CSE 312: Foundations of Computing II
Section 2: More Combinatorics, Intro Probability

0. Trick or Treat
Suppose on Halloween, someone is too lazy to keep answering the door, and leaves a jar of exactly N total candies. You count that there are exactly K of them which are kit kats (and the rest are not). The sign says to please take exactly n candies. Each item is equally likely to be drawn. Let X be the number of kit kats we draw (out of n). What is $\Pr(X = k)$, that is, the probability we draw exactly k kit kats?

1. Staff Photo
Suppose we have 13 chairs (in a row) with 8 TA's, and Professors Blank, Karlin, Ruzzo, Rao, and Tompa to be seated. Suppose all seatings are equally likely. What is the probability that every professor has a TA to his/her immediate left and right?

2. Ingredients
(a) Find the number of ways to rearrange the word "INGREDIENT", such that no two identical letters are adjacent to each other. For example, "INGREEDINT" is invalid because the two E's are adjacent.

(b) Repeat the question for the letters "AAAAABBB".

3. Divisibility
Consider the set $T = \{1, 2, ..., 36050\}$, and suppose we choose a subset S of size 3605, each equally likely. What is the probability that there are two (distinct) numbers in S whose difference is divisible by 99?