

## 1 | norm, $\|x\|$

**def**

For some  $x \in^n$ ,

$$\|x\| = \sqrt{x_1^2 + \cdots + x_n^2}$$

Using the definition of an inner product, norms can be defined for complex vectors in inner product spaces

For  $v \in V$ , the *norm* of  $v$ , denoted  $\|v\|$ , is defined by

$$\|v\| = \sqrt{\langle v, v \rangle}$$

## 2 | properties

$$2.1 \mid \|v\| = 0 \iff v = 0$$

$$2.2 \mid \|\lambda v\| = |\lambda| \|v\| \text{ for all } \lambda \in$$

## 3 | aka euclidean distance

## 4 | not linear, so we use the dot product to 'inject linearity'