

# ECE 520.651 Random Signal Analysis

## Homework # 1

Due 9:00 AM on Friday, September 14, 2007.

Read Chapter 1 from Stark and Woods before starting this homework.

1. Problem 1.10 from Stark and Woods
2. Problem 1.13 from Stark and Woods
3. Show that if a collection  $\mathcal{F}$  of subsets of  $\Omega$  is closed under complementation and *countable* unions, it is also closed under *countable* intersections.
4. Show that the properties P1, P2, P5 and P9 together *imply* the properties P1, P2 and P3 used to *define* a probability space.
5. Given a probability space  $(\Omega, \mathcal{F}, P)$ , and a decreasing sequence  $A_1 \supseteq A_2 \supseteq A_3 \supseteq \dots$  of events in  $\mathcal{F}$ , show that

$$\lim_{n \rightarrow \infty} P(A_n) = P\left(\lim_{n \rightarrow \infty} A_n\right).$$

This is property P10, which was stated in class without proof.

6. Enumerate the elements of  $\sigma(\mathcal{G})$ , the  $\sigma$ -field generated by  $\mathcal{G}$ , when  $\Omega = (0, 1]$  and  $\mathcal{G} = \left\{\left(0, \frac{1}{3}\right], \left(\frac{1}{2}, 1\right]\right\}$ .

Read Chapter 2 from Stark and Woods after finishing this homework.