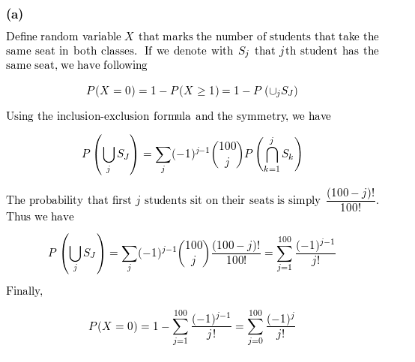
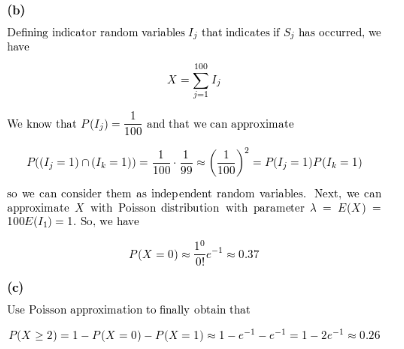
1. Harvard Law School courses often have assigned seating to facilitate the “Socratic method.” Suppose that there are 100 first year Harvard Law students, and each takes two courses: Torts and Contracts. Both are held in the same lecture hall (which has 100 seats), and the seating is uniformly random and independent for the two courses.
2. Find the probability that no one has the same seat for both courses (exactly; you should leave your answer as a sum).

  
(b) Find a simple but accurate approximation to the probability that no one has the same seat for both courses.   
(c) Find a simple but accurate approximation to the probability that at least two students have the same seat for both courses.



1. There are 100 passengers lined up to board an airplane with 100 seats (with each seat assigned to one of the passengers). The first passenger in line crazily decides to sit in a randomly chosen seat (with all seats equally likely). Each subsequent passenger takes his or her assigned seat if available, and otherwise sits in a random available seat. What is the probability that the last passenger in line gets to sit in his or her assigned seat?

Consider a special case where there are only 2 people (Jack and Ana) and 2 seats on the airplane. Jack picks a seat at random. The only way Ana gets to pick his designated seat is if Jack correctly picks hers. Since there are only 2 choices for she picks her own seat correctly with probability 1/21/2

Therefore P(P( Ana gets his seat)=P()=P(Jack chooses her own seat)=1/2)=1/2

Now, consider one more special case where we now have 3 people (Jack, Ana and Marie) boarding the flight in that order and Jack picking a random seat first up. In this scenario, Marie gets to sit on his designated seat in one of the following two possibilities:

· Jack picks her own seat

· Jack picks Ana’s seat and Ana picks Jack’s seat.

In all other cases the probability of Marie picking his seat is 0. So we have:

P(P( Marie gets his seat )=P()=P( Jack picks her own seat )+P()+P( Jack picks Ana’s seat )∗P()∗P( Ana picks Jack’s seat))

This reduces to:

P(P( Marie gets his seat )=1/3+(1/3)∗(1/2)=(1/3+1/6)=1/2.