

# MACM Day 4 - combination and the binomial theorem

## Summary

The binomial theorem asks, for each paired term, how many possible ways can it be constructed? 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  $k$  from 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 similar to the binomial theorem but uses permutations with repetition instead of combinations.