Week 2 Live Session

Breakout Session 1: Review your notes. Answer each other's questions and ask questions in the whole class discussion that you couldn't answer. Then answer the following questions.

1. In the game Twister, the color options for placing your hand are either red, blue, green or yellow. Propose a binomial experiment from this scenario.

2. Create an example, with context of the hypergeometric distribution. Make sure your example could not be approximated by the binomial distribution.

3. Which distribution has the same mean and variance?

4. Which of the discrete distributions that we discussed are related to each other? How are they related?

5. Thinking about moment generating functions:
    a. What are they used for?

    b. Describe the process to find moments.

c. Why do we use e^{tX} as the function we take the expected value of?

Two important aspects of probability:

- Determine whether the probability model we have chosen fits the data we are trying to model (a bad model will make for bad decisions).
- Determine the meaning behind the means and variances of the distributions we are working with.

Breakout Session 2: Roulette Example

Roulette is a casino game where a ball is spun around a wheel and the location where it lands determines who will win a payout on the game. Players can bet in different arrangements, with different payouts for each bet. Some examples of bets, with their probability of success are provided in the table below. The payout is the amount given back to the player if they bet a dollar and win.

Bet Name	Probability of Success	Payout
Straight up (any single number)	1/38	36
Top Line (0, 00, 1, 2, 3)	5/38	7
Color (Red or Black)	9/19	2

1. For each of the different bets, determine the expected value and standard deviation of winnings (or losses), if a player were to play one game for a dollar.

2. Based on the information you just learned, if someone gave you $100 and said you must play Roulette with that money, what would you do and why? Note: you can't keep the $100 and you can't give it back. However, you can keep any winnings from the roulette wheel.

3. Consider the following strategy: bet a dollar on a number, say 7 for example. If you lose, double your bet, if you win, you stop playing.
    a. Let X = the number of games you play until you win. What distribution does X follow?

    b. Let Y = the number of dollars bet until you win. What is the relationship between Y and X?

    c. What is the expected value of Y?

    d. Is this a good strategy?