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16/ENG01015
Assignment 3
Chem. Eng.

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

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

$$F_1 = 2, F_2 = 1, F_3 = 5, F_4 = -3, F_5 = 4$$

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

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2 & -1 & -2 & -1 & 2 \\ 0 & -3 & 9 & -6 & -13 & 6 \\ 0 & 2 & -4 & 6 & 10 & 0 \\ 0 & -1 & 9 & 10 & -15 & 2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -19+2/3(12) \\ -23-1(12) \\ 28+2/3(12) \\ -42+1/3(12) \end{bmatrix} \begin{bmatrix} 4 \\ 12 \\ -19 \\ -23 \\ 28 \\ 43 \end{bmatrix} \begin{aligned} F_1 &= -2/3 \\ F_2 &= -1 \\ F_3 &= -2/3 \\ F_4 &= 1/3 \end{aligned}$$

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

$$F_1 = 12/7$$

$$F_2 = -2/7$$

$$F_3 = 22/7$$

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

$$F_1 = 12/7$$

$$F_2 = -2/7$$

$$F_3 = 22/7$$

$$\begin{bmatrix}
 1 & 1 & -2 & 1 & 3 & -1 \\
 0 & -3 & 5 & 0 & -5 & -1 \\
 0 & 0 & -7/3 & -2 & -13/3 & 4/3 \\
 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\
 0 & 0 & 0 & 38/7 & 38/7 & -2/7 \\
 0 & 0 & 0 & -26/7 & 2/7 & -11/7
 \end{bmatrix}
 \begin{bmatrix}
 T_1 \\
 T_2 \\
 T_3 \\
 T_4 \\
 T_5 \\
 T_6
 \end{bmatrix}
 =
 \begin{bmatrix}
 4 \\
 12 \\
 -11 \\
 -13/7 \\
 -60/7 \\
 -52/7
 \end{bmatrix}$$

$$F_1 = -14, F_2 = 21$$

$$9$$

$$9$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 1 & 1 \\ 0 & -3 & 5 & 0 & 5 & 5 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{bmatrix} = \begin{bmatrix} 1 \\ 5 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 1 & 1 \\ 0 & -3 & 5 & 0 & 5 & 5 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{bmatrix} = \begin{bmatrix} 1 \\ 5 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$I = \frac{S}{N}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 1 & 1 \\ 0 & -3 & 5 & 0 & 5 & 5 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{bmatrix} = \begin{bmatrix} 1 \\ 5 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 1 & 1 \\ 0 & -3 & 5 & 0 & 5 & 5 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{bmatrix} = \begin{bmatrix} 1 \\ 5 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$-213 \quad T_6 = 2^{13}/14$$

19

$$T_1 = \frac{213}{14} \times \frac{19}{213} = -1$$

$$\frac{38}{9} T_2 + \frac{24}{3} T_6 = -11$$

$$T_2 = \left(\frac{-11}{9} + \frac{24}{3} \right) \times \frac{9}{38}$$

$$= 2$$

$$T_4 = 2 \left(\frac{-113}{7} + \frac{8}{7} + \frac{33}{7} \right) \times \frac{-7}{18} = 4$$

$$T_3 = (-11 + 8 + \frac{26}{13} + \frac{4}{13}) \times \frac{1}{7}$$

$$T_2 = \frac{12 - 15 + 10 - 1}{-3} = -2$$

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

$$= 1$$