

Exercise 2

Solve each system in Exercises 1–4 by using elementary row operations on the equations or on the augmented matrix. Follow the systematic elimination procedure described in this section.

$$2x_1 + 4x_2 = -4$$

$$5x_1 + 7x_2 = 11$$

Solution

Write the implied augmented matrix of this system of equations.

$$\left[\begin{array}{cc|c} 2 & 4 & -4 \\ 5 & 7 & 11 \end{array} \right]$$

To make the top left entry 1, divide the first row by 2.

$$\left[\begin{array}{cc|c} 1 & 2 & -2 \\ 5 & 7 & 11 \end{array} \right]$$

To make the bottom left entry 0, multiply the first row by -5 and add it to the second row.

$$\left[\begin{array}{cc|c} 1 & 2 & -2 \\ 0 & -3 & 21 \end{array} \right]$$

Divide the second row by -3 .

$$\left[\begin{array}{cc|c} 1 & 2 & -2 \\ 0 & 1 & -7 \end{array} \right]$$

Now that the augmented matrix is in triangular form, write the corresponding system of equations.

$$x_1 + 2x_2 = -2$$

$$x_2 = -7$$

Since x_2 is known now, x_1 can be found.

$$x_1 + 2(-7) = -2 \quad \rightarrow \quad x_1 = 12$$

Therefore, $x_1 = 12$ and $x_2 = -7$.