Probability : 1 lecture — 5 Sept Tuesday

- Introduction :- Just discussed why to study probability.

What is probability? :-

Consider the following example that illustrates that this may not be an easy question to answer.

Marble Example { A Box has 6 red and 4 green marbles. A marble is selected at random. What is the probability that marble selected is Red?

Solution { First ; Observe that it is difficult to define probability as a limiting relative frequency

in this case $6/10 = \lim \frac{N_R}{N}$ as $N \to \infty$
= limit of proportion of times N we would get a red as no of trials goes to ∞. We don't know if such limit exist and if it is always 6/10 no matter TL;DR what sequence TL;DR

- Talks about Theory of large numbers
  we think in terms of Frequency and hence forced to think in terms of frequency.

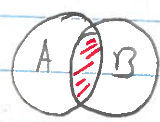
- We will see hence, by the end of the course to interpret it as limiting frequency [Not Define]

- Next task is to give Mathematical defination to probability and prove some theorems of the defination

ict Set ebra

1) A set : $A = \{ \omega ; \omega \in A \}$
in probability an event will be a set and a point in that set will be called an elementary outcome]

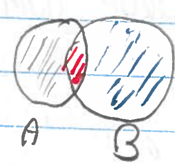
2) if A & B are two sets, then $A \cap B$ is $= \{ \omega ; \omega \in A \;\&\; \omega \in B \}$



} AND

fessor te :- Do not use trees cause he doesn't want you to lose Probablistic reasoning.

3) $A \cup B = \{ \omega ; \omega \in A \text{ or } \omega \in B \text{ or } \omega \in A \cap B \}$



is in A, B or Both

4) We Say $A \subset B$ [A contained in B] if $\omega \in A \rightarrow \omega \in B$ [implies it is also in B]

5) All discussions are in context of a Universal Set denoted as S

[will be called Sample Space]

6) $A^c = A' = \{ \omega \notin A$ and $\omega \in S \}$ OR
is in sample space but not in set A.

7) empty set denoted as ϕ.

Remember AND = $\cap$ OR = $\cup$

JARGON: If $A \cap B = \phi$; A, B are Disjoint OR mutually exclusive.

The following results VIP: ie De Morgans Laws.

De Morgans laws [DM]

1) $(A \cup B)^c = A^c \cap B^c$
2) $(A \cap B)^c = A^c \cup B^c$

easy to prove using the properties OR VENN DIAGRAM

Professors NOTE: We START OUR Probability Journey by explaining what a Random experiment is.

We make observations on outcome that are uncertain Before we perform the experiment