Date: 10/09/2022

Probability and Counting (Statistics 101)

- Sample space ⇒ set of all possible outcomes. (S)
- Event ⇒ subset of sample space.

$$P(A) = \frac{\#\text{favorable outcomes}}{\#\text{Possible outcomes}}$$

probability event

Assumptions ⇝
- All events are equally likely *
- Finite sample space.

Counting ⇝

Multiplication Rule – if we've exp with n_r possible outcomes, & for each outcome –

$n_1 \rightarrow 1$
$n_2 \rightarrow 2$
$n_3 \rightarrow 3$
⋮
$n_r \rightarrow r$

then, there exist $n_1 . n_2 . n_3 . \cdots n_r$ overall possible outcomes.

Binomial coe. $= \binom{n}{k} = {}^nC_k = \dfrac{n!}{(n-k)!\,k!}$

$= 0$ if $k > N$

subsets of size k, of n group.

⇒ order doesn't matter.

MATRIKAS

Date: / /

* Sampling Table ⇒

Choose k objects out of n.

	order	un-order
Replace	n^k	$\binom{n+k-1}{k}$
Don't Replace	$n(n-1)\cdots(n-k+1)$	$\binom{n}{k}$

Bose - Einstein -

Story Proof proof by interpretation.

$$\boxed{\binom{n}{k} = \binom{n}{n-k}} \quad \text{— (i)}$$

$$\boxed{n\cdot\binom{n-1}{k-1} = k\binom{n}{k}} \quad \text{— (ii)}$$

Choose ~~a~~ k ppl of N ppl, with 1 designated president.

$$\binom{m+n}{k} = \sum_{i=0}^{k} \binom{m}{i}\binom{n}{k-j}$$