## 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  $\{1, 2, 3, ...\}$  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*