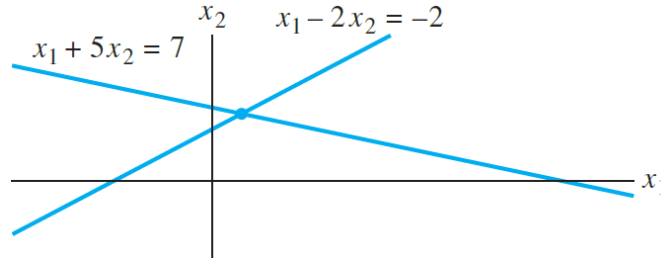


Exercise 3

Find the point (x_1, x_2) that lies on the line $x_1 + 5x_2 = 7$ and on the line $x_1 - 2x_2 = -2$. See the figure.



Solution

The system of equations to solve is

$$\begin{aligned}x_1 + 5x_2 &= 7 \\x_1 - 2x_2 &= -2.\end{aligned}$$

Write the implied augmented matrix of this system.

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

To make the bottom left entry 0, multiply the first row by -1 and add it to the second row.

$$\left[\begin{array}{cc|c} 1 & 5 & 7 \\ 0 & -7 & -9 \end{array} \right]$$

Divide the second row by -7 .

$$\left[\begin{array}{cc|c} 1 & 5 & 7 \\ 0 & 1 & \frac{9}{7} \end{array} \right]$$

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

$$\begin{aligned}x_1 + 5x_2 &= 7 \\x_2 &= \frac{9}{7}\end{aligned}$$

Since x_2 is known now, x_1 can be found.

$$x_1 + 5\left(\frac{9}{7}\right) = 7 \quad \rightarrow \quad x_1 = \frac{4}{7}$$

Therefore, $x_1 = 4/7$ and $x_2 = 9/7$.