Lecture 2

1. Don't lose common sense
2. Do check answers, especially by doing simple and extreme cases
3. Label people , objects etc. If have n people, then label them 1,2...n

Example: 10 people, split into them of 6, team of 4 => $\binom{10}{6}$ 2 teams of 5 => $\binom{10}{5}$ /2

Problem: pick k times from set of n objects, where order doesn't matter, with replacement.

Extreme cases: k = 0; k = 1; n = 2

Equiv : how many ways are there to put k indistinguishable particles into n distinguishable boxes?

Story proof- proof by interpretation

Ex1 $\binom{n}{k}$ = $\binom{n}{n-k}$

Ex2 n$\binom{n-1}{k-1}$ = k$\binom{n}{k}$ pick k people out of n, with one desigenate as president.

Ex3 $\binom{m+n}{k} = \sum_{j=0}^{k} \binom{m}{j}\binom{n}{k-j}$ (vandermonde) (范德蒙)

Axioms of Probability

Non-naive definition

Probability sample consists of S and P, where S is sample space, and P , a function which takes an event $A \subseteq S$ as input, returns $P(A) \in [0, 1]$ as output.

such that

1. $P(\phi) = 0, P(S) = 1$
2. $P(U_{n=1}^{\infty} A_n) = \sum_{n=1}^{\infty} P(A_n)$ if $A1, A2..An$ are disjoint (not overlap)