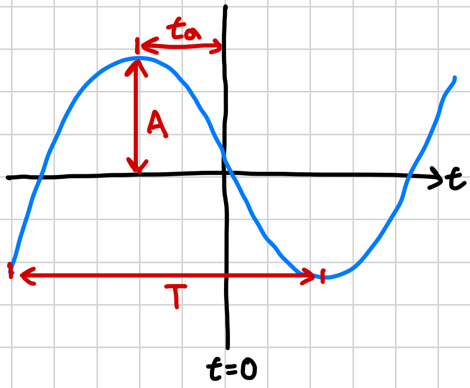
SIN WAVE REVIEW

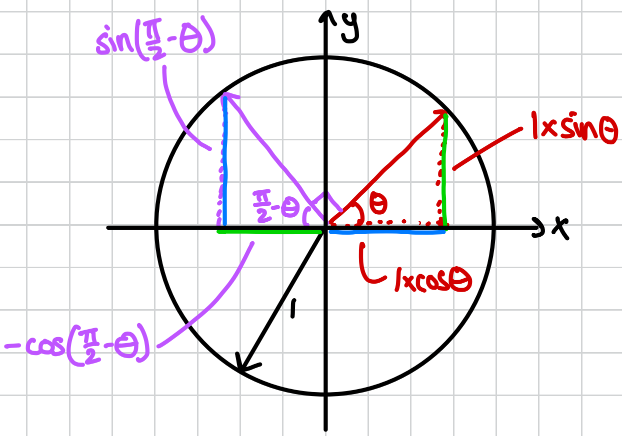


$$y(t) = A \times \cos(\omega t + \phi)$$

$$f = \frac{1}{T} \quad \frac{\text{cycles}}{s}$$

Angular Frequency $\omega = 2\pi f$

$$t_a \longrightarrow t_a \cancel{s} \times \frac{2\pi \text{ rad}}{\cancel{\text{cycle}}} \times \frac{\cancel{\text{cycle}}}{T \cancel{s}} = \underbrace{\frac{t_a}{T} \times 2\pi \text{ rad}}_{\text{Phase } = \phi}$$



$$(1\cos\theta)^2 + (1\sin\theta)^2 = 1^2$$

$$\cos^2\theta + \sin^2\theta = 1$$

$$\cos\theta = \sin\left(\theta + \frac{\pi}{2}\right) \;\star$$

$$\sin\theta = \cos\left(\frac{\pi}{2} - \theta\right) \;\star$$

No phase

$$\underbrace{y(t) = A\cos(\omega t + \Phi)}_{\text{Amplitude - Phase}} = \underbrace{a\cos(\omega t) + b\sin(\omega t)}_{\text{cosine-sine Form}}$$

$$A = \sqrt{a^2 + b^2}$$
$$\Phi = \tan^{-1}\left(\frac{-b}{a}\right)$$
$$a = A\cos\Phi$$
$$b = A\sin\Phi$$

FOURIER'S THEOREM

Any periodic signal can be equivalently expressed as a sum of sine waves

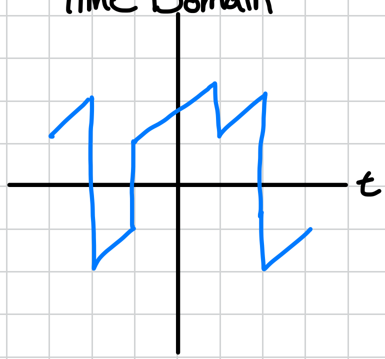
dc part

$$f(t) = a_0 + \sum_{n=1}^{\infty} c_n \cos(n\omega_0 t + \phi_n) = a_0 + \sum_{n=1}^{\infty} [a_n \cos(n\omega_0 t) + b_n \sin(n\omega_0 t)]$$

Every harmonic has own amplitude and phase

Every harmonic has a sine amplitude and cosine amplitude

Time Domain



Frequency Domain