Find an equation for the parabola in the form $y = x^2 + ax + b$ that contains the points $(-1, 11)$ and $(3, 7)$.

- The points $(-1, 11)$ and $(3, 7)$ must satisfy the equation $y = x^2 + ax + b$.

- Substituting these points into the equation, we obtain

$$11 = 1 - a + b \quad , \quad -a + b = 10 \quad \text{and}$$

$$7 = 9 + 3a + b \quad , \quad 3a + b = -2$$

- We now solve the system $\begin{aligned} -a + b &= 10 \\ 3a + b &= -2 \end{aligned}$ for a and b .

- Now $\begin{aligned} -a + b &= 10 \\ 3a + b &= -2 \end{aligned} \Rightarrow \begin{aligned} a - b &= -10 \\ 3a + b &= -2 \end{aligned} \Rightarrow 4a = -12 \quad , \quad a = -3 \quad , \quad b = 7$

- The equation of the parabola is $y = x^2 - 3x + 7$.

Reduce the following system to echelon form and find the solution set.

$$\begin{aligned} x+3y+z&=12 \\ -x+4y-z&=9 \\ 2x+3y+z&=10 \end{aligned}$$

- The matrix corresponding to this system of equations is $\begin{bmatrix} 1 & 3 & 1 & 12 \\ -1 & 4 & -1 & 9 \\ 2 & 3 & 1 & 10 \end{bmatrix}$
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- Using backward substitution $z=5$, $y=3$, $x+3y+z=12$, $x+3(3)+5=12$, and $x=-2$.