I. **Pre-class material** Either read the indicated textbook sections OR watch the indicated video.

(a) **Sections to Read** (All content from Blitzstein and Hwang's *Introduction to Probability* unless otherwise noted). A digital copy of the textbook is available for free via the authors' website.

- Read section 4.4

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

- Lecture 10: Expectation Continued (from 30:00 to 39:00)
- The video lecture's coverage of the Fundamental Bridge is very light. So read / skim section 4.4 in the textbook as well.

II. **Objectives** (By the end of the day's class, students should be able to do the following:)

- Translate set-theoretic operations on events in a sample space to multiplication and addition operations on the corresponding indicator random variables.
- Explain how a counting variable can be decomposed into a sum of indicator variables.
- Utilize the fundamental bridge in order to solve a wide variety of probability problems.

III. **Reflection Questions** (Submit answers on Gradescope `https://www.gradescope.com/courses/425901`)

1) Consider a sequence of n Bernoulli$-p$ trials (not necessarily independent). For $1 \leq i \leq n$, let A_i be the event that the ith trial is a success. Define a random variable X by

$$X = I_{A_1} + I_{A_2} + \cdots + I_{A_n}$$

where I_{A_i} is the indicator variable for the event A_i. In the context of this story, what does the variable X represent? What is the expected value of X?

2) In your own words, explain why the "fundamental bridge" described in section 4.4 is often helpful for solving probability problems.

IV. **Additional Feedback** Are there any topics you would like further clarification about? Do you have any additional questions based on the readings / videos? *If not, you may leave this section blank.*