Def Sinusoidal Function (oscillation, signal) is fn that can be written

$f(t) = A\cos(\omega t - \phi)$

- A: amplified by A
- ω: compressed by ω
- ϕ: shifted by ϕ/ω

$A > 0$: amplitude

ϕ: phase lag, ie the lag in radians

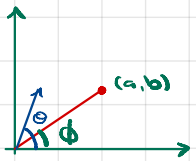
$\tau = \phi/\omega$: time delay/lag $f(t) = A\cos(\omega(t - \phi/\omega))$

ω: angular frequency

$\nu = \omega/2\pi$: frequency of $f(t)$

$p = 2\pi/\omega = 1/\nu$: period

$\Rightarrow f(t) = A\cos(\omega(t-\tau))$



$a+ib = Ae^{i\phi}$

(a,b) rectangular coord.

(A,ϕ) polar coord.

we know that for any unit vector with angle Θ to horizontal, $\langle \cos\Theta, \sin\Theta \rangle \cdot \langle a,b \rangle = 1 \cdot |\langle a,b \rangle| \cos(\Theta - \phi)$

$\Rightarrow a\cos\Theta + b\sin\Theta = \underbrace{A\cos(\Theta - \phi)}_{\text{Sinusoidal}}$, $A = (a^2+b^2)^{1/2}$