Department of Electrical & Computer Engineering   ECE 146A
University of California, Santa Barbara   Winter 2008
Shynk
H.O. #7

HOMEWORK #3

Due Friday, February 1, 2008 (5:00 p.m.)

Reading: Chapter 2 (2.5–2.6)

Problems:

1. Let $\hat{g}(t)$ be the Hilbert transform of $g(t)$. Show that the Hilbert transform of $\hat{g}(t)$ is $-g(t)$. Derive the Hilbert transform of $\text{rect}(t)$.

2. Show that the square-wave carrier for DSB-SC discussed in class can be represented by

$$c(t) = \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2n-1} \cos[2\pi f_c t(2n-1)]. \tag{1}$$

   Also show that the Fourier series coefficients needed for this result are given by

$$c_n = \frac{2}{\pi n} \sin(\pi n/2) - \frac{1}{\pi n} \sin(\pi n). \tag{2}$$

3. Problem 2.10

4. Problem 2.11

5. Problem 2.14

6. Problem 2.18