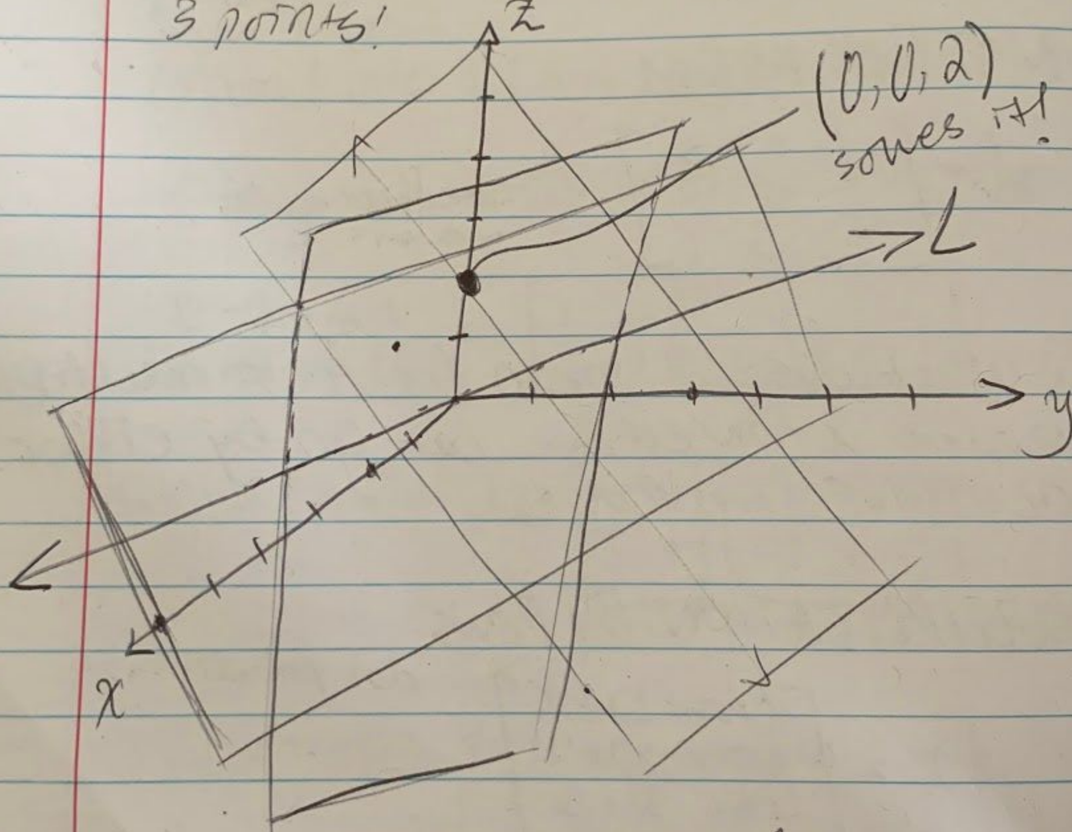
~~Ex.~~ $x+2y+3z=6$ — $(0,0,2)$, $(0,3,0)$, $(6,0,0)$

$2x+5y+2z=4$ — $(2,0,0)$, $(0,0,2)$, $(1,0,1)$

$6x-3y+z=2$ — $(0,0,2)$

(1) ROW PICTURE (3 PLANES INTERSECT @ POINT):

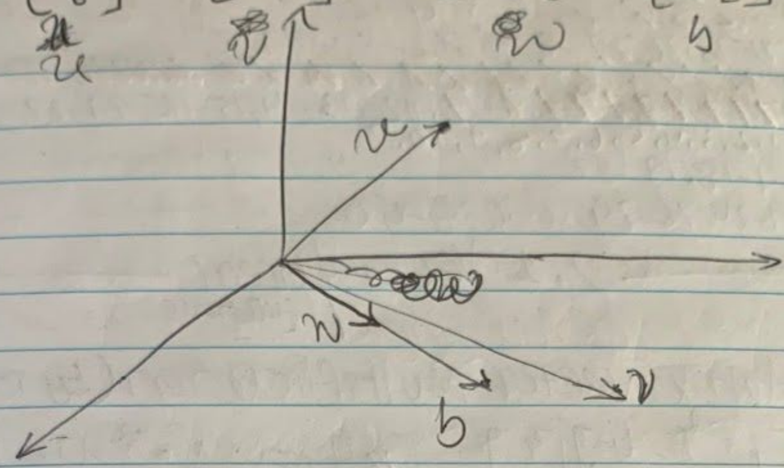
∴ 3 points define a PLANE, so let's take 3 points!



(2) COLUMN PICTURE (LINEAR COMBINATION OF 3 VECTORS CREATE $\begin{bmatrix} 6 \\ 4 \\ 2 \end{bmatrix}$:

$$x\begin{bmatrix}1\\2\\6\end{bmatrix}+y\begin{bmatrix}2\\5\\-3\end{bmatrix}+z\begin{bmatrix}3\\2\\1\end{bmatrix}=\begin{bmatrix}6\\4\\2\end{bmatrix}$$

$u \quad v \quad w \quad b$



- also, $\underline{I} = \begin{bmatrix}1&&\\&1&\\&&1\end{bmatrix}$, and changes nothing when multiplied by vector!

** KEY IDEAS **

1. Basic operations on $\vec{v}$ & $\vec{w}$ are scalar multiplication $c\vec{v}$ & vector addition $\vec{v}+\vec{w}$
2. Those two operations together give the linear combination $c\vec{v}+d\vec{w}$.
3. Matrix vector multiplication can go by rows (dot products) or by columns (linear combinations) latter preferred.

* 4. Column Picture: $A\vec{x}=\vec{b}$ (linear combination of columns of A give rise to a vector $\vec{b}$)

* 5. Row Picture: Each equation in $A\vec{x}=\vec{b}$ gives a line ($n=2$), plane ($n=3$), or a hyperplane ($n>3$)