1.53(c)

1 1.53(c), §1 Asked

Asked: Solve:

$$\left(\begin{array}{ccc|c} 1 & 2 & 3 & 3 \\ 2 & 3 & 8 & 4 \\ 5 & 8 & 19 & 11 \end{array}\right) \qquad \begin{array}{l}(1)\\(2)\\(3)\end{array}$$

2 1.53(c), §2 Elimination

$$\left(\begin{array}{ccc|c} 1 & 2 & 3 & 3 \\ 2 & 3 & 8 & 4 \\ 5 & 8 & 19 & 11 \end{array}\right) \qquad \begin{array}{l}(1)\\(2)\\(3)\end{array}$$

Forward elimination:

$$\left(\begin{array}{ccc|c} 1 & 2 & 3 & 3 \\ 0 & -1 & 2 & -2 \\ 0 & -2 & 4 & -4 \end{array}\right) \qquad \begin{array}{l}(1)\\(2') = (2) - 2(1)\\(3') = (3) - 5(1)\end{array}$$

$$\left(\begin{array}{ccc|c} 1 & 2 & 3 & 3 \\ 0 & -1 & 2 & -2 \\ 0 & 0 & 0 & 0 \end{array}\right) \qquad \begin{array}{l}(1)\\(2')\\(3'') = (3') - 2(2')\end{array}$$

Echelon form. *You must bring it completely to this form.*

3 1.53(c), §3 Solution

$$\left(\begin{array}{ccc|c} 1 & 2 & 3 & 3 \\ 0 & -1 & 2 & -2 \\ 0 & 0 & 0 & 0 \end{array}\right) \qquad \begin{array}{l}(1)\\(2')\\(3'') = (3') - 4(2')\end{array}$$

Back substitution: From $(3'')$ nothing, then from $(2')$, $y = 2 + 2z$, this in (1) to give $x = 3 - 2(2 + 2z) - 3z = -1 - 7z$.

4 1.53(c), §4 Determinant

$$\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 8 \\ 5 & 8 & 19 \end{vmatrix} = 1\,3\,19 + 2\,8\,5 + 3\,2\,8 - 1\,8\,8 - 2\,2\,19 - 3\,3\,5 = 0$$