

EE 484

Homework 3

Due Monday, February 8, 2016

Work all 3 problems.

Problem 1. Compute the Fourier transform of the following

$$x(t) = \begin{cases} 1, & -1/2 \leq t \leq 1/2, \\ 0, & \textit{elsewhere} \end{cases}$$

and sketch a plot of its magnitude in the frequency domain.

Problem 2. Suppose $f = 1000$ Hz. Compute the Fourier transform of the following

$$x(t) = \begin{cases} \cos(2\pi ft), & -1/2 \leq t \leq 1/2, \\ 0, & \textit{elsewhere} \end{cases}$$

and sketch a plot of its magnitude in the frequency domain.

Problem 3. Suppose now using Matlab that you sample $x(t)$ in Problem 2 with a sampling rate of f_s Hz corresponding to a sample period of T_s sec where $T_s = 1/f_s$. Plot the DFT (discrete Fourier transform) using Matlab when

- a. $f_s = 2000$ Hz.
- b. $f_s = 2500$ Hz.
- c. $f_s = 4000$ Hz.
- d. $f_s = 4777$ Hz.