

Combinatorics Homework

Homework Due on April 23, 2015

Do the following problems and, of course, give explanation when needed.

1. A four-sided die is shaped like a tetrahedron and the numbers 1 – 4 can be rolled with equal probability. Suppose that a four-sided die and standard six-sided die are rolled and the results are summed:
 - (a) Write down all the possible sums and how many ways there are to make each one.
 - (b) Use generating functions to find another way to label the dice with positive integers to get the same possibilities with the same number of ways to get each.
2. Let a_n be the number of subsets of $\{1, 2, 3, \dots, n\}$ where the distance between any two elements is at least three. Show the closed form for the generating function is:

$$F(x) = \frac{x^2 + x + 1}{1 - x - x^3}$$