EECS 216 – Winter 2008

Homework #6 – Assigned Feb. 19 – Due Tuesday March 4

• Grading: Not all problems will be graded, but you should do all of them.

• Submission: Submit in black box in room 4230 EECS before 5:00 on Tues. Mar. 4.

• Note: You have two weeks to do this set; try to finish before winter break.

• Read: Text sections 4.1-4.3. Topic: Fourier transforms and properties.

• Next week: Applications of Fourier transform: sampling and modulation.

• Have a good winter break! SL & AY

1. (30 points: 6@5) Text #4.5abcfgi. Express your answers in terms of $\text{rect}$, $\delta$, etc.

   \[
   \text{rect}(\omega) = \begin{cases} 
   1 & \text{for } |\omega| < \frac{1}{2} \\
   0 & \text{otherwise}
   \end{cases}
   \]

   so that $X(\omega) = \begin{cases} 
   1 & \text{for } 0 \leq \omega \leq 2 \\
   0 & \text{otherwise}
   \end{cases}$ and $x(t)$ is NOT real.

   - Indefinite integral: $\int \frac{1}{t^2+a^2} dt = \frac{1}{a} \tan^{-1} \frac{t}{a} + C$.
   - Compare to Example #4.3.6 on p. 180-181.

3. (15 points: 5+5+5) Text #4.24. This should be very easy if you sketch the spectra.

4. (20 points: 10+10), Text #4.19. In Fig. P4.19 change $\omega_m$ to $\omega_m/2$.

5. (20 points: 4@5) Text #4.11. Using Fourier transforms to compute definite integrals.
   - Use the table on p. 172-173 to get Fourier transform pairs.
   - Compare this to the infinite series in HW #5 problem #5.