STAT 134: Section 8

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Conceptual Review

a. What is the content of the central limit theorem? Is this different from the Normal approximation to the Binomial?

b. What does a Geometric (p) random variable on $\{1, 2, 3, \ldots\}$ represent? Let X have this distribution; specify $P(X = x)$ and $P(X > x)$ for all x.

c. What are two expressions which, if you evaluated them, would give $E(X)$?

Problem 1

Suppose that in a particular application requiring a single battery, the mean lifetime of a battery is 4 weeks, with an SD of 1 week. The battery is replaced with a new one when it dies, and so on. Assume battery lifetimes are independent. Approximate the chance that more than 26 replacements will have to be made in a two year period, starting with a fresh battery and not counting that one as a replacement.

Ex 3.3.23 in Pitman's Probability

Should we use the continuity correction here? Why/why not?

Problem 2

Jasper, Shiyin, and Katherine have coins with respective probabilities p_1, p_2, p_3 of flipping heads. They flip their coins independently at the same times. What is the probability that the first person to flip heads has to flip more than n times? (What distribution does this follow?)
Ex 3.4.5 in Pitman's Probability