

7.1 Solving Systems of 2 Equations

Obj: 1. Solve systems of equations graphically & algebraically.

Solve:

$$\begin{array}{r} 2x - y = 10 \\ 3x + 2y = 1 \end{array}$$

Method 1: Substitution

1. Solve one eq. for one variable

$$y = 2x - 10$$

2. Plug that into the other eq.

$$\begin{aligned} 3x + 2(2x - 10) &= 1 \\ 7x - 20 &= 1 \\ 7x &= 21 \\ x &= 3 \end{aligned}$$

$$\begin{aligned} y &= 2(3) - 10 \\ y &= -4 \\ (3, -4) \end{aligned}$$

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Method 2: Graphing

$$\begin{array}{r} 2x - y = 10 \\ 3x + 2y = 1 \end{array}$$

1. Solve both eqs. for y

$$y = 2x - 10$$

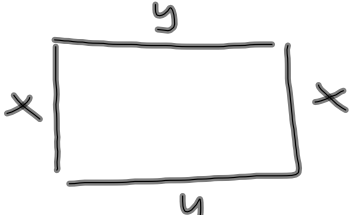
$$y = -\frac{3}{2}x + \frac{1}{2}$$

2 Graph & find intersection

$$(3, -4)$$

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Find the dimensions of a rectangular garden with perimeter 100ft and area 300 ft².



$2x + 2y = 100 - 2x$
 $xy = 300$

$y = 50 - x$

$x(50 - x) = 300$
 $50x - x^2 = 300$
 $0 = x^2 - 50x + 300$

$x = \frac{50 \pm \sqrt{(-50)^2 - 4(1)(300)}}{2}$
 $x \approx 6.97, 43.03$
 $y \approx 43.03, 6.97$

6.97 x 43.03 ft

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Solve: $x = y + 3$

$x - y^2 = 3y$

$y + 3 - y^2 = 3y$

$0 = y^2 + 2y - 3$

$0 = (y - 1)(y + 3)$

$y = 1, -3$

$x = 4, 0$

$(4, 1)$
 $(0, -3)$

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Solve: $y = x^3 - 6x$
 $y = 3x$

Graph:

$(3, 9)$ $(-3, -9)$
 $(0, 0)$

Substitution

$$x^3 - 6x = 3x$$

$$x^3 - 9x = 0$$

$$x(x^2 - 9) = 0$$

$$x(x+3)(x-3) = 0$$

$$x = 0 \quad x = -3 \quad x = 3$$

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Solve: $\left. \begin{array}{l} 3(2x + 3y = 5) \\ 2(-3x + 5y = 21) \end{array} \right\}$

Method 3: Elimination

$$\begin{array}{r} 6x + 9y = 15 \\ -6x + 10y = 42 \\ \hline 19y = 57 \\ y = 3 \end{array}$$

$$\begin{array}{r} 2x + 3(3) = 5 \\ 2x = -4 \\ x = -2 \end{array}$$

$$(-2, 3)$$

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Solve by elimination:

$$\begin{array}{l} 2x + y = 10 \\ -2(x - 2y = -5) \end{array}$$

$$\begin{array}{r} 2x + y = 10 \\ -2x + 4y = 10 \\ \hline 5y = 20 \\ y = 4 \end{array}$$

$$\begin{array}{l} 2x + 4 = 10 \\ 2x = 6 \\ x = 3 \\ (3, 4) \end{array}$$

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Solve: $\begin{array}{l} -2(x - 3y = -2) \\ 2x - 6y = 4 \end{array}$

$$\begin{array}{r} -2x + 6y = 4 \\ 2x - 6y = 4 \\ \hline 0 = 8 \end{array}$$

No Sol.

On graph: parallel lines \rightarrow don't intersect

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$$\text{Solve: } \begin{aligned} 3(4x - 5y) &= 2 \\ -12x + 15y &= -6 \end{aligned}$$

$$\begin{array}{r} \cancel{12x} - \cancel{15y} = \cancel{6} \\ \cancel{-12x} + \cancel{15y} = \cancel{-6} \\ \hline \end{array}$$

$$0 = 0 \quad \text{infinitely many sol.}$$

On graph: same line

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7.1 P575

1-9 odd, 14-18 even,

19-25 odd, 49, 52

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