

Exercise 23

Vectors \mathbf{v} and \mathbf{w} are sides of an equilateral triangle whose sides have length 1. Compute $\mathbf{v} \cdot \mathbf{w}$.

Solution

All sides of an equilateral triangle have the same length, so the angles are all 60° . Use the definition of the dot product to calculate $\mathbf{v} \cdot \mathbf{w}$.

$$\begin{aligned}\mathbf{v} \cdot \mathbf{w} &= \|\mathbf{v}\| \|\mathbf{w}\| \cos \theta \\ &= (1)(1) \cos 60^\circ \\ &= \cos \frac{\pi}{3} \\ &= \frac{1}{2}\end{aligned}$$