Lab Assignment - 4
Fourier Transform

February 19, 2016

PROBLEM 1:

Consider the following signals:

$$x_1(t) = 2e^{-t}u(t) + 5e^{-(t-1)/2}u(t-1) \qquad x_2(t) = \frac{1}{1+t^2}$$
$$x_3(t) = \frac{\cos(2t)}{4+t^2} \qquad ,$$

where $u(t)$ is the unit step function.

(a) Compute the Fourier transform of all of the above signals on paper without using Fourier integral definition. You can use Fourier transform properties and the Fourier transforms 1,2 and 3 in Table 3.1 of the text book. Plot both the magnitude and phase spectrum by hand. Write down the magniutde response as well as phase response expressions.

(b) Compute the Fourier transform of $x_1(t)$ and $x_2(t)$ using MATLAB. Plot both the magnitude and phase spectrum using MATLAB.

Short Questions

The first page of your assignment should answer the following short questions:

1. What values of F_s and T_0 did you choose for the two questions in Question 1(b).

2. What effect did you observe in the Fourier transform in Question 1(b) when you doubled F_s and T_0.

Hint

Read section 3.9 (till equation 3.100 only) and 3.10 of the text book.

Deliverable

You are supposed to bring a hand-written report of the assignment to the lab. You don't need to print plots and only need to write the code corresponding to different plots.