ECE 5510 Fall 2009: Homework 8

Due: at 5pm in the HW locker, **Thursday**, November 19

1. Y&G 10.8.1

2. Y&G 10.8.3

3. Y&G 10.8.4: Before doing part (a), show by recursion that C_n can be written as

$$C_n = \frac{C_0}{2^n} + 4\sum_{i=1}^{n} \frac{X_i}{2^{n-i}}$$

   Hint for part (b): When you use both C_m and C_{m+k} in the same expression, be sure to use different indices on the summations: *i.e.*, if the first sum is $\sum_i$, then the next sum could be $\sum_j$ (don't use identical dummy variables on the two summations). Finally, to make this problem less work, only compute $C_C[m, k]$ for $k \geq 0$.

4. Y&G 10.10.1

5. Y&G 10.10.3: Hint: Math Fact B.2 on pg. 507.

6. A zero-mean WSS Gaussian random process $X(t)$ has autocorrelation (autocovariance) function
$$C_X(\tau) = \begin{cases} 4 - 2|\tau|, & -2 \text{ s} \leq \tau \leq 2 \text{ s} \\ 0, & o.w. \end{cases}$$

   (a) Write down the joint pdf at two time instants separated by 1 s.

   (b) Write down the joint pdf at two time instants separated by 3 s.