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 2.4-2.6
- Video: Lecture 5: Conditioning Continued, Law of Total Probability (from start through 32:00, then 41:00 to end)

Objectives

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

- Explain what is meant by the statement "conditional probabilities are probabilities" and what is meant by the statement "Bayes' Rule is coherent".
- Define independence of events using set theory notation.
- State in common language how to determine if two events are independent.
- Interpret conditional independence in common language.
- Distinguish between conditional independence and unconditional independence.

Reflection Questions

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

1. Briefly explain what is meant by the statement *Bayes' Rule is coherent*. Why is it important that Bayes' rule is coherent?
2. If A and B are independent events, are A^c and B^c necessarily independent? Rigorously show why, or provide a counter-example for why not.
3. For the following scenario, determine if A and B are independent, and if they are conditionally independent given C. Provide brief, intuitive answers (i.e. no math necessary): Let A be the event that student 1 is on time for class and B the event that student 2 is on time for class. They are not friends (yet). Let C be the event that there is heavy snowfall.
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?