

1. Find

$$\begin{pmatrix} 1 & 1 & 2 \\ 0 & 1 & 2 \\ 1 & 0 & 1 \end{pmatrix}^{-1} \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}.$$

$$\text{Solution: } \begin{pmatrix} 1 & -1 & 0 \\ 2 & -1 & -2 \\ -1 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \\ 0 \end{pmatrix}$$

2. Find the value of k for which the system

$$\begin{aligned} x + y + 4z &= -1 \\ x + 2y - 2z &= -3 \\ 5x + 11y + kz &= -15 \end{aligned}$$

has no solution.

Solution: The augmented matrix of the system after Gauss elimination is

$$\begin{pmatrix} 1 & 1 & 4 & -1 \\ 0 & 1 & -6 & -2 \\ 0 & 0 & k+16 & 2 \end{pmatrix}.$$

The system has no solution if $k + 16 = 0$ that is $k = -16$.