Three-variable systems: eliminate, solve and check

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Worked example 1

Solve the system. Show elimination and check every original equation.

$$\begin{cases} (1)x + (1)y + (1)z = 9 \\ (1)x + (-1)y + (0)z = -1 \\ (0)x + (1)y + (-1)z = -1 \end{cases}$$

Guided attempt 2

Solve the system. Show elimination and check every original equation.

$$\begin{cases} (1)x + (1)y + (1)z = 6 \\ (1)x + (-1)y + (0)z = 0 \\ (0)x + (1)y + (-1)z = 0 \end{cases}$$

1. From $x - y = 0$, write $y = \square$.
2. From $y - z = 0$, write $z = y = \square$.
3. Substitute in the first equation: $x + x + x = 6$, so $x = \square$; recover y,z and check all three.

Prerequisite 3

Does $x = 1, y = 2, z = 3$ solve the displayed system? Check every equation.

$$\begin{cases} (1)x + (1)y + (1)z = 6 \\ (1)x + (-1)y + (0)z = -1 \\ (0)x + (1)y + (-1)z = -1 \end{cases}$$

A. Yes, every original equation holds.

B. No, checking one equation is enough to reject it.

Prerequisite 4

To reduce three equations in x,y,z to a two-variable system, what should the two derived equations have in common?

A. They both eliminate the same unknown and retain the same other two.

B. One eliminates x and the other only y, leaving three unknowns together.

C. Their right sides must both be zero.

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Independent practice 5

Solve the system. Show elimination and check every original equation.

$$\begin{cases} (1)x + (1)y + (1)z = 12 \\ (1)x + (-1)y + (0)z = 2 \\ (0)x + (1)y + (-1)z = -1 \end{cases}$$

Independent practice 6

Solve the system. Show elimination and check every original equation.

$$\begin{cases} (1)x + (1)y + (1)z = 10 \\ (2)x + (-1)y + (0)z = -1 \\ (0)x + (1)y + (-1)z = 2 \end{cases}$$

Independent practice 7

Solve the system. Show elimination and check every original equation.

$$\begin{cases} (1)x + (1)y + (0)z = 5 \\ (0)x + (1)y + (1)z = 7 \\ (1)x + (0)y + (1)z = 6 \end{cases}$$

Independent practice 8

Solve the system. Show elimination and check every original equation.

$$\begin{cases} (1)x + (1)y + (1)z = 3 \\ (1)x + (-1)y + (0)z = 1 \\ (0)x + (1)y + (-1)z = 1 \end{cases}$$

Exit question 9

Does $x = 2, y = 3, z = 4$ solve the displayed system? Check every equation.

$$\begin{cases} (1)x + (1)y + (1)z = 9 \\ (1)x + (-1)y + (0)z = -1 \\ (0)x + (1)y + (-1)z = -1 \end{cases}$$

A. Yes, every original equation holds.

B. No, checking one equation is enough to reject it.

Exit question 10

After elimination gives y=3 and z=4, the original first equation is x+y+z=9. What remains to finish the solution?

A. Find x=2, then check all three original equations.

B. Stop; two values are enough.

C. Choose any x without checking.