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Mathematical Engineering

$$\bar{x}_1 + \bar{x}_2 - 2\bar{x}_3 + \bar{x}_4 + 3\bar{x}_5 - \bar{x}_6 = 4$$

$$2\bar{x}_1 - \bar{x}_2 + \bar{x}_3 + 2\bar{x}_4 + \bar{x}_5 - 3\bar{x}_6 = 20$$

$$\bar{x}_1 + 3\bar{x}_2 - 3\bar{x}_3 - \bar{x}_4 + 2\bar{x}_5 + \bar{x}_6 = -15$$

$$5\bar{x}_1 + 2\bar{x}_2 - \bar{x}_3 - \bar{x}_4 + 2\bar{x}_5 + \bar{x}_6 = -3$$

$$-3\bar{x}_1 - \bar{x}_2 + 2\bar{x}_3 + 3\bar{x}_4 + \bar{x}_5 + 3\bar{x}_6 = 16$$

$$4\bar{x}_1 + 3\bar{x}_2 + \bar{x}_3 - 6\bar{x}_4 - 3\bar{x}_5 - 2\bar{x}_6 = -27$$

$$A^{(0)} = \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 2 & -1 & 1 & 2 & 1 & -3 & 20 \\ 1 & 3 & -3 & -1 & 2 & 1 & -15 \\ 5 & 2 & -1 & -1 & 2 & 1 & -3 \\ -3 & -1 & 2 & 3 & 1 & 3 & 16 \\ 4 & 3 & 1 & -6 & -3 & -2 & -27 \end{bmatrix}$$

$$A^{(1)} = \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ E_2 - E_1 & 0 & -15 & 15 & 0 & -25 & -05 & 6 \\ E_3 - E_1 \Rightarrow & 0 & 2 & -1 & -1 & -1 & 2 & -19 \\ E_4 - E_1 \Rightarrow & 0 & -0.6 & 1.8 & -1.2 & -2.6 & 1.2 & -4.8 \\ E_5 - E_1 \Rightarrow & 0 & -0.67 & 1.33 & 2 & -3.3 & 0 & -9.3 \\ E_6 - E_1 \Rightarrow & 0 & -0.25 & 2.25 & -2.5 & -3.75 & 0.5 & -10.25 \end{bmatrix}$$

Divide through E_3 by 2 and swap (pivot) with E_2

$$A^{(2)} = \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.25 \\ 0 & -1.5 & 2.5 & 0 & -1.5 & -0.5 & 6 \\ 0 & -0.6 & 1.8 & -1.2 & -2.6 & 1.2 & -4.8 \\ 0 & -0.67 & 1.33 & 2 & -3.3 & 0 & -9.3 \\ 0 & -0.25 & 2.25 & -2.5 & -3.75 & 0.5 & -10.25 \end{bmatrix}$$

$$\begin{array}{l}
 \tilde{A}^{(5)} \\
 E_2 \leftrightarrow E_3 \\
 E_4 \leftrightarrow E_2 \\
 \times 0.5 \\
 \times 0.5
 \end{array}
 \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1.167 & -1 & -2.167 & 0.667 & -5.5 \\
 0 & 0 & 2.5 & 3 & -4.01 & 3 & -17.167 \\
 0 & 0 & 1.499 & -3.99 & -5.497 & 1 & -23.493 \\
 0 & 0 & 8.5 & -11 & -15.5 & 3 & -52.5
 \end{array} \right]$$

Divide through Eq by 2.5 and swap with E3

$$\tilde{A}^{(6)} \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1 & -1.2 & -1.93 & 1.2 & -6.867 \\
 0 & 0 & 1.167 & -1 & -2.167 & 0.667 & -5.5 \\
 0 & 0 & 1.499 & -3.99 & -5.497 & 1 & -23.493 \\
 0 & 0 & 8.5 & -11 & -15.5 & 3 & -52.5
 \end{array} \right]$$

$$A = \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1 & -1.2 & -1.933 & 1.2 & -6.867 \\
 0 & 0 & 0 & 0.343 & 0.076 & -0.041 & 2.159 \\
 0 & 0 & 0 & -1.463 & -1.734 & -5.35 & -8805 \\
 0 & 0 & 0 & -0.094 & 0.109 & -0.847 & 0.691
 \end{array} \right]$$

Divide through Eq by 0.343

$$\tilde{A}^{(7)} = \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1 & -1.2 & -1.93 & 1.2 & -6.867 \\
 0 & 0 & 0 & 1 & 0.22 & -1.831 & 6.280 \\
 0 & 0 & 0 & 0 & 0.454 & 2.194 & -0.202 \\
 0 & 0 & 0 & 0 & -1.382 & 10.842 & -18.681
 \end{array} \right]$$

Divide through 10 by 0.454

$$= \left[\begin{array}{cccccc|c}
 1 & 1 & -2 & 1 & 3 & -1 & 4 \\
 0 & 1 & -0.5 & -1 & -0.5 & 1 & -9.5 \\
 0 & 0 & 1 & -1.2 & -1.933 & 1.2 & -6.867 \\
 0 & 0 & 0 & 1 & 0.222 & -1.83 & 6.280 \\
 0 & 0 & 0 & 0 & 1 & 2.28 & -0.204 \\
 0 & 0 & 0 & 0 & 6 & -10.133 & 10.157
 \end{array} \right]$$