
Math 218: Combinatorics

HOMEWORK 7 : DUE SEPTEMBER 29

1. Suppose you toss a 6-sided dice 10 times and record the number on the top of the dice each time. Use Inclusion-Exclusion to determine the number of ways those dice could be thrown so that each of the 6 numbers occur at least once in your list of 10 numbers. Here we assume tossing a 1 and then nine 6's is different than tossing nine 6's first and then a 1.
2. Determine the number of permutations of the set $[9]$ in which at least one odd integer is fixed.
3. Recall Theorem 5.1.3 that the number of ways of choosing k elements from the set $[n]$ with repetition allowed is $\binom{n+k-1}{k}$. What if we are only allowed to use fewer than k of some of the elements in $[n]$?

This problem may be solved using Inclusion-Exclusion. Figure out how to use Inclusion-Exclusion to count the number of combinations of 10 elements of the list consisting of two a 's, four b 's, and six c 's (and then actually count them).

4. You visit the bakery from Homework 3 at the end of the day. They now only have three kinds of pastries left: jelly doughnuts, cheese danishes, and cinnamon rolls. Also, they only have 6 jelly doughnuts left, 6 cheese danishes, and 3 cinnamon rolls. How many options are there for a box of 12 pastries?