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Quiz #1

Justify all your answers completely (Or with a proof or with a counter example) unless mentioned differently.

Problems:

1. (20pt) Find the intersection between the plane passing through the origin with direction $(2,1,0)$ and $(-2,0,1)$ and the plane passing through origin with directions $(-2,1,0)$ and $(1,0,1)$. For this, follow the following steps:
   (a) after giving me the general form for an implicit description of an arbitrary plane, give an implicit description for these two planes,
   (b) then translate the problem into solving a linear system of equation, solve the system and answer to the question.
2. (20pt) Explicit the solution set of the systems corresponding to the following augmented matrices, in a parametric vector form and geometrically if necessary:
   (a)
   $$\begin{pmatrix} 1 & 0 & 0 & -1/3 & -47 \\ 0 & 1 & 0 & -2 & 0 \\ 0 & 0 & 1 & -2/3 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$
   (b)
   $$\begin{pmatrix} 2 & 4 & 3 & -2 \\ 0 & 5 & 5 & -4 \\ 0 & 0 & 0 & 7 \end{pmatrix}$$
   (c)
   $$\begin{pmatrix} 1 & -4 & 0 & 0 & 0 & 5 & 0 \\ 0 & 0 & 1 & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & 1 & -4 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix}$$
3. Let
   $$A = \begin{pmatrix} 2 & 3 & 4 & 5 \\ 0 & 7 & 8 & 9 \\ 0 & 0 & 5 & 1 \\ 0 & 0 & 0 & 12 \end{pmatrix}$$

Do the columns of A span $\mathbb{R}^4$?