MACM Day 4 - combination and the binomial theorem

Summary

The binomial theorem asks, for each paired term, how many possible ways can it be contructed? This gives us a combination for each coefficient. A combination can be thought of in 3 different ways: 1. the number of subsets of size k fron a set of size n, 2. the number of binary strings of length n with k 1's, 3. the coefficient of `x^k*y^(n-k) in (x+y)^n`. The multinomial theorem is simular to the binomial theorem but uses permutations with repetition instead of combinations.