Linear Dependency

Lets look again at two of the vectors we saw in the previous quiz:

- $\vec{v_2} = \begin{bmatrix} 2 \\ 2 \\ 2 \end{bmatrix}$
- $\vec{v_3} = \begin{bmatrix} 8 \\ 8 \\ 8 \end{bmatrix}$

We stated that one vector can be derived from the other by a simple mathematical linear combination.

For example:

$$4\vec{v}_2 = \vec{v}_3$$

When one vector **can** be defined as a linear combination of the other vectors, they are a set of **linearly dependent** vectors.

When each vector in a set of vectors vector **can not** be defined as a linear combination of the other vectors, they are a set of **linearly independent** vectors.

In our example,

- $\{\vec{v}_2, \vec{v}_3\}$ is a linearly dependent set
- $\{\vec{v}_1, \vec{v}_2\}$ is a linearly independent set

and

- $\{\vec{v}_1, \vec{v}_3\}$ is a linearly independent set

($\vec{v_1}$ is defined in the previous quiz as: $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$)

The easiest way to know if a set of vectors is linear dependent or not, is with the use of **determinants**. Determinants are beyond the scope of our Linear Algebra Essentials and we will not focus on that.