the span

example

# the linear span

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- Given some vectors we now ask: what is the set of all vectors that you can get from a linear combination of these specific vectors?
- The answer is "*the span of these vectors*". Because of the rules of vector addition, any such linear combination will be in the vector space.

> The set of all linear combinations of vectors $\vec{v_1}, \vec{v_2}, \ldots, \vec{v_n}$ is denoted by $span(\vec{v_1}, \vec{v_2}, \ldots, \vec{v_n})$ and called the linear span of these vectors.

## example

What is the span of the vectors $\vec{v_1} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \vec{v_2} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$?

We can actually get to any other vector in the plane, by taking a linear combination of $\vec{v_1}$ and $\vec{v_2}$.
In other words, the span of $\vec{v_1}$ and $\vec{v_2}$ is $\mathbb{R}^2$, i.e. the whole plane.

# the span