UW Math Circle
October 15, 2015
Homework

1. You're back at Hogwarts! This time, Harry Potter is behind one door and Voldemort is behind the remaining two. Snape tells you at most one of the three signs is true.

I	II	III
Voldemort is in this room.	Harry Potter is in this room.	Voldemort is in room II.

   Where is Harry Potter?

2. How many diagonals are there in a regular n-gon? (A regular n-gon is a polygon with n sides whose sides and angles are all the same.)

3. Is it possible to fill a 4×4 grid with integers such that the sum of the numbers in each row is odd and the product of numbers in each column is odd?

4. How many 10 digit numbers have at least two equal digits?

5. Samuel the squirrel is collecting nuts for winter. He stores the nuts in three different trees. If he has collected 10 nuts so far, how many ways are there for him to distribute them among the three trees? (Note: he does not have to put nuts in all of the trees; for instance, he could put all 10 nuts in the first tree and 0 in the others.)