Pre-class preparation

Please read the following textbook sections from Blitzstein and Hwang's *Introduction to Probability* (second edition) OR watched the indicated video from Blitzstein's Math 110 YouTube channel:

- Textbook: Sections 3.1-3.3
- Video: Lecture 7: Gambler's Ruin and Random Variables (33:00-end) and Lecture 8: Random Variables and Their Distributions (start to 8:00)

Objectives

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

- Provide both the formal and informal definition of a random variable.
- Define the probability mass function (PMF) of a discrete random variable.
- Determine whether a given function can be the PMF for some random variable.
- For Bernoulli and Binomial random variables: define the PMF and provide explicit descriptions of the PMF.
- For Bernoulli and Binomial random variables: provide examples of phenomena/experiments that follow the distribution, and identify when an experimental outcome does not follow the distribution.

Reflection Questions

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

1. Based on your reading, what is one advantage for using random variables to describe the result of an experiment, rather than describing the result in terms of events (as we have done in the past)?
2. Suppose X and Y are both random variables with the Bernoulli(0.5) distribution. Does this imply that $X = Y$? Explain.
3. For the following, determine if the random variable X follows a Bernoulli or Binomial distribution. If so, state the value of p (and n in the case of Binoimal). If X does not follow one of the distributions, explain why not.
   (a) At a light bulb factory, quality control inspections are periodically performed to minimize the number of defect products released to consumers. Bulbs are produced in batches of 100. The inspector takes a batch and chooses 10 bulbs at random (without replacement) to inspect. Let X be the number of defective bulbs.

(b) The probability of having blood type A positive is 0.34. Choose 4 people at random. Let X be the number of people that do not have blood type A positive.

4. (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?