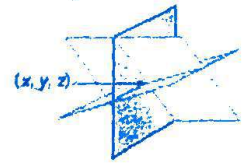
GLUE HERE

$$\begin{cases} -4x - y + 3z = -9 \\ 3x + 2y - z = 3 \\ x + 3y - 5z = 29 \end{cases}$$

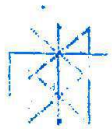
DON'T BE UPSET BY THE RESULTS YOU DION'T GET WITH THE WORK YOU DION'T DO!

Solving Systems of Equations with 3 Equations and 3 Variables

The solution to a system of three variables can have one solution, which is called an ordered triple (x, y, z), where three individual planes intersect at a s



It can also have...

Infinitely Many Solutions	No Solution
The planes intersect in a line or planes intersect on the same plane  Or 	There are no points in common with all three planes. 

Is the point (3, -2, -4) a solution to the system $\begin{cases} 2x + 4y - 5z = 18 \\ -3x + 5y + 2z = -27 \\ -5x + 3y - z = -17 \end{cases}$?

x y z

$2(3) + 4(-2) - 5(-4) = 18$ ✓

$-3(3) + 5(-2) + 2(-4) = -27$ ✓

$-5(3) + 3(-2) - (-4) = -17$ ✓

(3, -2, -4) is a solution

Example 1: Find the Solution to the system.

$3x - 2y + 4z = 35$
$-4x + y - 5z = -36$
$5x - 3y + 3z = 31$

1) Eliminate 1 variable by using 2 pairs of 2 equations.

$3x - 2y + 4z = 35$
$(-4x + y - 5z = -36)\ 2$
$-8x + 2y - 10z = -72$
$+\ 3x - 2y + 4z = 35$
$-5x - 6z = -37$

$(-4x + y - 5z = -36)\ 3$
$5x - 3y + 3z = 31$
$-12x + 3y - 15z = -108$
$+$
$-7x - 12z = -77$

make sure you eliminate the same variable

2) Solve the system of 2 equations you just created.

$(-5x - 6z = -37)\ -2$
$-7x - 12z = -77$
$+\ 10x + 12z = 74$
$3x = -3$
$x = -1$

$-5(-1) - 6z = -37$
$5 - 6z = -37$
$-5 \quad -5$
$-6z = -42$
$z = 7$

3) Substitute the values back into an original equation to find the 3rd value.

$-4x + y - 5z = -36$
$-4(-1) + y - 5(7) = -36$
$4 + y - 35 = -36$
$y - 31 = -36$
$+31 \quad +31$
$y = -5$

$(-1, -5, 7)$

$2x + 4y - 5z = 18$
$-3x + 5y + 2z = -27$
$-5x + 3y - z = -17$

$(3, -2, 4)$

$2x + 4y - 5z = 18$
$(-5x + 3y - z = -17)\ -5$
$25x - 15y + 5z = 85$
$+2x + 4y - 5z = 18$
$27x - 11y = 103$

$(-5x + 3y - z = -17)\ 2$
$-3x + 5y + 2z = -27$
$+\ -10x + 6y + 2z = -34$
$-13x + 11y = -61$

$27x - 11y = 103$
$+\ -13x + 11y = -61$
$14x = 42$
$x = 3$

$-13(3) + 11y = -61$
$-39 + 11y = -61$
$11y = -22$
$y = -2$

$2x + 4y - 5z = 18$
$2(3) + 4(-2) - 5z = 18$
$z = 4$

Special Systems

$5x + 4y - 5z = -10$
$-4x - 10y - 8z = -16$
$6x + 15y + 12z = 24$

$(5x + 4y - 5z = -10)\ 4$
$(-4x - 10y - 8z = -16)\ 5$
$20x + 16y - 20z = -40$
$+\ 20x - 50y - 40z = -80$
$-34y - 60z = -120$

$(-4x - 10y - 8z = -16)\ 6$
$(6x + 15y + 12z = 24)\ 4$
$-24x - 60y - 48z = -96$
$+\ 24x + 60y + 48z = 96$
$0 = 0$

TR

$-6a + 9b - 12c = 21$
$-2a + 3b - 4c = 7$
$10a - 15b + 20c = -30$

$-6a + 9b - 12c = 21$
$(-2a + 3b - 4c = 7)\ -3$
$+\ 6a - 9b + 12c = -21$
$0 = 0$