EECS 16A Designing Information Devices and Systems I
Spring 2015 Discussion 10F

1. Trigonometric Identities

Prove the following identities:

(a) $\cos t = \frac{1}{2}(e^{jt} + e^{-jt})$

(b) $\sin t = \frac{1}{2}(e^{jt} - e^{-jt})$

(c) $\cos(t \pm \frac{\pi}{2}) = \mp \sin t$

(d) $\sin(t \pm \frac{\pi}{2}) = \pm \cos t$

(e) $2 \sin t \cos t = \sin 2t$

(f) $\cos^2 t = \frac{1}{2}(1+\cos 2t)$

(g) $\sin^2 t = \frac{1}{2}(1-\cos 2t)$

(h) $\sin t_1 \sin t_2 = \frac{1}{2}(\cos(t_1-t_2)-\cos(t_1+t_2))$

(i) $\cos t_1 \cos t_2 = \frac{1}{2}(\cos(t_1-t_2)+\cos(t_1+t_2))$

2. Compute the following:

(a)

$$\int_{-T}^{T} \cos\frac{n\pi t}{T}\cos\frac{m\pi t}{T}dt$$

(b)

$$\int_{-T}^{T} \sin\frac{n\pi t}{T} \sin\frac{m\pi t}{T} dt$$

(c)

$$\int_{-T}^{T} \cos(\omega_1 t) \sin(\omega_2 t) dt$$