STAT 134: Section 7

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Conceptual Review

What is the point of:

- the method of indicators?

- inequalities like those of Markov and Chebyshev?

Problem 1

Suppose we have n unique pairs of chopsticks in a drawer (so $2n$ chopsticks in total). Hurrying to prepare for dinner, we grab $2k$ chopsticks uniformly at random from the $2n$ chopsticks in the drawer. If X is the number of matching pairs of chopsticks that we drew, what is $\mathbb{E}(X^2)$?

Problem 2

Suppose $X \sim \text{Poisson}(1)$ and $Y = 1 + X$.

a. Apply Markov's inequality to bound $\mathbb{P}(X \geq 2)$ and $\mathbb{P}(Y \geq 3)$.

b. $\mathbb{P}(X \geq 2) = \mathbb{P}(Y \geq 3)$, right? Why are the bounds different? What could be done to ensure the bounds from Markov's inequality are the same? Discuss.