

ORIMWENSE OSASUYI ERNEST.

16/ENGG06/061

MECHANICAL ENGINEERING

300 LEVEL

ASSIGNMENT 3

Soln

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

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

$$T_1 + 8T_2 - 3T_3 - T_4 + 0T_5 + T_6 = -15$$

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

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

$$4T_1 + 8T_2 + T_3 - 6T_4 - 3T_5 - 2T_6 = -27$$

$$A^{(1)} = \left[\begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 2 & -1 & 1 & 2 & 1 & -3 & 20 \\ 1 & 3 & -3 & -1 & 2 & 1 & -15 \\ 5 & 2 & -1 & -1 & 2 & 1 & -3 \\ -3 & -1 & 2 & 3 & 1 & 3 & 16 \\ 4 & 3 & 1 & -6 & -3 & -2 & 27 \end{array} \right]$$

$$\tilde{A}^{(2)} = \left[\begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ \xrightarrow{E_2 - E_1} & 0 & -1.5 & 2.5 & 0 & -2.5 & -0.5 & 8 \\ \xrightarrow{E_3 - E_1} & 0 & 2 & -1 & -2 & -1 & 2 & -19 \\ \xrightarrow{E_4 - E_1} & 0 & -0.6 & 1.8 & -1.2 & -2.6 & 1.2 & -4.6 \\ \xrightarrow{E_5 - E_1} & 0 & -0.667 & 1.33 & -2 & -3.33 & 0 & -9.33 \\ \xrightarrow{E_6 - E_1} & 0 & -0.25 & 2.25 & -2.5 & -3.75 & 0.5 & -10.75 \end{array} \right]$$

Divide through E_3 by 2 and Swap (Pivot) with E_2

$$\tilde{A}^{(2)} = \left[\begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\ 0 & -1.5 & 2.5 & 0 & -2.5 & -0.5 & 8 \\ 0 & -0.6 & 1.8 & -1.2 & -2.6 & 1.2 & -4.6 \\ 0 & -0.667 & 1.33 & -2 & -3.3 & 0 & -9.3 \\ 0 & -0.25 & 2.25 & -2.5 & -3.75 & 0.5 & -10.75 \end{array} \right]$$

$$\begin{array}{l}
 \text{R}(A) \\
 \text{E}_1 \div 2.5 \\
 \text{E}_2 \div 2.5 \\
 \text{E}_3 \div 2.5
 \end{array}
 \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1.167 & -1 & -2.167 & 0.67 & -5.5 \\
 0 & 0 & 2.5 & -3 & -4.93 & 3 & -19.167 \\
 0 & 0 & 1.497 & -3.47 & -5.497 & 1 & -25.493 \\
 0 & 0 & 8.5 & -11 & -15.5 & 3 & -52.5
 \end{array} \right]$$

Divide through E_3 by 2.5 and Swap E_2 & E_3

$$\begin{array}{l}
 \text{R}(A) \\
 A
 \end{array}
 \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1 & -1.2 & -1.93 & 1.2 & -6.867 \\
 0 & 0 & 1.167 & -1 & -2.167 & 0.667 & -5.5 \\
 0 & 0 & 1.497 & -3.47 & -5.497 & 1 & -25.493 \\
 0 & 0 & 8.5 & -11 & -15.5 & 3 & -52.5
 \end{array} \right]$$

$$A : \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1 & -1.2 & -1.933 & 1.2 & -6.867 \\
 0 & 0 & 0 & 0.345 & 0.076 & -0.628 & 2.154 \\
 0 & 0 & 0 & -1.465 & -1.734 & -5.33 & -8.805 \\
 0 & 0 & 0 & -0.094 & 0.109 & -0.847 & 0.691
 \end{array} \right]$$

Divide through E_4 by 0.345

$$\begin{array}{l}
 \text{R}(A) \\
 A
 \end{array}
 \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1 & -1.2 & -1.93 & 1.2 & -6.867 \\
 0 & 0 & 0 & 1 & 0.22 & -1.831 & 6.280 \\
 0 & 0 & 0 & 0 & 0.957 & 2.194 & -0.282 \\
 0 & 0 & 0 & 0 & -1.882 & 10.842 & -13.681
 \end{array} \right]$$

Divide through E_5 by 0.957

$$\begin{array}{l}
 \text{R}(A) \\
 A
 \end{array}
 \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1 & -1.2 & -1.933 & 1.2 & -6.867 \\
 0 & 0 & 0 & 1 & 0.222 & -1.83 & 6.280 \\
 0 & 0 & 0 & 0 & 1 & 2.28 & -0.294 \\
 0 & 0 & 0 & 0 & 0 & -10.133 & 10.157
 \end{array} \right]$$