

U3D1

Solving Linear Systems in 3-Variables

Aug 13-9:09 AM

Solve by elimination:

$$\begin{array}{rcl}
 1. & 2x + 3y = 7 & \\
 & -1(2x + y = 3) & \\
 \hline
 & & 2x + 3y = 7 \\
 & & -2x - y = -3 \\
 \hline
 & & 2y = 4 \\
 & & \frac{2y}{2} = \frac{4}{2} \\
 & & y = 2 \\
 & 2x + y = 3 & \\
 & 2x + 2 = 3 & \\
 & \quad \underline{-2} \quad \underline{-2} & \\
 & \frac{2x}{2} = \frac{1}{2} & \\
 & x = \frac{1}{2} & \\
 & & (\frac{1}{2}, 2)
 \end{array}$$

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2. $5x - 2y = 4$
 $2(-2x + y = 2)$

$$\begin{array}{r} 5x - 2y = 4 \\ -4x + 2y = 4 \\ \hline x = 8 \end{array}$$

$(8, 18)$

$$\begin{array}{r} 5x - 2y = 4 \\ 40 - 2y = 4 \\ -40 \quad -40 \\ \hline -2y = -36 \\ -2 \quad -2 \\ \hline y = 18 \end{array}$$

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3. A scientist wants to create 120 ml of a solution that is 30% acidic. To create this solution, she has access to a 20% solution and a 45% solution. How many millimeters of each solution should she combine to create the 30% solution?

Let x : 20% solution
 y : 45% solution

Total $x + y = 120$ $-2(x + y = 120)$
 Percent $.2x + .45y = 30(120)$ $.2x + .45y = 36$

$$\begin{array}{r} -.2x - .2y = -24 \\ .2x + .45y = 36 \\ \hline \end{array}$$

$$\begin{array}{r} .25y = 12 \\ .25 \quad .25 \\ \hline y = 48 \end{array}$$

$$\begin{array}{r} x + y = 120 \\ x + 48 = 120 \\ x = 72 \end{array}$$

72 ml of 20%
 and 48 ml of 45%
 solution.

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What if you want to solve for 3 variables?

Set up 3 equations w/
3 unknowns.

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How would you solve the following?

① $2x + 3y - z = 5$

② $4x - y - z = -1$

③ $x + 4y + z = 12$

① $2x + 3y - z = 5$ ② $4x - y - z = -1$
③ $x + 4y + z = 12$

④ $3x + 7y = 17$ ⑤ $5x + 3y = 11$

④ $5[3x + 7y = 17]$ $15x + 35y = 85$
⑤ $-3[5x + 3y = 11]$ $-15x - 9y = -33$

$3x + 14 = 17$
 $3x = 3$
 $x = 1$

$26y = 52$
 $26 \quad 26$
 $y = 2$

① $2(1) + 3(2) - z = 5$

$8 - z = 5$
 $-8 \quad -8$

$-z = -3$
 $z = 3$

$(1, 2, 3)$

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Solve:

① $x + 2y - z = 8$

② $y + z = 4$

③ $x - y - z = 2$

② $2 + z = 4$

$z = 2$

$(6, 2, 2)$

② $0x + y + z = 4$

③ $x - y - z = 2$

$x = 6$

① $x + 2y + z = 8$

② $0x + y + z = 4$

$x + 3y = 12$

$6 + 3y = 12$

$3y = 6$

$y = 2$

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$x - 2y - 2z$

$2z = 3y - 3x$

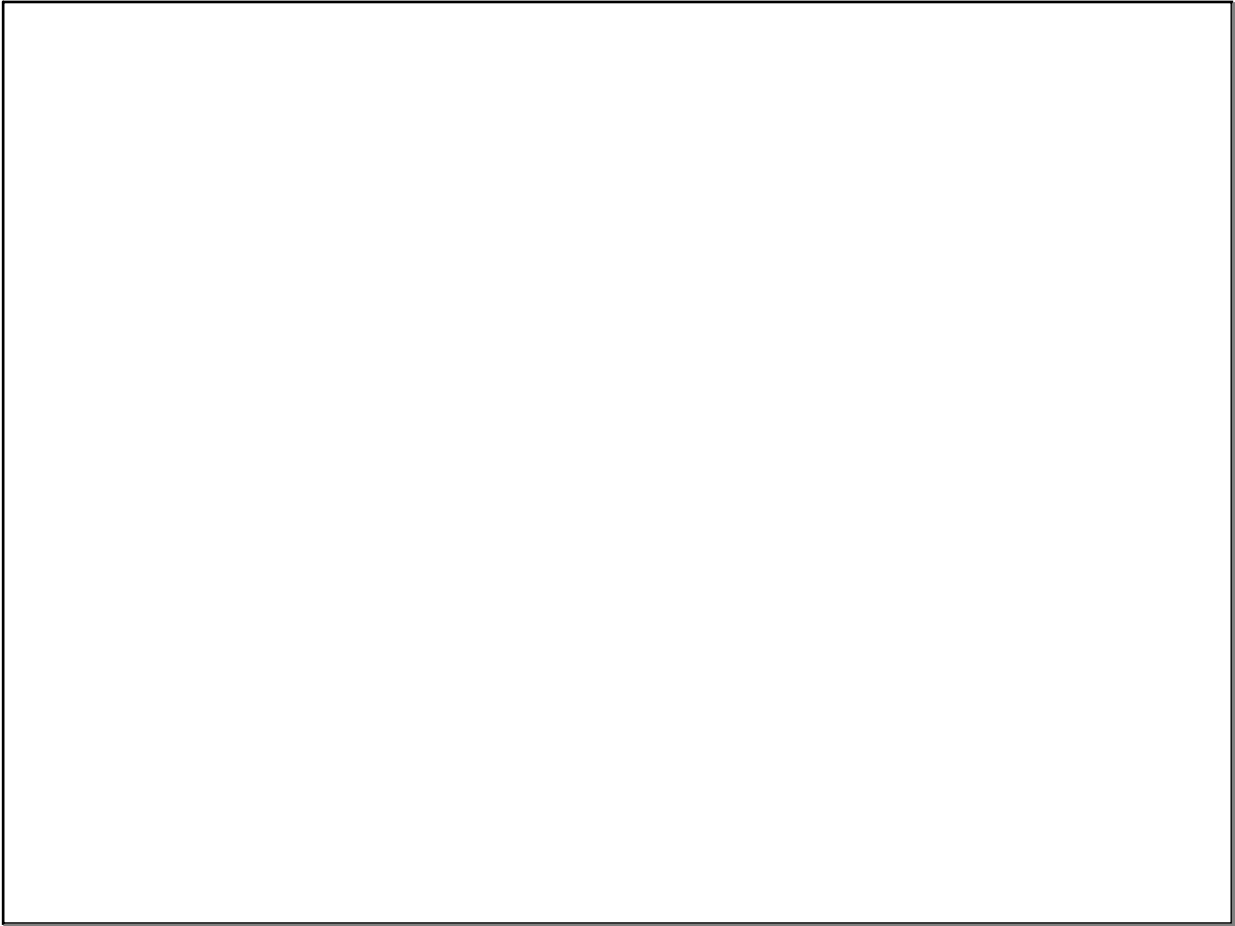
$x + z = 2y - 3$

$x - 2y + 2z = 0$

$3x - 3y + 2z = 0$

$x - 2y + z = -3$

Oct 12-7:24 AM



Oct 12-11:11 AM