



# Inner Product Norms

## 1 Why

An inner product gives rise to a norm naturally.

## 2 Definition

**Proposition 1.** *Let  $(V, \mathbf{F})$  be a vector space. Let  $f : V \times V \rightarrow \mathbf{F}$  be an inner product such that  $f(x, x) \in \mathbf{R}$ . Let  $g : V \rightarrow \mathbf{R}$  such that*

$$g(x) = \sqrt{f(x, x)}.$$

*Then  $g$  is a norm.*

The *norm* of a vector in an inner product space is the square root of the inner product of the vector with itself.

### 2.1 Notation





