

EE 341 - Homework 6

Due October 7, 2005

For problems which require MATLAB, please include a MATLAB m-file which shows how you made your plots.

1. Find the Fourier transforms of the following signals:

(a) $x(t) = e^{-2t} \cos(2\pi t)u(t)$

(b) $x(t) = \cos^2(2\pi t) \sin(2\pi t)$

(c) $x(t) = \text{sinc}(t) * \text{sinc}(2t)$

(d) $x(t) = (1 - e^{-t})u(t)$

2. Sketch the spectra ($|X(\omega)|$ and $\angle X(\omega)$) for the following signals:

(a) $x(t) = \text{sinc}(t - 2)$

(b) $x(t) = \text{sinc}^2(t) \cos(8\pi t)$

(c) $x(t) = \cos(\pi t - 0.25\pi)$

(d) $x(t) = \cos(\pi t)p_1(t)$

(e) $x(t) = \cos(\pi t)p_{100}(t)$

3. Find the Fourier transform of the following signals and sketch their spectra ($|X(\omega)|$ and $\angle X(\omega)$):

(a) $x(t) = \delta(t + 1) + \delta(t - 1)$

(b) $x(t) = \delta(t + 1) - \delta(t - 1)$

4. Sketch the spectra ($|Y(\omega)|$ and $\angle Y(\omega)$) where $y(t) = m(t)x(t)$ (the signal $x(t)$ which has been modulated by the signal $m(t)$):

(a) $X(\omega) = p_1(\omega) \quad m(t) = \cos(\pi t)$

(b) $X(\omega) = p_4(\omega) \quad m(t) = \cos(\pi t)$

(c) $X(\omega) = p_1(\omega) \quad m(t) = \cos(10\pi t)$

5. Problem 4.24.