Stat 134: Indicators Review

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Wednesday, December 6, 2017

Problem 1

A building has 10 floors above the basement. If 12 people get into an elevator at the basement, and each person independently chooses a floor at random to get out, what is the expected number of floors the elevator will stop at?

Ex 3.2.14 in Pitman's Probability

Hint: Use Indicators

Problem 2

In a drawer, there are N unique pairs of socks (for a total of $2N$ socks). If I pull out $n \leq 2N$ socks, without replacement, what is the expected number of matching pairs of socks I will have?

Hint: Use Indicators

Problem 3

In a bin, there are r red balls and b blue balls. What is the expected number of balls I will have if I take balls out, one by one (i.e. without replacement) until there are no more red balls in the bin?

Hint: Use Indicators

Problem 4

Derive $\mathbb{E}[X]$ and $\text{Var}(X)$, where $X \sim$ Hypergeometric Distribution with parameters (n, N, G), where n is the sample size, N is the total number of elements, and G is the number of good elements.

Hint: Use Indicators