MATH CLUB: MATH BATTLE!

MAR 11, 2018

1. There are 12 students in a classroom; 6 of them are Democrats and 6 of them are Republicans. Every hour the students are randomly separated into four groups of three for political debates. If a group contains students from both parties, the minority in the group will change his/her political alignment to that of the majority at the end of the debate. What is the probability that after two hours all students will be of the same party affiliation?

2. Lunasa, Merlin, and Lyrica each have a distinct hat. Every day, two of these three people, selected randomly, switch their hats. What is the probability that, after 2017 days, every person has their own hat back? What about 2018 days?

3. On a square ruled paper, with square size 1, we have a stick of length 5, placed so that both ends are at grid points. We are allowed to rotate the stick around one end, but after each rotation, both ends must be again at grid points.

Is it possible that after several such rotations the stick returns to the original posiion, but with ends switched?

[Clarification: during each rotation, one end must be fixed. However, you can first rottae around one end, then, at the next step, rotate around the other.]

[Hint: even and odd!]