Homework 4

Lecture 6 & 7 Material

- 1 Students always fear going to class and having the teacher announce a pop quiz for which they are completely unprepared. The quiz consists of 50 T/F questions. The student has no choice but to guess the answer randomly for all 50 questions.
 - a. Simulate taking this quiz by random guessing. Number a sheet of paper 1 to 50 to represent the 50 questions. Write either a T (true) or F (false) for each questions, by predicting what you think would happen if you repeatedly flipped a coin and let a tail represent a T guess and a head represent an F guess. (Don't actually flip a coin, just write down what you think a random series of guesses would look like.)
 - b. How many questions would you expect to answer correctly simply by guessing?
 - c. This table shows the 50 correct answers. The answers should be read across rows. How many questions did you answer correctly.

TRUE FALSE FALSE FALSE [1] FALSE FALSE FALSE FALSE TRUE FALSE FALSE TRUE [13] TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE [25] TRUE TRUE FALSE TRUE FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE [37] TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE FALSE TRUE [49] TRUE FALSE

- d. The above "answers" were actually randomly generated by a simulation program. What percentage of the correct answers were true, and what percentage would you expect? Why are they not necessarily identical?
- e. Are there groups of numbers within the sequence of 500 correct answers that appear nonrandom? For instance, what is the longest run of Ts or Fs? By comparison, what is the longest run of Ts or Fs within your answers? (There is a tendency in guessing what randomness looks like to identify too few long runs in which the same outcome occurs several times in a row.)
- 2 The jury pool for the upcoming murder trial of a celebrity actor contains the names of 100,000 individuals in the population who may be called for jury duty. The proportion of the available jurors on the population list who are Hispanic is .40. A jury of size 12 is selected at random from the population list of available jurors. Let X = the number of Hispanics selected to be jurors for this jury.
 - a. Is it reasonable to assume that X has a binomial distribution? If so, identify the values of n and p. If not, explain why not.
 - b. Find the probability that no Hispanic is selected.
 - c. If no Hispanic is selected out of a sample of size 12, does this cast doubt on whether the sampling was truly random? Explain.
- 3 Do textbook problems 4.4, 5.1, 5.4, 5.25, 5.53, 5.58