1. There are 9+7 =16 seats. For each seat i the probability that the child on seat i forms boy-girl or girl-boy pair with child on seat i+1 is

If we denote xi as the number of boy-girl neighbor between seat i and i+1, its expectation is .

Using linearity of expectation of random variables

1. Uncorrelated means the covariance of X and Y are zero. Namely

Independent means the joint p.d.f equal to the product of marginal p.d.f of each variable:

The independent condition is a stronger statement. If X and Y are independent, then

X and Y are uncorrelated.

But if X and Y are uncorrelated then they are not necessarily independent.

Example: (reference: Statistics and Data Analysis, example 2.25 page 37)

If

Then

By definition if

Then X and Y are uncorrelated. But X and Y are clearly dependent.

1. I’d consider this problem this way:

If we do end up doing the third roll, then the expected value of this roll is easy to get which is E3 = 3.5;

So for the second roll we either stop if we rolled a number larger than 3.5, namely 4,5,6 or we go into the third round, so the expected value of second roll is

Similarly for the first roll, we only keep the number if it’s 5 or 6

So the value of this game should be 4.67.

1. Reference:

[1]. Ordered Statistic by Herbert A. David

[2]. <http://math.stackexchange.com/questions/14190/average-length-of-the-longest-segment?lq=1>

The cdf of length of largest piece can be written as

Continue as long as 1-iy>0.

Therefore the pdf is

1. The correlation coefficient matrix of these three random variables is

This matrix is positive semidefinite, therefore

Therefore the range of r is

1. 不会
2. Ridge regression is typically used when the number of predictors is larger than the number of samples. the way of doing it is to minimize the following expression

Where is the tuning parameter to control the penalty term.

Reference: <http://www.stat.cmu.edu/~ryantibs/datamining/lectures/16-modr1.pdf>

1. Lasso regression minimize
2. Assume the game stops whenever a head is flipped and we get dollar. Then the expected payoff of this game is

But the host probably doesn’t have infinite amount of money. Say we know the host only have 1 Billion dollars. That is about . So the real expected payoff of this game should be

<https://en.wikipedia.org/wiki/St._Petersburg_paradox>