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: Indicators and Fundamental bridge
- Textbook: 4.4

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.
- Apply the fundamental bridge in order to solve a wide variety of probability problems.

Reflection Questions

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

1. In your own words, explain why the "fundamental bridge" can be helpful in solving probability problems.
2. Consider a sequence of n Bernoulli trials where each each trial i has probability of success p_i, $i = 1, \ldots, n$. Let A_i be the event that the i-th trial is a success. Define a random variable X as
$$X = \mathbf{1}_1 + \mathbf{1}_2 + \cdots + \mathbf{1}_n,$$
where $\mathbf{1}_j$ is the indicator variable for the event A_i. In this set-up, what does the variable X represent? What is its expected value?
3. (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?