ECS 315: Quiz 3 Solution

Instructions

1. Separate into groups of no more than three persons.
2. Only one submission is needed for each group. Late submission will not be accepted.
3. ***Write down all the steps*** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
4. **Do not panic.**

Name	ID
Prapun	555

1. Arrivals of call request to a mobile base station are modeled by a Poisson process with a rate of ~~λ~~ 10 requests per hour. Let N be the number of call requests made between 9:30 and 10:00. What is the probability that N > 1?

Counting occurrences of a Poisson process within a time interval of length T gives a Poisson RV with parameter $\alpha = \lambda T$.

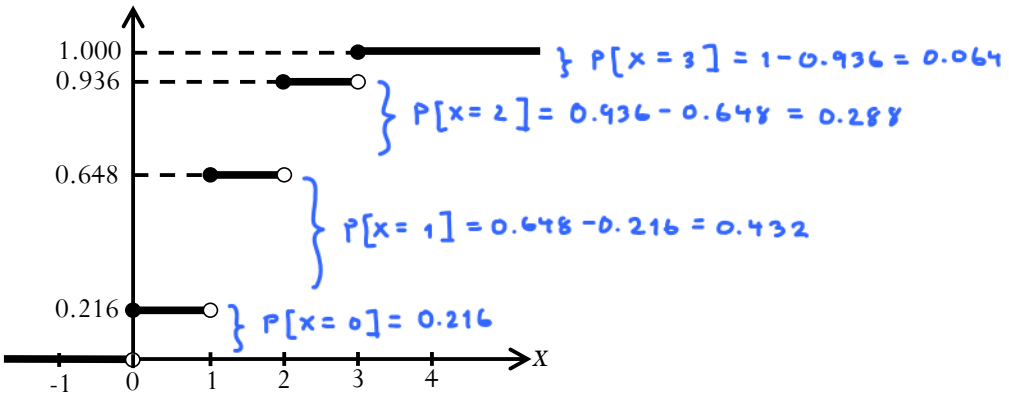
In which case, $P[N=k] = e^{-\alpha}\frac{\alpha^k}{k!}$.

The duration of the time interval of interest is $T = \frac{1}{2}$ hr.

Here, $\lambda = 10$. So, $\alpha = \lambda T = 10 \times \frac{1}{2} = 5$.

$$P[N>1] = 1 - P[N \le 1] = 1 - P[N=0] - P[N=1] = 1 - e^{-\alpha}(1+\alpha) = 1 - 6e^{-5} \approx 0.9596$$

2. Suppose the cdf of a random variable X is plotted below.



Find $\mathbb{E}X$.

The staircase-like cdf tells us that X is a discrete RV. The cdf plot also starts from 0 and ends at 1; so we know that all the "interesting" probabilities happen inside the given interval. Furthermore, we have notec before that we can get the pmf values from the locations and the sizes of the jumps in the cdf plot.

$$p_X(x) = \begin{cases} 0.216, & x = 0, \\ 0.432, & x = 1, \\ 0.288, & x = 2, \\ 0.064, & x = 3, \\ 0, & \text{otherwise.} \end{cases}$$

$$\Rightarrow \mathbb{E}X = \sum_x x p_X(x) = 0 \times 0.216 + 1 \times 0.432 + 2 \times 0.288 + 3 \times 0.064 = 1.2$$