3)
$$\begin{pmatrix} 1 & 3 & 5 & -4 & 0 & 1 \\ 1 & 3 & 2 & -2 & 1 & 0 \\ 1 & -2 & 1 & -1 & -1 & 3 \\ 1 & -4 & 1 & 1 & -1 & 3 \\ 1 & 2 & 1 & -1 & 1 & -1 \end{pmatrix}$$

$$\to \begin{pmatrix} 1 & 3 & 5 & -4 & 0 & 1 \\ 0 & -1 & -4 & 3 & 1 & -2 \\ 0 & -5 & -4 & 3 & -1 & 2 \\ 0 & -7 & -4 & 5 & -1 & 2 \\ 0 & 0 & -3 & 2 & 1 & -2 \end{pmatrix}$$

$$\to \begin{pmatrix} 1 & 3 & 5 & -4 & 0 & 1 \\ 0 & -1 & -4 & 3 & 1 & -2 \\ 0 & 0 & -3 & 2 & 1 & -2 \\ 0 & 0 & 24 & -16 & -8 & 16 \\ 0 & 0 & 16 & -12 & -6 & 12 \end{pmatrix}$$

$$\to \begin{pmatrix} 1 & 3 & 5 & -4 & 0 & 1 \\ 0 & -1 & -4 & 3 & 1 & -2 \\ 0 & 0 & -3 & 2 & 1 & -2 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{4}{3} & -\frac{2}{3} & \frac{4}{3} \end{pmatrix}$$

$$\begin{cases} -\frac{4}{3}x_4 - \frac{2}{3}x_5 = \frac{4}{3} \Rightarrow x_4 = -1 - \frac{1}{2}x_5 \\ -3x_3 + 2x_4 + x_5 = -2 \\ -x_2 - 4x_3 + 3x_4 + x_5 = -2 \\ x_1 + 3x_2 + 5x_3 - 4x_4 = 1 \end{cases} \Rightarrow \begin{cases} x_1 = -\frac{1}{2}x_5 \\ x_2 = -1 - \frac{1}{2}x_5 \\ x_3 = 0 \end{cases}$$

4)
$$\begin{pmatrix} 2 & -3 & 3 & -2 & 0 \\ 3 & 4 & -5 & 7 & 0 \\ 4 & 11 & -13 & 16 & 0 \\ 7 & -2 & 1 & 3 & 0 \end{pmatrix} \quad \frac{1}{2}-\frac{4}{2},\ -\frac{1}{2},\ \frac{14}{2}+\frac{6}{2}$$

$$\to \begin{pmatrix} 2 & -3 & 3 & -2 & 0 \\ 0 & \frac{17}{2} & -\frac{19}{2} & 10 & 0 \\ 0 & 17 & -19 & 20 & 0 \\ 0 & \frac{17}{2} & -\frac{19}{2} & 10 & 0 \end{pmatrix}$$

$$\to \begin{pmatrix} 2 & -3 & 3 & -2 & 0 \\ 0 & \frac{17}{2} & -\frac{19}{2} & 10 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{cases} 2x_1 - 3x_2 + 3x_3 - 2x_4 = 0 \\ \frac{17}{2}x_2 - \frac{19}{2}x_3 + 10x_4 = 0 \end{cases}$$

$$\Rightarrow \begin{cases} x_1 = \frac{1}{17}(3x_3 - 13x_4) \\ x_2 = \frac{1}{17}(19x_3 - 20x_4) \end{cases}$$

6)
$$\begin{pmatrix} 1 & 2 & 3 & -1 & 1 \\ 3 & 2 & 1 & -1 & 1 \\ 2 & 3 & 1 & 1 & 1 \\ 2 & 2 & 2 & -1 & 1 \\ 5 & 5 & 2 & 0 & 2 \end{pmatrix}$$

$$\to \begin{pmatrix} 1 & 2 & 3 & -1 & 1 \\ 0 & -1 & -5 & 3 & -1 \\ 0 & -4 & -8 & 2 & -2 \\ 0 & -2 & -4 & 1 & -1 \\ 0 & -5 & -13 & 5 & -3 \end{pmatrix} \quad -4\ -8\ 2\ -2$$

$$\to \begin{pmatrix} 1 & 2 & 3 & -1 & 1 \\ 0 & -1 & -5 & 3 & -1 \\ 0 & 0 & 12 & -10 & 2 \\ 0 & 0 & 6 & -5 & 1 \\ 0 & 0 & 12 & -10 & 2 \end{pmatrix}$$

$$\to \begin{pmatrix} 1 & 2 & 3 & -1 & 1 \\ 0 & -1 & -5 & 3 & -1 \\ 0 & 0 & 6 & -5 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{cases} x_1 + 2x_2 + 3x_3 - x_4 = 1 \\ -x_2 - 5x_3 + 3x_4 = -1 \\ 6x_3 - 5x_4 = 1 \end{cases}$$

$$\Rightarrow \begin{cases} x_1 = \frac{1}{6}(5x_4 + 1) \\ x_2 = \frac{1}{6}(1 - 7x_4) \\ x_3 = \frac{1}{6}(5x_4 + 1) \end{cases}$$