Stat 134: Section 8

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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 the IQ scores of a million individuals have a mean of 100 and an SD of 10.

a. Without any further assumptions, find a bound for the proportion of individuals with an IQ over 130.

b. Now find a smaller upper bound, assuming the distribution is symmetric about 100.

c. Now suppose the scores follow a Normal curve. Find the proportion of individuals with an IQ over 130.

Ex 3.3.13 in Pitman's Probability

Problem 3

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 $E(X)$ and $Var(X)$.