

## Exercise 11

Solve the systems in Exercises 11–14.

$$\begin{aligned}x_2 + 4x_3 &= -5 \\x_1 + 3x_2 + 5x_3 &= -2 \\3x_1 + 7x_2 + 7x_3 &= 6\end{aligned}$$

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### Solution

Write the augmented matrix corresponding to this system of equations.

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

Switch the second row with the first row to make the top left entry 1.

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

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

$$\left[ \begin{array}{ccc|c} 1 & 3 & 5 & -2 \\ 0 & 1 & 4 & -5 \\ 0 & -2 & -8 & 12 \end{array} \right]$$

Multiply the second row by 2 and add it to the third row.

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

The last row implies that  $0 = 2$ , which means there's no solution. In other words, no choice of  $x_1$ ,  $x_2$ , and  $x_3$  can satisfy  $0x_1 + 0x_2 + 0x_3 = 2$ .