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Multivariable

Linear Systems

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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

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.

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$$x + 2y - 7z = -4$$
$$2x + y + z = 13$$
$$3x + 9y - 36z = -33$$

What letter shall we try and eliminate first?

Ok, let's do the x's.

$$-2x - 4y + 14z = 8$$
$$2x + y + z = 13$$

Mult. Eq. 1 by -2

and add it to eq. 2

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

Now do eq. 1 & 3

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

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

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

Adding these two equations yields:

$$0 = 0$$

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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.

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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:

$a - b + c = 3$

$a + b + c = 1$ 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.