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 3.7-3.9, 3.11

- Video:

    - Lecture 9: Expectation, Indicator Random Variables, Linearity (from 11:00-14:00)
    - Lecture 8: Random Variables and Their Distributions (from 18:00 to 32:00)
    - Read Sections 3.7, 3.11 (functions of variables and 'R' are not discussed in the videos)

Objectives

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

- Give the formula of functions of discrete random variables.

- Define what it means for random variables to be independent, independent and identically distributed, or conditionally independent.

- Provide examples of random variables that are independent or not independent.

- Leverage independence of random variables to simplify probability calculations.

- Simulate Bernoulli, Binomial, Hypergeometric and Discrete Uniform variables in R.

Reflection Questions

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

1. True or false? If the PMF of a random variable X is $p_X(x)$, then the PMF of $Z = 1+X$ is $p_Z(x) = 1 + p_X(x)$. Explain.

2. Explain the difference between saying that X and Y are identically distributed, and saying that X and Y are independent. Is it possible for X and Y to be identically distributed, but not independent?

3. Use R to simulate 100 independent Binomial random variables with $p = 0.5$ and n = 10. Based on your sample, approximate $P(X \leq 5)$. Then compare to the exact probability given by `pbinom`.

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?