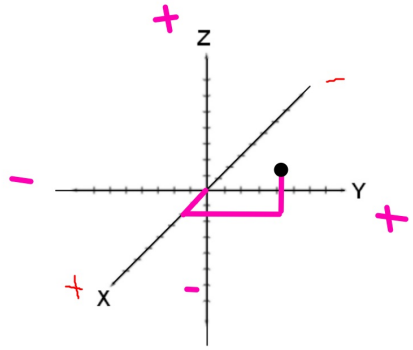
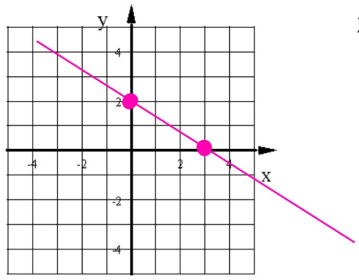
Section 3-6: System of Equations with Three Variables.

Ordered Triple: (x,y,z) ⟶ (2,5,3)

x-axis, y-axis, and z-axis defines SPACE (3-D)



What is does the graph of 4x + 6y = 12 look like?



x-int = $\frac{12}{4} = 3$

y-int = $\frac{12}{6} = 2$

The graph of an equation with three variables

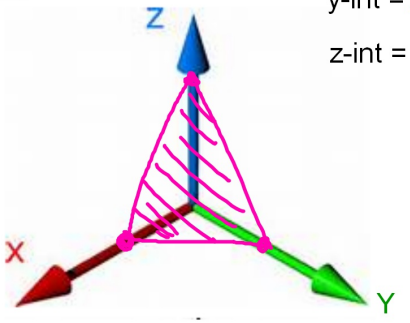
12x + 9y + 6z = 36

A plane in space

x-int = $\frac{36}{12} = 3$

y-int = $\frac{36}{9} = 4$

z-int = $\frac{36}{6} = 6$



A system of linear equations (2 variables) can have how many solutions?

y = 3x - 4

2x + 6y = 21

One Solution: Lines intersect at ONE point

No Solution: Lines are parallel

Many Solutions: Equations are the same line

A system of equations in three variables requires THREE EQUATIONS.

A system of equations in three variables can have how many solutions?

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

$6x - 7y + z = 34$

$-4x + 5y - z = -24$

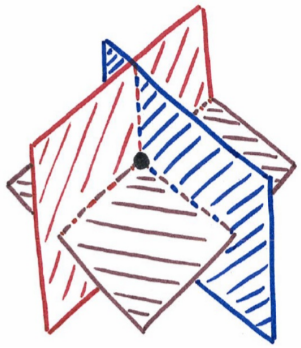
# of solutions possible:

One Solution

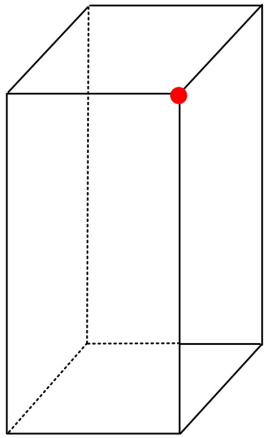
No Solution

Many Solutions

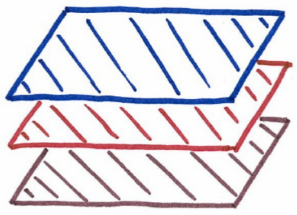
One Solution:



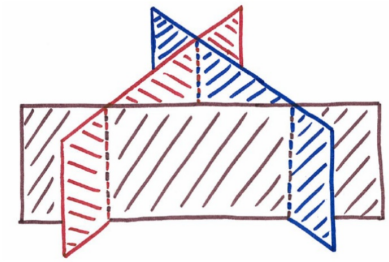
OR



No Solution:



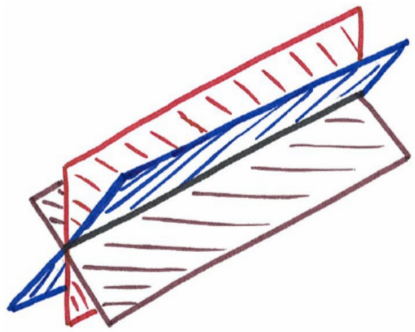
3 parallel planes



All 3 planes don't intersect at the same spot.

Many Solutions:

The 3 planes intersect to form a line:



Solve this system of equations in three variables:

$x + 3y + 7z = 43$

$4x - 3y + z = 19$

$x + 5y - 2z = 13$

Use matrices!

$(6, 3, 4)$

$A \begin{bmatrix} 1 & 3 & 7 \\ 4 & -3 & 1 \\ 1 & 5 & -2 \end{bmatrix}$ 3×3

$B \begin{bmatrix} 43 \\ 19 \\ 13 \end{bmatrix}$ 3×1

$[A]^{-1}[B]$