Solve the following system of equations:

Inconsistent System (planes do not intersect)

① $2x + y - 3z = -3$

② $x + 3y - 4z = 11$

③ $x + 8y - 9z = 5$

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

$(+)\ -2x-6y+8z=-22$

④ $-5y+5z=-25$

$x+3y-4z=11$

$(+)\ -x-8y+9z=-5$

⑤ $-5y+5z=6$

$-5y+5z=-25$

$(+)\ 5y-5z=-6$

$0=-31$

No Solution.

Consistent System Dependent Solution
(planes intersect along a line)

① $x + y + z = 3$

② $2x + y + 4z = 8$

③ $x + 2y - z = 1$

$$\begin{array}{rl} x+y+z=3 & 4x+2y+8z=16 \\ (-)\ 2x+y+4z=8 & (-)\ x+2y-z=1 \\ \hline \boxed{④\ -x-3z=-5} & \boxed{⑤\ 3x+9z=15} \end{array}$$

$$\begin{array}{rl} -3x-9z=-15 & \text{Infinite Solutions} \\ (+)\ 3x+9z=15 & \\ \hline 0=0 & \end{array}$$

$\boxed{z=t}$

$-x-3(t)=-5$

$-x=3t-5$

$x=-3t+5$

$\boxed{x=5-3t}$

$x+y+z=3$

$(5-3t)+y+(t)=3$

$5+y-2t=3$

$\boxed{y=2t-2}$

$\boxed{(5-3t,\ 2t-2,\ t)}$

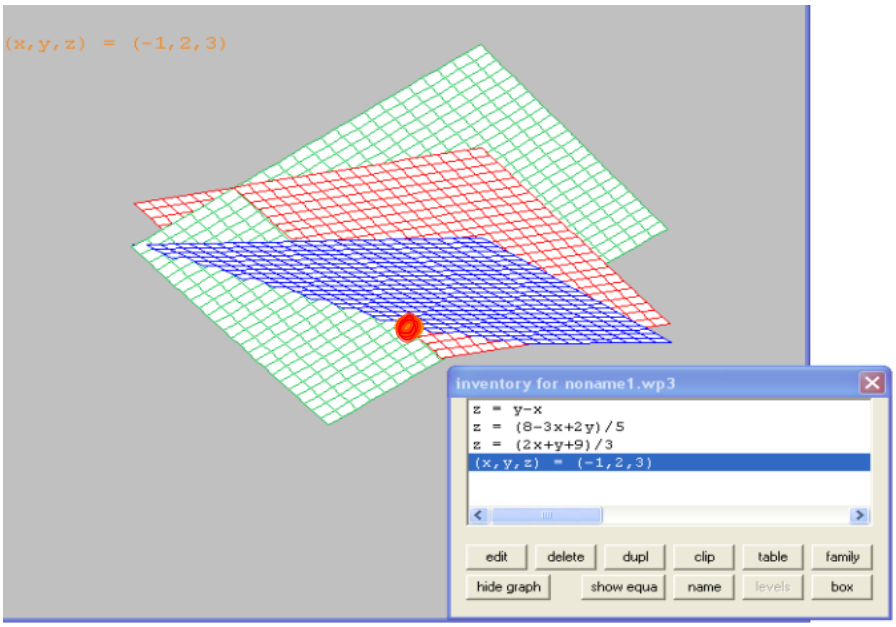
Write a general solution in terms of a parameter (i.e. z = t). For each value assigned to the parameter there will be one distinct solution.

Types of Systems

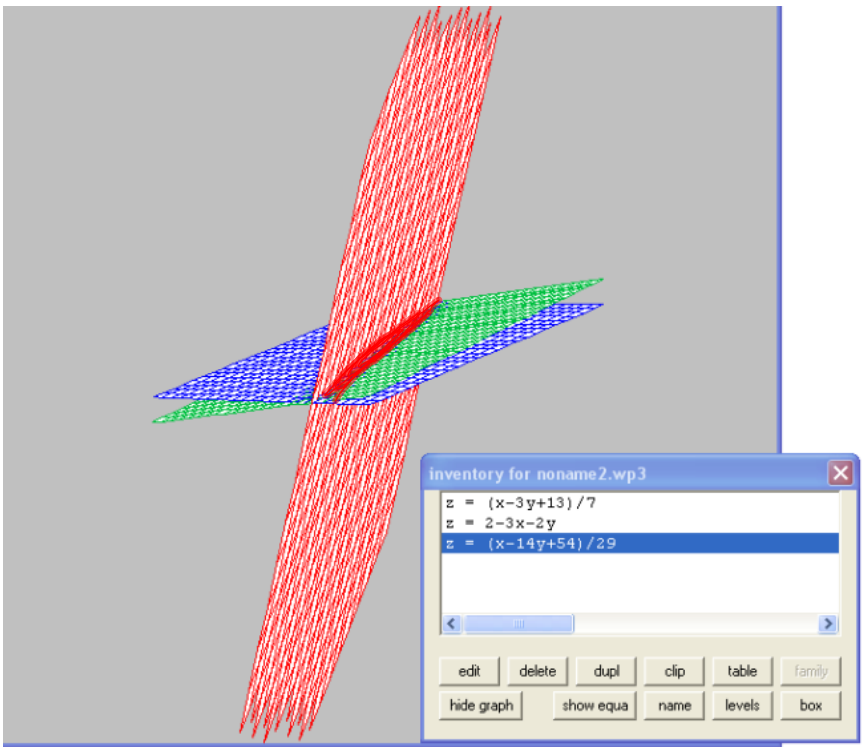
Remember: Looking at **intersecting planes**!

Consistent: At least one solution

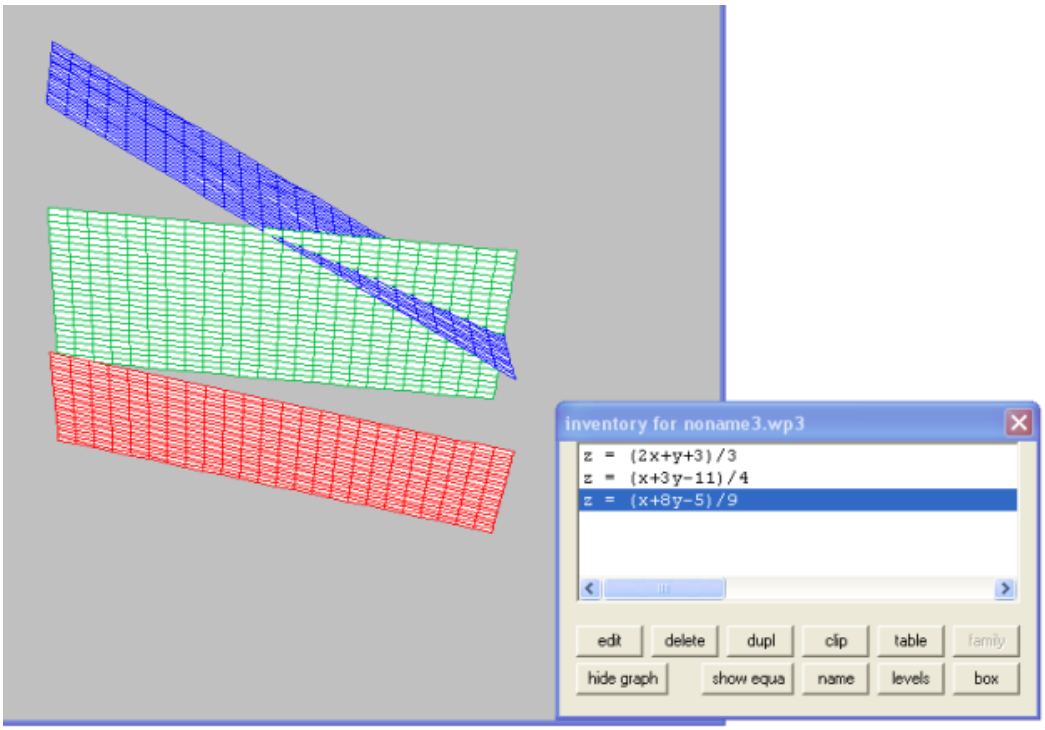
Independent: One Unique solution



Dependent: Infinite number of solutions

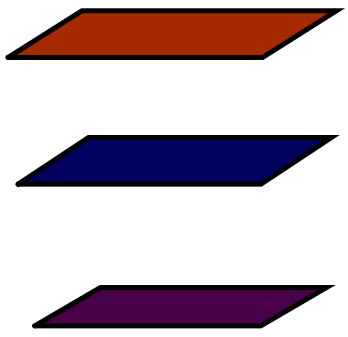


Inconsistent: No Solutions

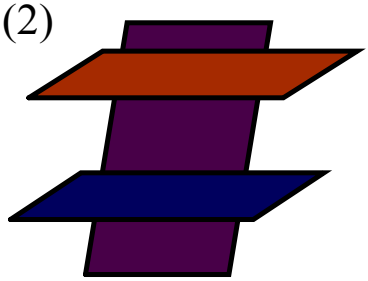


3 Possible Orientations That Give No Solution...

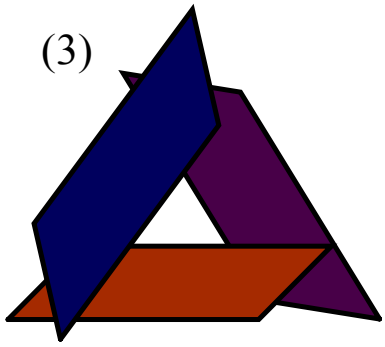
(1)



(2)



(3)



More Word Problems

A hockey stick, gloves, and a helmet cost $425. The stick costs twice as much as the gloves. The helmet costs $25 more than the gloves. Find the cost of each

Let x = ($) stick
Let y = ($) gloves
Let z = ($) helmet

$x = 2y$

$z = y + 25$

① $x + y + z = 425$

② $x - 2y = 0$

③ $-y + z = 25$

$x + y + z = 425$

↔ $x - 2y = 0$

④ $3y + z = 425$

$-y + z = 25$

↔ $3y + z = 425$

$-4y = -400$

$y = \$100$

$-(100) + z = 25$

$z = \$125$

$x + y + z = 425$

$x + (100) + (125) = 425$

$x = \$200$

∴ The stick costs $200
" gloves " $100
" helmet " $125

An ipod, a docking station, and an itunes subscription costs $825. The ipod costs $150 more than the docking station. The station costs 4 times the amount of the subscription. Find the cost of each.

Let x = ipod ($)
Let y = d.s. ($)
Let z = itunes ($)

① $x+y+z=825$
② $x-y=150$
③ $y-4z=0$
④ $2y+z=675$

$x+y+z=825$
$-(x-y=150)$

$2y-8z=0$
$-(2y+z=675)$
$-9z=-675$
$z=75$

$y-4(75)=0$
$y-300=0$
$y=300$

$x-(300)=150$
$x=450$

Homework