

### Quiz 3

1. Recall that, as shown in class, the homogeneous system  $A\mathbf{x} = \mathbf{0}$  given by

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

becomes, in row-reduced echelon form,

$$\begin{pmatrix} 1 & 0 & -1 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

and that therefore the 3 planes corresponding to the 3 rows of the original system, whose normal vectors are the rows of  $A$ ,

$$\vec{A}_1 = \langle 1, 2, 3 \rangle$$

$$\vec{A}_2 = \langle 4, 5, 6 \rangle$$

$$\vec{A}_3 = \langle 7, 8, 9 \rangle$$

must all lie in the same plane. *Show this*, namely show that  $\vec{A}_3$  lies in the span of  $\vec{A}_1$  and  $\vec{A}_2$ , or in other words **find constants**  $a, b \in \mathbb{R}$  **such that**

$$a\vec{A}_1 + b\vec{A}_2 = \vec{A}_3$$

*You may find it easier to work with column vectors rather than row vectors.*