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15/ENG06/036
Elect/Elec

1) $T_1 + T_2 - T_3 + T_4 + 3T_5 - T_6 = 4$
$2T_1 - T_2 + T_3 + 2T_4 + T_5 - 3T_6 = 20$
$T_1 + 3T_2 - 3T_3 - T_4 + 2T_5 + T_6 = -13$
$5T_1 + 2T_2 - T_3 - T_4 - 12T_5 + T_6 = -3$
$-3T_1 - T_2 + 2T_3 + 3T_4 + T_5 - 5T_6 = 16$
$4T_1 + 3T_2 + T_3 - 6T_4 - 3T_5 - 2T_6 = -27$

Soln

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 2 & -1 & 1 & 2 & 1 & -3 \\ 1 & 3 & -3 & -1 & 2 & 1 \\ 5 & 2 & -1 & -1 & 2 & 1 \\ -3 & -1 & -2 & 3 & 1 & 3 \\ 4 & 3 & 1 & -6 & 3 & -2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} \begin{bmatrix} 4 \\ 26 \\ -15 \\ -3 \\ 16 \\ -27 \end{bmatrix}$$

Augmented matrix

$$\left[\begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 2 & -1 & 1 & 2 & 1 & -3 & 26 \\ 1 & 3 & -3 & -1 & 2 & 1 & -15 \\ 5 & 2 & -1 & -1 & 2 & 1 & -3 \\ -3 & -1 & 2 & 3 & 1 & 3 & 16 \\ 4 & 3 & 1 & 6 & -3 & -2 & -27 \end{array}\right]$$

$$\left[\begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -1 & 1 & 2 & 1 & -3 & 20 \\ 0 & 0 & -3 & -1 & 2 & 1 & -15 \\ 0 & 0 & 0 & -1 & 2 & 1 & -3 \\ 0 & 0 & 0 & 0 & 1 & 3 & 16 \\ 0 & 0 & 0 & 6 & 0 & -2 & -27 \end{array}\right]$$

(iv) 2 - 2(1) = 0
(V) 1 - 2(3) = -5
V,) -3 - 2(-1) = -1
V,,) 20 - 2(4) = 12
Row 2 = [0 -3 5 5 -1 : 12]
a_{31} to 0 Row 3 - 1(Row 1)

i) 1 - 1(1) = 0
ii) 3 - 1(-1) = 2
iii) -3 - 2(-2) = 1
iv) 2 - 1 - (1) = -2
v) 2 - 1(3) = -1
v,) 1 - (-1) = 2
v,,) -15 - 1(4) = -19
Row 3 → [0 2 -1 -2 -1 2 : -19]
a_{41} to 0 Row 4 - 5/1 (Row 1)

i) 5 - 5(1) = 0
ii) 2 - 5(1) = -3
iii) -1 - 5(-2) = 9
iv) -1 - 5(1) = -6
v) 2 - 5(3) = -13
v,) 1 - 5(-1) = 6
v,,) -3 - 5(4) = -23
(Row 4) → (0 -3 9 -6 -13 6 -23]
a_{51} to (Row 5) - -3 (Row 1)
(Row 5) + 3 (Row 1)

i) -3 + 3(1) = 0
ii) -1 + 3(1) = 2
iii) 2 + 3(-2) = -4
iv) 3 + 3(1) = 6
v) 1 + 3(3) = 10
v,) 3 + 3(-1) = 0

(Row 5

i) 6 -
ii) 5 -
iii) 1-
iv) -6
v) -
vi) -
vii) -

(Row 5) → [0 2 -4 6 10 0 28]
a_{61} to 0 (row 6) - 4/1 (row 1)

(i) 4 - 4(1) = 0
(ii) 3 - 4(1) = -1
(iii) 1 - 4(-2) = 9
(iv) -6 - 4(0) = -10
(v) -3 - 4(3) = -15
(vi) -3 - 4(-1) = 2
(vii) -27 - 4(4) = -43

Row 6 → (0, -1, 9, -10, -15, 3 | 43)

$$\left[\begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & 12 \\ 0 & 2 & -1 & -2 & -1 & 2 & -14 \\ 0 & -3 & 9 & -6 & -13 & 6 & -23 \\ 0 & 2 & -4 & 6 & 10 & 0 & 28 \\ 0 & -1 & 9 & -10 & -15 & 2 & -43 \end{array}\right]$$

To make a_{32} 0 we have row 3 - $\frac{a_{32}}{a_{22}}$ × (Row 2)

(i) 2 - 2/3 (-3) = 0
(ii) -1 - 2/3 (5) = -13/3
(iii) -2 - (2/3)(0) = -3
(iv) -1 - (2/3)(-5) = -3/5
(v) 2 - (2/3)(-1) = 4/5
(vi) -14 - (2/3)(12) = -11

The new row 3 = (0 0 1/3 -2 -13/3 4/5 | -11)

To make a_{42} 0 we had row 4 - (-3/3) row 2 = row 4 + 1

(i) -3 + (-1) = 0
(ii) 9 + 1(5) = 14
(iii) -6 + 1(0) = -6
(iv) -13 + 1(-5) = -8
(v) 6 + 1(-1) = 4
(vi) -23 + 1(12) = -11

New row 4 = (0, 0, 4, -6, -8 7 : 35)

To make a_{53} 0, we have row$_5$ $-\frac{2}{3}$ × row$_2$ = row $5 + \frac{2}{3}$

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

ii) $-4 + \frac{2}{3}(5) = -\frac{2}{3}$

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

iv) $10 + \frac{2}{3}(-5) = \frac{20}{3}$

v) $6 + \frac{2}{3}(-1) = \frac{2}{3}$

vi) $28 + \frac{2}{3}(12) = 36$

The new row 5 (0 0 $-\frac{2}{3}$ 6 $\frac{20}{3}$ $-\frac{2}{3}$ 36)

To make a_{62} 0, we have row 6 $-\frac{1}{3}$ × r...

i) $-1 - \frac{1}{3} \times (-3) = 0$

ii) $7 - \frac{1}{3}(5) = \frac{22}{3}$

iii) $-10 - \frac{1}{3}(0) = 10$

iv) $-15 - \frac{1}{3}(-5) = -\frac{40}{3}$

v) $2 - \frac{1}{3}(-1) - \frac{7}{3}$

vi) $-43 - \frac{1}{3}(12) - 47$

The new row 6 = (0, 0, $\frac{22}{3}$ - 10 $\frac{40}{3}$ $\frac{7}{3}$: -47)

Thus the new set of Augmented matrix

1	1	-2	1	3	-1	4
0	-3	5	0	-5	-1	12
0	0	7/3	-2	-17/3	4/3	-11
0	0	4	-6	-8	7	-35
0	0	-2/3	6	20/3	-2/3	36
0	0	22	-10	-40/3	7/3	-47

To make a_{43} 0, we have row 4 $\left(\frac{4}{7/3}\right)$ × row 3 row 4 $\frac{12}{7}$

i) $4 - \frac{12}{7}\left(\frac{7}{3}\right) = 0$

ii) $-6 - \left(\frac{12}{7}\right)(-2) = -\frac{18}{7}$

iii) $-8 - \left(\frac{12}{7}\right)\left(\frac{3}{3}\right) = -\frac{4}{7}$

iv) $7 - \left(\frac{12}{7}\right)\left(\frac{4}{3}\right) = \frac{33}{7}$