

Sec. 7.4 Consistent and Inconsistent Systems

Solve $\begin{cases} y = 5 - x \\ y = 2x - 7 \end{cases}$

Substitution

$$\begin{array}{r} 5 - x = 2x - 7 \\ +x \quad +x \\ \hline 5 = 3x - 7 \\ +7 \quad +7 \\ \hline 12 = 3x \\ \frac{12}{3} = \frac{3x}{3} \end{array}$$

$$4 = x$$

$$m = -\frac{A}{B} = -\frac{-3}{-6} = \frac{1}{2}$$

$$y = 5 - 4$$

$$y = 1$$

$$(4, 1)$$

Solve

Substitution

$$m = \frac{-1}{-2} = \frac{1}{2}$$

$$\begin{array}{r} 3x - 6y = -12 \rightarrow 3(2y + 4) - 6y = -12 \\ 3x - 6y = -12 \\ \rightarrow x - 2y = 4 \\ +2y \quad +2y \\ \hline x = 2y + 4 \end{array}$$

$$6y + 12 - 6y = -12$$

$$0y + 12 = -12$$

$$12 = -12$$

False

no solution
(parallel lines)

$$\begin{array}{l}
 2x - y = -1 \rightarrow 2x - y = -1 \\
 \downarrow \\
 4x + 2y = 7 \\
 \hline
 4x + 2(2x + 1) = 7 \\
 4x + 4x + 2 = 7 \\
 8x + 2 = 7 \\
 \underline{-2 \quad -2} \\
 8x = 5 \\
 \frac{8x}{8} = \frac{5}{8} \\
 x = \frac{5}{8} \\
 \left(\frac{5}{8}, \frac{9}{4}\right) \text{ one solution}
 \end{array}$$

$$\begin{array}{l}
 2x - y = -1 \\
 \underline{-2x} \qquad \underline{-2x} \\
 \hline
 -y = -2x - 1 \\
 \underline{-1} \qquad \underline{-1} \\
 -y = -2x - 1 \\
 \rightarrow y = 2x + 1 \\
 y = \frac{5}{4} + 1 \\
 y = \frac{5}{4} + \frac{4}{4} \\
 y = \frac{9}{4}
 \end{array}$$

- (3, -2)
one solution * Consistent and independent
(is an answer) (different lines)
- 5 = 5
True
infinitely many solutions * Consistent and dependent
(is an answer) (same lines)
- 5 = 7
no solution
False * Inconsistent → (parallel lines)
(no answer)