

ELEC 320: Homework Assignment 16

Date Assigned: Monday, November 2, 1998

Date Due: Wednesday, November 4, 1998

Reading: Chapter 4, Sections 4.3 and 4.4.

Lab: Please decide on a lab project by November 5 and 10 so that we can begin working on them.

Problems:

1. Please study Example 4.7 in the text on pages 166-167. Do your best to write down all of the steps required to show that the Fourier transform of a rectangular pulse is a “sinc” function. This is one of the *most important* Fourier transform pairs to understand – it arises in many applications.

You do not have to submit anything for this item.

2. Find the Fourier transform of the functions $\delta(t)$ and $\delta(t - 1)$ using the *definition* of the Fourier transform, not the table. In other words, compute the integral that defines the Fourier transform for these time functions. (Hint: Recall the “sifting” property of impulse functions.)
3. Sketch $\text{sinc}(10t)$, $\text{sinc}(t/10)$, and $\text{sinc}(\pi t)$. Label the amplitude at $t = 0$ and the zero-crossing points.
4. Sketch $X(\omega) = \text{sinc}\left(\frac{1000\omega}{\pi}\right)$. Find the inverse Fourier transform $x(t)$ using the tables, and sketch $x(t)$.
5. What is the Fourier transform of $\cos(2\pi 1000t)$? Sketch the 2-sided amplitude spectrum.