I. **Sections to Read** (All content from Blitzstein and Hwang's *Introduction to Probability* unless otherwise noted)

- 4.7 and 4.8

II. **Videos to Watch** (All videos from Blitzstein's Math 110 YouTube channel, unless otherwise noted)

- Lecture 11: Poisson Distribution

III. **Objectives**

- State the definition of a Poisson random variable both in terms of its pmf and a story model.
- Show that the expected value for a Poisson variable with parameter λ is λ.
- 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.

IV. **Quiz Questions** (Submit answers on Gradescope)

1) What is the value of the infinite series $\displaystyle\sum_{k=0}^{\infty} \frac{1}{k!}$? Explain how this sum is related to the Poisson distribution.
2) In the 'Poisson paradigm,' we say that $X = \sum_{j=1}^{n} I_{A_j}$ is approximately Poisson distributed with rate $\lambda = \sum_{j=1}^{n} P(A_j)$, provided the events A_j are at most weakly dependent. Explain why it would not be appropriate to say X is approximately Poisson when the A_j are highly dependent (for example, when the A_j are all disjoint).
3) In the proof in the text (Theorem 4.8.1) that the sum of two independent Poisson variables is Poisson, where was the independence assumption used?