

Useful Trigonometric Relations

$$\sin(-\alpha) = -\sin \alpha$$

$$\cos(-\alpha) = \cos \alpha$$

$$\sin \alpha = \cos (\alpha - 90^\circ)$$

$$\cos \alpha = \sin (\alpha + 90^\circ)$$

$$\sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \cos \alpha \sin \beta$$

$$\cos(\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta$$

$$\frac{d}{dt} \sin \omega t = \omega \cos \omega t$$

$$\frac{d}{dt} \cos \omega t = -\omega \sin \omega t$$

$$\int \sin \omega t dt = -\frac{1}{\omega} \cos \omega t$$

$$\int \cos \omega t dt = \frac{1}{\omega} \sin \omega t$$

Useful Exponential Relations

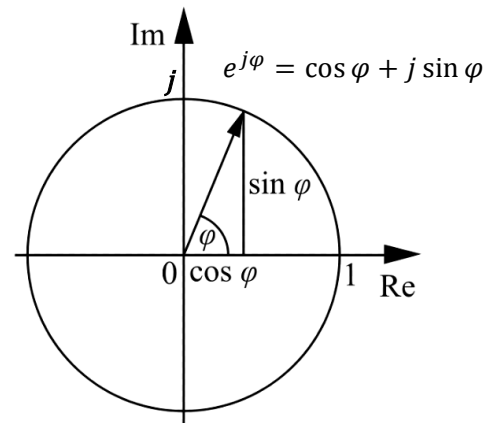
$$e^{j0} = e^{-j2\pi} = j^0 = \frac{1}{j^4} = 1$$

$$e^{j\frac{\pi}{2}} = e^{-j\frac{3\pi}{2}} = j^1 = \frac{1}{j^3} = j$$

$$e^{j\pi} = e^{-j\pi} = j^2 = \frac{1}{j^2} = -1$$

$$e^{j\frac{3\pi}{2}} = e^{-j\frac{\pi}{2}} = j^3 = \frac{1}{j^1} = -j$$

$$e^{j2\pi} = e^{-j0} = j^4 = \frac{1}{j^0} = 1$$



$$\frac{d}{dt} e^{j\omega t} = j\omega e^{j\omega t}$$

$$\int e^{j\omega t} dt = \frac{1}{j\omega} e^{j\omega t}$$

Fun Facts

$$\ln(-1) = j\pi$$

$$j^j = 0.207880 \dots$$