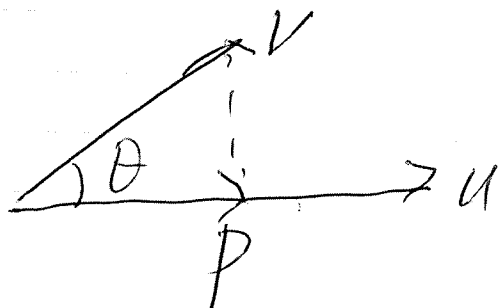Def. $\cos\theta = \dfrac{u \cdot v}{\|u\| \, \|v\|}$

Def. u and v are said to be orthogonal if $(u, v) = 0$.

Thm. $\|u + v\|^2 = \|u\|^2 + \|v\|^2$ iff u and v are orthogonal.

○ Projections

P = projection of v onto u

$$P = \|v\| \cos\theta \, \dfrac{\vec{u}}{\|u\|}$$

$$= \|v\| \, \dfrac{(u, v)}{\|u\| \, \|v\|} \, \dfrac{\vec{u}}{\|u\|}$$

$$= \dfrac{(u, v) \, \vec{u}}{\|u\|^2} = \dfrac{(u, v)}{(u, u)} \, \vec{u}$$