Stochastic Processes November 27, 2021
Sharif University of Technology CE 40-695
Dr. H.R. Rabiee

Time: 20 mins

Name: Std. Number:

Quiz 4 (Poisson Process, Point Process)

Questions

1. Let $X(t)$ be a Poisson process with rate λ.

   (a) (3 points) If we define a process $Y(t) = X(t) - \lambda t$, Is $Y(t)$ weakly stationary ? why?

   (b) (7 points) let assume that T is the time of the first event. Then, $P(T \leq s) = 1 - exp(-\lambda s)$. Show that for $0 < s < t$,

   $$P(T \leq s | X(t) = 1) = s/t$$

   Hint : $T \leq s$ is equivalent to $X(s) \geq 1$

2. (10 points) Let $X(t) = N(t+1) - N(t)$ where $N(t), t \geq 0$ is a Poisson process with rate λ. Compute

   $$Cov[X(t), X(t+s)]$$