Leo Berman ECE 4512 Homework 1

#1) $2e^{j\pi/3} = 2(e^{j\pi/3}) = 2(\cos(\frac{\pi}{3}) + j\sin(\frac{\pi}{3}))$

$= 2(1/2 + j(\frac{\sqrt{3}}{2})) = 1 + j\sqrt{3}$

#2) a) $\int_0^1 2\cos(2\pi t)\sin(2\pi t)\,dt$ $\quad u = \sin(2\pi t)$, $du = 2\pi\cos(2\pi t)$

$= \int_0^0 1\pi\,du = 0$

b) $\int_0^1 2\cos^2(2\pi t)\,dt = 2\int_0^1 \frac{1+\cos(4\pi t)}{2}\,dt = \int_0^1 (1+\cos(4\pi t))\,dt$

$= \left[t + \frac{\sin(4\pi t)}{4\pi}\right]_0^1 = 1 - 0 = 1$

$\int_0^1 2\sin^2(2\pi t)\,dt = 2\int_0^1 \frac{1-\cos(4\pi t)}{2}\,dt = \int_0^1 1-\cos(4\pi t)\,dt$

$= \left[t - \frac{\sin(4\pi t)}{4\pi}\right]_0^1 = 1 - 0 = 1$

#3) $\int_0^1 2\sin(2\pi t)\sin(4\pi t)\,dt = \int_0^1 (\cos(2\pi t) - \cos(6\pi t))\,dt$

$= \left[\frac{\sin(2\pi t)}{2\pi}\right]_0^1 - \left[\frac{\sin(6\pi t)}{6\pi}\right]_0^1 = 0$