

Represent the given information in the table and simplify:

$$\left[\begin{array}{ccc|c} 3 & 1 & 1 & 2 \\ 2 & 1 & 0 & 1 \\ 0 & 1 & 2 & 2 \end{array} \right] \quad (1)$$

$$= \left[\begin{array}{ccc|c} 3 & 1 & 1 & 2 \\ 0 & \frac{1}{3} & -\frac{2}{3} & -\frac{1}{3} \\ 0 & 1 & 2 & 2 \end{array} \right] \quad L_2 - \frac{2}{3}L_1 \quad (2)$$

$$= \left[\begin{array}{ccc|c} 2 & 1 & 0 & 1 \\ 0 & \frac{1}{3} & -\frac{2}{3} & -\frac{1}{3} \\ 0 & 0 & 4 & 3 \end{array} \right] \quad L_3 - 3L_1, L_1 \rightarrow (1)L_2 \quad (3)$$

₁ From L_1 , $2a_1 + a_2 = 1$.

₂ From L_2 , $a_2 - 2a_3 = -1$.

₃ From L_3 , $a_3 = 1.5$.

₄ Hence, $a_1 = \frac{1}{4}, a_2 = \frac{1}{2}, a_3 = \frac{3}{4}$.

₅ Take $a_1 = \frac{1}{4}, a_2 = \frac{2}{4} = \frac{1}{2}, a_3 = \frac{3}{4}$.

$$a_1 \begin{pmatrix} 3 \\ 2 \\ 0 \end{pmatrix} + a_2 \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} + a_3 \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix} = \begin{pmatrix} \frac{3+2+3}{4} \\ \frac{2+2+0}{4} \\ \frac{0+2+6}{4} \end{pmatrix} \quad (4)$$

$$= \begin{pmatrix} 2 \\ 1 \\ 2 \end{pmatrix} \quad (5)$$