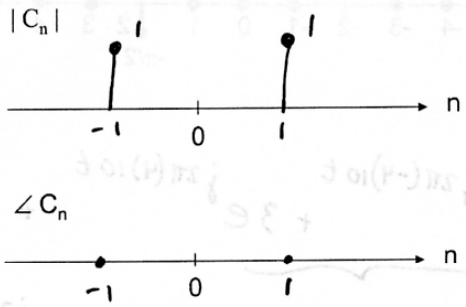
Name: Key

EE432 Fall 2008 Quiz 04

1. Given that $x(t) = 2\cos(2\pi 60t)$, what are the Fourier series coefficients C_n? Plot the magnitude and phase of the coefficients below:

$f_F = 60$ Hz

$x(t) = 2\,\frac{1}{2}\,e^{j2\pi(1)60t} + 2\,\frac{1}{2}\,e^{j2\pi(-1)60t}$



2. Write sin(2π40t) as a sum of complex exponentials.

$\frac{e^{j2\pi 40t}}{2j} - \frac{e^{-j2\pi 40t}}{2j} = -\frac{1}{2}e^{+j2\pi 40t} + \frac{1}{2}e^{-j2\pi 40t}$

3. What is the Fourier transform of $x(t) = 2$? $= 2e^{j\omega_0 t}$ where $\omega_0 = 0$

$2 \cdot 2\pi\delta(\omega)$

$= 4\pi\delta(\omega)$

4. What is the Fourier transform of $rect(t)$?

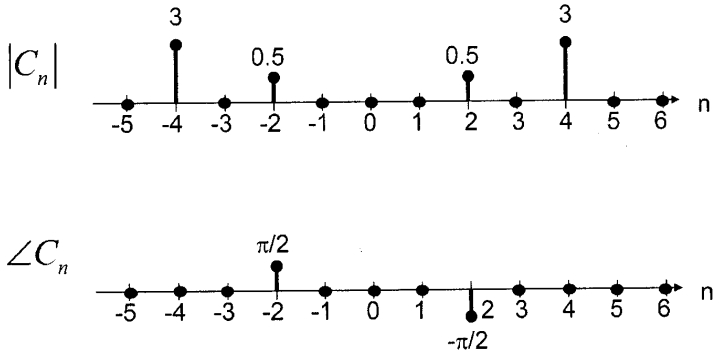
$\mathrm{sinc}\left(\frac{\omega}{2\pi}\right)$

5. What is the Fourier transform of $rect(2t)$?

$\frac{1}{|2|}\,\mathrm{sinc}\left(\frac{\omega}{2\pi}\,\frac{1}{2}\right) = \frac{1}{2}\,\mathrm{sinc}\left(\frac{\omega}{4\pi}\right)$

$f_F = 10$ Hz

6. Given the plot of the magnitude and phase of the Fourier series of a signal below, find the signal.



$3e^{j2\pi(-4)10t} + 3e^{j2\pi(4)10t} + .5je^{j2\pi(-2)10t} + .5(-j)e^{j2\pi(2)10t}$

$6\cos 2\pi 40t + \dfrac{e^{j2\pi 20t} - e^{-j2\pi 20t}}{2j}$

$6\cos 2\pi 40t + \sin 2\pi 20t$

Bonus: Who was the general who lead elephants into Italy to invade Rome?

Hannibal