Quiz

The following is a set of three vectors:

(1) $\vec{v_1} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$

(2) $\vec{v_2} = \begin{bmatrix} 2 \\ 2 \\ 2 \end{bmatrix}$

(3) $\vec{v_3} = \begin{bmatrix} 8 \\ 8 \\ 8 \end{bmatrix}$

All three vectors are $\in \mathbb{R}^3$

Quiz Question

Which vectors above define a plane spanned by a linear combination?

Answer:

(1) and (2)

(1) and (3)

The question in this quiz may seem a bit strange. We have three vectors, why do they not all define the plane that can be spanned by a linear combination of them all?

A simple glance at vectors $\vec{v}_2, and\ \ \vec{v}_3$will show you that one vector can be defined as a linear combination of the other.

for example:

$$\vec{v}_2 = 0.25\,\vec{v}_3$$

$$\begin{bmatrix} 2 \\ 2 \\ 2 \end{bmatrix} = 0.25 \begin{bmatrix} 8 \\ 8 \\ 8 \end{bmatrix}$$

In other words, if we use $\vec{v}_2$ as a part of our linear combination (for creating finding the vectors spanned), we do not need $\vec{v}_3$. And vice versa: if we use $\vec{v}_3$as a part of our linear combination (for creating finding the vectors spanned), we do not need $\vec{v}_2$.

Therefore, to define the plane spanned by a linear combination of the vectors above, we need $(\vec{v}_2, and\ \ \vec{v}_1)$or $(\vec{v}_3, and\ \ \vec{v}_1)$.