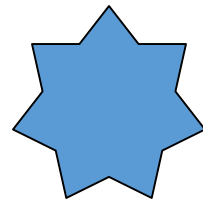




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Multivariable Linear Systems





Solve by using elimination.

$$x - 2y + 3z = 9$$

$$-x + 3y = -4$$

$$2x - 5y + 5z = 17$$

We want to eliminate one of the variables. Since z is already missing in eq. 2, let's eliminate z in eq. 1 and 3. Mult eq. 1 by 5 and eq. 3 by -3 .

$$5x - 10y + 15z = 45$$

$$-6x + 15y - 15z = -51$$

$$-x + 5y = -6$$

Now take eq. 2 and this new eq. and eliminate the x 's.

$$-x + 3y = -4$$

$$x - 5y = 6$$

$$-2y = 2 \quad \& \quad y = -1$$

By back-substituting,
 $x = 1$ and $z = 2$

$(1, -1, 2)$ ordered triple



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In a system of linear equations, there are 3 possible categories for the solutions to fall into. They are:

1. Exactly one solution
2. No solutions
3. Infinitely many solutions.



$$x + 2y - 7z = -4$$

$$2x + y + z = 13$$

$$3x + 9y - 36z = -33$$

$$-2x - 4y + 14z = 8$$

$$2x + y + z = 13$$

$$-3y + 15z = 21$$

M(-3) $-3x - 6y + 21z = 12$

$$3x + 9y - 36z = -33$$

$$3y - 15z = -21$$

What letter shall we try and eliminate first?

Ok, let's do the x's.

Mult. Eq. 1 by -2
and add it to eq. 2

Now do eq. 1 & 3

Adding these two equations yields:

$$0 = 0$$

So now that we have $0 = 0$, we know that there are infinitely many solutions.

Start by letting $z = a$

We will now substitute a in for z in one of the equations that has 2 variables in it.

Let's use $3y - 15z = -21$

$$3y - 15a = -21$$

Now solve for y .

$$3y = 15a - 21$$

$$y = 5a - 7$$

Now plug a and $5a - 7$ in for z and y in one of the three original equations.

$$x + 2(5a - 7) - 7a = -4$$

$$x = -3a + 10$$

$$x + 10a - 14 - 7a = -4$$

$(-3a + 10, 5a - 7, a)$ is our ans.



Find a quadratic function $f(x) = ax^2 + bx + c$ whose graph passed through the points $(-1,3)$, $(1,1)$, and $(2,6)$.

First, plug in the 3 points for x and y to obtain our three equations.

For $(-1,3)$ we get $a(-1)^2 + b(-1) + c = 3$

For $(1,1)$ we get $a(1)^2 + b(1) + c = 1$

and $(2,6)$ gets us $a(2)^2 + b(2) + c = 6$

This produces the following 3 equations for us to solve:

$$a - b + c = 3$$

$$a + b + c = 1 \text{ and}$$

$$4a + 2b + c = 6$$

Now, we solve for a, b, and c and plug them back into $f(x) = ax^2 + bx + c$ to get our parabola equation.