CSCI 2824, Fall 2015

Challenge Problem 3, due Thursday November 5 (hard copy, in class)

The “Secret Santa” problem:

The "Secret Santa" game is a holiday classroom game for children in which every student brings in a present (with no identifying name) and puts it in a large basket. Each present is then randomly assigned to a child in the class. In effect, then, everyone is giving a "secret" gift. From the teacher's standpoint, our "random" assignment has to exclude the possibility that a child's gift ends up back with that same child.

(a) So... suppose we're the teacher. We have 8 children in a classroom, and we want to assign each of them a “Secret Santa”. Naturally, we don’t want to assign any kid to be his or her own Santa. How many distinct legal arrangements are there?

(b) And now that you’ve solved the problem for 8, write an expression that solves the problem for n in general. As n gets large, what is the probability that *any* Secret Santa arrangement will be a legal one?