\frac{20}{3}) & -\frac{2}{3} + \frac{2}{7}(\frac{2}{3}) \\ 0 & 0 & 0 & -10 - \frac{22}{7}(-2) & -\frac{44}{3} - \frac{22}{7}(-\frac{13}{3}) & \frac{7}{3} - \frac{22}{7}(\frac{7}{3}) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -35 - \frac{12}{7}(-11) \\ 36 + \frac{2}{7}(-11) \\ 47 - \frac{22}{7}(-11) \end{bmatrix}$$



$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/8 & 33/7 \\ 0 & 0 & 0 & 0 & 38/7 & 29/3 \\ 0 & 6 & 0 & 0 & 10/9 & -20/3 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ -11/9 \\ 95/9 \end{bmatrix}$$

$$F_1 = \frac{10 \times 9}{9 \times 38} = \frac{5}{19}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 0 & 38/9 & 29/3 \\ 0 & 6 & 0 & 0 & 10/9 - 5/19(38/9) & -20/3 - 5/19(29/3) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ -11/9 \\ 95/9 - 5/19(-11/9) \end{bmatrix}$$

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

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

$$T_6 = -1$$

$$\frac{38}{9} T_5 + \frac{29}{3} T_6 = \frac{-11}{9}$$

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

$$T_5 = \left[ \frac{-11}{9} + \frac{29}{3} \right] \frac{9}{38}$$

$$= 2$$

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4

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

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

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

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

$$\begin{cases} T_1 = 1 \\ T_2 = -2 \\ T_3 = 3 \\ T_4 = 4 \\ T_5 = 2 \\ T_6 = -1 \end{cases}$$