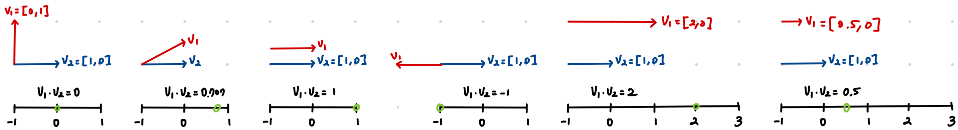
Inner product: finding correlation



$\langle v_1, v_2 \rangle = 0$: Basis vector

☆ v_1, v_2 are orthogonal

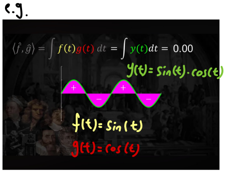
When v_1 and v_2 are orthogonal to each other, $Av_1 + Bv_2$ can reach everywhere in 2D plane

In other words, v_1 and v_2 must have 0 correlation to be orthogonal.

How to check functions are orthogonal to each other?

: $\langle \hat{f}, \hat{g} \rangle = \int f(t)\, g(t)\, dt.$

e.g.



Sin(t) and cos(t) has 0 correlations to each other.

Hence, every periodic cycle can be described with sin(t) + cos(t)

↳ Fourier Series : $\hat{f}(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos\left(\frac{2\pi n x}{T}\right) + \sum_{n=1}^{\infty} b_n \sin\left(\frac{2\pi n x}{T}\right)$