1. You have 8 candies. One of them is poisonous and is heavier than the rest. You are allowed to use a balance to check if a group of candies is heavier than another. At most how many weighings do you need to determine the poisonous candy?

2. There is an n x n grid. How many ways are there to fill the grid with jack-o-lanterns such that the number of jack-o-lanterns in each row and each column are even numbers?

3. A set S of persons at a Halloween party has the following property. Any two with the same number of friends in S have no common friends in S. Prove that there is a person in S with exactly one friend in S.

4. 100 people have been imprisoned by the zombies. Each prisoner's jail cell has a number on it. Each prisoner has access to 100 drawers, each of which has a paper slip with the label 1 - 100. Each prisoner can pick up to at most 50 slips. The prisoners will be let out if every one of them is able to find the paper clip matching their jail cell number. What is a strategy that can given them a nontrivial probability of escaping?

   Given a good strategy, what is the probability of surviving?

5. A lawnmower needs to mow a circular track. The exact quantity of gas needed for the lawnmower to complete a single loop around a track is distributed among n containers placed along the track. All the grass must be mowed; otherwise, zombies would spawn from the lawn at night. Does there always exist a starting position at which the lawnmower, beginning with an empty tank of gas, can complete a single loop around the track without running out of gas and save the town from zombies?.

6. There are 2n oreos in a circle, each of which has one black side and one gold side. One can perform the following operation: for an oreo for which the black side is facing up, the two adjacent oreos can be flipped. Find all the initial configurations from which some sequence of moves leads to the position where exactly one is gold.