ECE108 Assignment3

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April 1, 2018

Contents

1 Rolling Dice

a Dicerolling1,2,3,4,5,6

How many times will the sequence 1,2,3,4,5,6 occur? What is the probability of this occurring?

well if $n \leq 6$, there is 0 chance of any sequence occuring
if $n = 6$, there is 1 occurence which means $\frac{1}{6^6}$ chance
if $n \geq 6$,there are

$$(n-5) * 6^{n-5} \text{occurences}$$

which leads to a probability of occurence to

$$\frac{(n-5) * 6^{n-5}}{6^n}$$

b DicerollingA,B,C

How many times will the sum of the number of 1's and 2's equal the sum of the number of 3's, 4's, 5's and 6's? What is the probability of this occurring?
let's say

$$1\&2 \mapsto A$$

$$3\&4 \mapsto B$$

$$5\&6 \mapsto C$$

$A\&B\&C$ with all equal possibilities of showing up (1/3)
Then we can say we are only throwing a 3 sided dice, therefore the total amount of possibilities while throwing is

$$3^N$$

using the analogy of undistinguishable As and $B\&C$s our equation for $\|A\| = \|B\| + \|C\|$ is

$$\frac{n!}{\frac{n}{3}! + \frac{2n}{3}!}$$

How many times will the sum of the number of 1's and 2's equal the sum of the number of 3's and 4's and equal the sum of the number of 5's and 6's? What is the probability of this occurring?

How many times will you roll a 1 twice in succession? For the purpose of this calculation, the sequence ...11.... counts as once, but so does ...111.... The sequence ...1111... counts as twice. What is the probability of this occurring?

How many times will you roll a 1 k-times in succession? As with the previous case, when a 1 is counted as part of a k-sequence, it is not counted as part of a subsequent k-sequence. What is the probability of this occurring?

You have a communications system that transmits bundles of data from a source to a destination. Most bundles are received correctly. However, there is a random chance of the data in a bundle being in error. Roughly every E^{th} bundle is in error. If you transmit n bundles, what is the probability of two bundles in sequence being in error? what is the probability of k bundles in sequence being in error?

sense of whether or not your answers look correct.