Stat 134: Section 7

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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?

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

Let A and B be independent events, with indicator random variables I_A and I_B.

a. Describe the distribution of $(I_A + I_B)^2$ in terms of $P(A)$ and $P(B)$;

b. What is $\mathbb{E}(I_A + I_B)^2$?

c. Suppose we now have a set of identical but not necessarily independent indicators $I_1, I_2, \ldots, I_n$. Derive a useful formula for $\mathbb{E}(I_1 + I_2 + \ldots + I_n)^2$