GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

ECE 4260

Problem Set #10

Date assigned: April 5, 2017
Date due: April 12, 2017

Reading: Continue reading Chapter 9 in Stark and Woods.

Reminder: The final exam will be Wednesday May 3, 2017. You may bring in 3 handwritten sheets of notes. Various tables will be provided.

Problem 10.1:

Work problem 9.5 in Stark and Woods

Problem 10.2:

Work problem 9.6 in Stark and Woods

Problem 10.3:

Work problem 9.7 in Stark and Woods

Problem 10.4:

Consider the random telegraph signal (RTS) as developed in Section 9.2, specifically pp 557-558, in Stark and Woods. A different contruct proceeds as follows:

- The process, $X(t)$, started at $-\infty$.
- Events occur in a Poisson fashion with rate λ.

- Each Poisson event defines the start of a new interval.
- Each interval is independent of all others.
- Each interval takes on the value +1 or -1 with equal probablity.

(a) Is the process WSS?

(b) Find $R_{XX}(t_1, t_2)$.

(c) Let $Y(t) = aX(t)$. Find $R_{YY}(t_1, t_2)$.

(d) Let $V(t) = 0.5(X(t) + 1)$. Find $R_{VV}(t_1, t_2)$.

(e) Now change the Poisson rate to 2λ. Why is $R_{YY}(t_1, t_2)$ the same as that obtained for the book's RTS ACF?

Problem 10.5:

Consider the RTS as defined above, but let the interarrival time between events follow a second order Erlang. Find $R_{XX}(t_1, t_2)$.