

3. Find the general solution of the following system of linear equations:

$$\begin{aligned}x_1 + 2x_2 &= 3 \\x_1 + 3x_2 &= 2 \\3x_1 + 8x_2 &= 7.\end{aligned}$$

$$\left[\begin{array}{cc|c} 1 & 2 & 3 \\ 1 & 3 & 2 \\ 3 & 8 & 7 \end{array} \right]$$

$$\begin{aligned}R_2 &\rightarrow R_2 - R_1 \\ R_3 &\rightarrow R_3 - 3R_1\end{aligned}$$

$$\left[\begin{array}{cc|c} 1 & 2 & 3 \\ 0 & 1 & -1 \\ 0 & 2 & -2 \end{array} \right]$$

$$\begin{aligned}R_3 &\rightarrow R_3 - 2R_2 \\ R_1 &\rightarrow R_1 - R_2\end{aligned}$$

$$\left[\begin{array}{cc|c} 1 & 0 & 5 \\ 0 & 1 & -1 \\ 0 & 0 & 0 \end{array} \right]$$

so $x_1 = 5$ $x_2 = -1$

4. Express $v = \begin{bmatrix} 3 \\ 2 \\ 7 \end{bmatrix}$ as a linear combination of $v_1 = \begin{bmatrix} 1 \\ 1 \\ 3 \end{bmatrix}$ and $v_2 = \begin{bmatrix} 2 \\ 3 \\ 8 \end{bmatrix}$, if possible.

$$v = 5v_1 - v_2$$

see # 3