

## **CTS MS EXAM QUESTION, SPRING 2013**

An observed classical Poisson process,  $N(t)$ , may have one of two equiprobable, constant rates,  $\lambda_1$  or  $\lambda_2$ , with  $\lambda_2 > \lambda_1$ . After an observation interval of  $T$  seconds, it is required to decide which rate is present. The decision rule is:

Choose  $\lambda_2$  if  $N(T) \geq M$

Choose  $\lambda_1$  if  $N(T) < M$

where  $M$  is a fixed, positive integer.

- (1) Obtain an expression for the probability of an incorrect decision.
- (2) Determine the length,  $T_0$ , of the observation interval that minimizes the probability of an incorrect decision.