STAT 134: Section 6

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Conceptual Review

Please discuss these short questions with those around you in section. These problems are intended to highlight concepts from lecture that will be relevant for today's problems.

a. When do we want to use indicators instead of the weighted sum formula to calculate expectation? What's the rule for choosing indicators?

b. State Markov's Inequality and Chebyshev's Inequality.

Problem 1

In a well-shuffled standard deck of cards, we are interested in the number of adjacent pairs; i.e., cards which are the same rank as the card before or after them in the deck. Calculate the expected number of adjacent pairs.

Hint: consider the probability that a card is the same as the card before it.

Problem 2

Suppose we have n unique pairs of chopsticks in a drawer (so $2n$ sticks in total). Hurrying to prepare for dinner, we grab k pairs of these at random from the drawer and try to make matching pairs from this pile of $2k$ chopsticks. Let X represent the number of matching pairs. Find $\mathbb{E}(X)$.

Problem 3

Suppose that bundles of yarn are 60 meters long on average, with an SD of 5 meters, and that bundles are independent of one another. In terms of n, find an upper bound (less than 1) on the probability that the total length of n bundles is less than 200 meters, for $n \geq 4$.