

## 1 | inner product space

def

An *inner product space* is a vector space  $V$  along with an inner product on  $V$ .

When  $V = \mathbb{R}^n$ , assume the inner product is the Euclidean inner product

$$\langle (w_1, \dots, w_n), (z_1, \dots, z_n) \rangle = w_1 \overline{z_1} + \dots + w_n \overline{z_n}$$

## 2 | results

### 2.1 | Axler 6.7 properties

2.1.1 | **For each fixed  $u \in V$ , the function that takes  $v$  to  $\langle v, u \rangle$  is a linear map from  $V$  to  $\mathbb{C}$**

2.1.2 |  $\langle 0, u \rangle = 0 = \langle u, 0 \rangle \forall u \in V$

2.1.3 |  $\langle u, v + w \rangle = \langle u, v \rangle + \langle u, w \rangle$  **for all**  $u, v, w \in V$

2.1.4 |  $\langle u, \lambda v \rangle = \overline{\lambda} \langle u, v \rangle$  **for all**  $\lambda \in \mathbb{C}$  **and**  $u, v \in V$