

Math 4133 - Linear Algebra

Quiz #11 - 2013.02.13

Solutions

1. Explain why the definition of the dot product for complex valued vectors must be modified.

When dealing with real vectors, we know that $|\vec{u}|^2 = \vec{u} \cdot \vec{u}$. Note that the norm of a vector is always a real valued function, giving the magnitude of the vector. For the analogy to work over \mathbb{C} , we must have that $|\vec{u}|^2 = \vec{u} \cdot \overrightarrow{\vec{u}}$, since $z \cdot \bar{z} = |z|^2$ for any real complex number z .

2. What does it mean, geometrically speaking, when $\vec{u} \cdot \vec{v} = 0$?

This simply means that \vec{u} and $\vec{v} = 0$ are orthogonal.