Pre-class preparation

Please watch the following video or read the following textbook sections from Blitzstein and Hwang's *Introduction to Probability* (second edition):

- Video: Poisson
- Textbook: Sections 4.7 (stop before Approximation 4.7.3), and Theorem 4.8.1
- Optional video about: where the Poisson distribution comes from

Objectives

By the end of the day's class, students should be able to do the following:

- State the definition of a Poisson random variable both in terms of its PMF and a story model.
- Calculate the expected value and variance for a Poisson distribution.
- Describe the shape of the Poisson distribution for both small and large values of the parameter λ.
- Summarize and provide examples of the "Poisson paradigm".
- Explain how to obtain a binomial variable by conditioning on values of a Poisson variable, and conversely, explain how to obtain a Poisson variable by taking limits of binomial variables.

Reflection Questions

Please submit your answers to the following questions to the corresponding Canvas assignment by 7:45AM:

1. Suppose we have random variables $X_i \sim \text{Poisson}(\lambda_i)$ for $i = 1, \ldots, n$. If the X_i are known to be mutually independent, what is the expected value and the variance of the new random variable $X_1 + \ldots + X_n$? Find these quantities in two ways.
2. (Optional) Is there anything from the pre-class preparation that you have questions about? What topics would you like would you like some more clarification on?