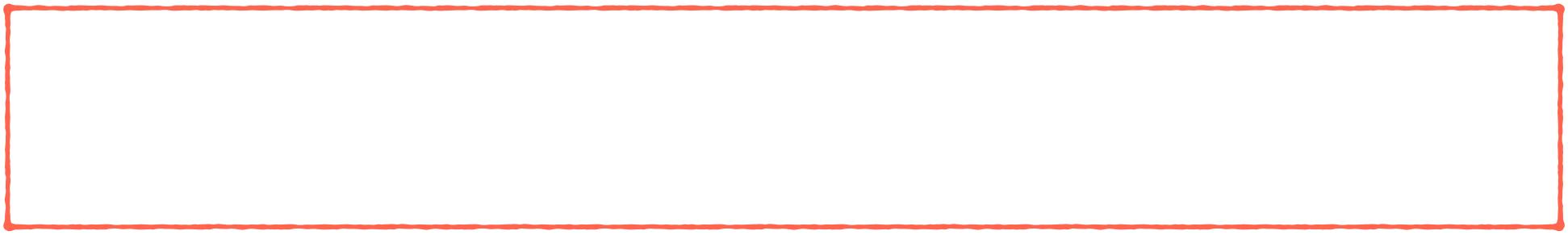


linear combinations

## Geometrically,





## linear combinations

We say that  $\vec{v}$  is a linear combination of  $\vec{v_1}, \vec{v_2}, ..., \vec{v_n}$ , if there exist scalars  $x_1, x_2, ..., x_n$  such that  $\vec{v} = x_1 \vec{v_1} + x_2 \vec{v_2} + ... + x_n \vec{v_n}$ .

- A linear combination means we add (or subtract) scalar multiples of vectors to get a new vector
- Because of the rules of vector addition, any such linear combination will be in the vector space
- **Geometrically**, the linear combinations of a nonzero vector form a line. The linear combinations of two nonzero vectors form a plane, unless the two vectors are collinear, in which case they form a line.

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

## linear combinations: planes and lines

