

Sep. 4

meaning: n

$$P[X \leq x, Y \leq y] \quad \text{---} \quad P[\omega \mid X(\omega) \leq x, Y(\omega) \leq y]$$

i.e.

$$P[(X \leq x) \cap (Y \leq y)]$$

$$X_1, X_2, \dots, X_{100} \sim \text{POI}(\lambda)$$

$$\bar{X} = \frac{1}{100} \sum_{i=1}^{100} X_i$$

Recall $\sum_{i=1}^{100} X_i \sim \text{POI}(100\lambda)$

$$P[\bar{X} \geq 1] = 1 - P[\bar{X} < 1]$$

(since Poisson RV is in $\{0\} \cup \mathbb{N}$)

$$= 1 - P[\bar{X} = 0]$$

$$= 1 - P\left[\frac{1}{100} \sum X_i = 0\right]$$

$$\updownarrow \quad \star \nabla \leftarrow$$

$$= 1 - P[\sum X_i = 0]$$

$$= 1 - e^{-100\lambda}$$

Interesting note:

It's very hard to identify the sampling distribution of \bar{X} for a random sample from a uniform dist.

The CLT is useful in this case.

Rule of thumb

When you have a random sample of 100, you should see '100' somewhere in your solution

Important!

It's only kosher to multiply by 100 here because the RHS is equal to zero.

Doesn't generally work for any real number.

Note: For HW2, we need to note that independence is a crucial condition