

## Exercise 12

Solve the systems in Exercises 11–14.

$$\begin{aligned}x_1 - 3x_2 + 4x_3 &= -4 \\3x_1 - 7x_2 + 7x_3 &= -8 \\-4x_1 + 6x_2 - x_3 &= 7\end{aligned}$$

---

### Solution

Write the augmented matrix corresponding to this system of equations.

$$\left[ \begin{array}{ccc|c} 1 & -3 & 4 & -4 \\ 3 & -7 & 7 & -8 \\ -4 & 6 & -1 & 7 \end{array} \right]$$

To make the middle-left entry 0, multiply the first row by  $-3$  and add it to the second row.

$$\left[ \begin{array}{ccc|c} 1 & -3 & 4 & -4 \\ 0 & 2 & -5 & 4 \\ -4 & 6 & -1 & 7 \end{array} \right]$$

To make the bottom-left entry 0, multiply the first row by 4 and add it to the third row.

$$\left[ \begin{array}{ccc|c} 1 & -3 & 4 & -4 \\ 0 & 2 & -5 & 4 \\ 0 & -6 & 15 & -9 \end{array} \right]$$

Multiply the second row by 3 and add it to the third row.

$$\left[ \begin{array}{ccc|c} 1 & -3 & 4 & -4 \\ 0 & 2 & -5 & 4 \\ 0 & 0 & 0 & 3 \end{array} \right]$$

The last row implies that  $0 = 3$ , which means there's no solution. In other words, no choice of  $x_1$ ,  $x_2$ , and  $x_3$  can satisfy  $0x_1 + 0x_2 + 0x_3 = 3$ .