

GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

ECE 4260

Problem Set #11

Date assigned: April 12, 2017

Date due: April 19, 2017

Reading: Read Sections 10.5 and 10.6 in Stark and Woods.

Problem 11.1:

(a) Bottles arrive at the Little Volcano Bottle Capper (LVBC) in a Poisson manner, with average arrival rate of λ bottles per minute. The LVBC works instantly, but we also know that it destroys any bottles which arrive within $\frac{1}{5\lambda}$ minutes of the most recent successful capping operation. A long time after the process began, what is the probability that a randomly selected arriving bottle (marked at the bottle factory) will be destroyed?

(b) A particular neuron fires at random times with the following description. Immediately after firing, the neuron has a refractory period of 0.002 s, during which it cannot fire. After the refractory period, the time until firing follows an exponential pdf with parameter (rate) 100/s. Assume this process began a long time ago. Although the sequence of firings is no longer Poisson, it will have an average rate. Find this rate.

Problem 11.2:

Work problem 9.50 in Stark and Woods

Problem 11.3:

Work problem 9.57 in Stark and Woods

Problem 11.4:

Work problem 9.61 in Stark and Woods

Problem 11.5:

Work problem 9.62 in Stark and Woods