STAT 134: Section 5

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Conceptual Review *(Poisson approximation and random sampling)*

1. What is the Poisson distribution?

2. Suppose X has a Binomial(n, p) distribution. What is the Poisson approximation to the probability $P(X = k)$?

3. *"If we already have Normal approximation to the Binomial, why do we care to have Poisson approximation as well?"*

4. *"Does the Poisson approximation have a continuity correction like the Normal approximation?"*

5. Suppose there are G good items and B bad items in a collection of $N = G + B$ items and you draw n of them. What is the probability that exactly g of the n items are good if:
   (a) you draw n items with replacement; or if
   (b) you draw n items without replacement?

Problem 1

A cereal company advertises a prize in every box of its cereal. In fact, only about 95% of their boxes have prizes in them. If a family buys one box of this cereal every week for a year, estimate the chance that they will collect more than 45 prizes.
Ex 2.4.9 in Pitman's Probability

What assumptions are you making?

Problem 2

A lot of 50 items (10 bad) is inspected by the following two–stage plan: (i) A first sample of 5 items is drawn. If all are good, the lot is passed; if two or more are bad, the lot is rejected. (ii) If the sample contains exactly one bad item, a second sample of 10 more items is drawn from the remaining 45; the lot is rejected if two or more are bad. Otherwise, the lot is accepted.

a. What is the probability that a second sample is drawn, and contains more than one bad item?

b. Find the chance the lot is accepted.

Ex 2.5.9 in Pitman's Probability