

1 Numbered Balls

Suppose you have a bag containing seven balls numbered 0, 1, 1, 2, 3, 5, 8.

- (a) You perform the following experiment: pull out a single ball and record its number. What is the expected value of the number that you record?

- (b) You repeat the experiment from part (a), except this time you pull out two balls together and record their total. What is the expected value of the total that you record?

2 Airport Revisited

- (a) Suppose that there are n airports arranged in a circle. A plane departs from each airport, and randomly chooses an airport to its left or right to fly to. What is the expected number of empty airports after all planes have landed?

- (b) Now suppose that we still have n airports, but instead of being arranged in a circle, they form a general graph, where each airport is denoted by a vertex, and an edge between two airports indicates that a flight is permitted between them. There is a plane departing from each airport and randomly chooses a neighboring destination where a flight is permitted. What is the expected number of empty airports after all planes have landed? (Express your answer in terms of $N(i)$ - the set of neighboring airports of airport i , and $\deg(i)$ - the number of neighboring airports of airport i).

3 Telebears

Lydia has just started her CalCentral enrollment appointment. She needs to register for a marine science class and CS 70. There are no waitlists, and she can attempt to enroll once per day in either class or both. The CalCentral enrollment system is strange and picky, so the probability of enrolling in the marine science class is μ and the probability of enrolling in CS 70 is κ . These events are independent. Let M be the number of days it takes to enroll in the marine science class, and C be the number of days it takes to enroll in CS 70.

- (a) What distribution do M and C follow? Are M and C independent?

- (b) For some integer $k \geq 1$, what is $\mathbb{P}[C \geq k]$?

- (c) For some integer $k \geq 1$, what is the probability that she is enrolled in both classes before day k ?