1

Lect-1

9-1-17

A patient is admitted to the hospital and a potentially life-saving drug administered. The following dialog takes place between the nurse and concerned relative.

RELATIVE: Nurse, what is the probability that the drug will work?

NURSE: I hope it works, we'll know tomorrow.

RELATIVE: Yes, but what is the probability that it will?

NURSE: Each case is different, we have to wait.

RELATIVE: But let's see, out of a hundred patients that are treated unde similar conditions, how many times would you expect it to work?

NURSE (somewhat annoyed): I told you, every person is different, for som it works, for some it doesn't.

RELATIVE (insisting): Then tell me, if you had to bet whether it will wor or not, which side of the bet would you take?

NURSE (cheering up for a moment): I'd bet it will work.

RELATIVE (somewhat relieved): OK, now, would you be willing to lose tw dollars if it doesn't work, and gain one dollar if it does?

NURSE (exasperated): What a sick thought! You are wasting my time!

Lecture-1

Probability and Statistics.

MA20104 (3-0-0)
L T P

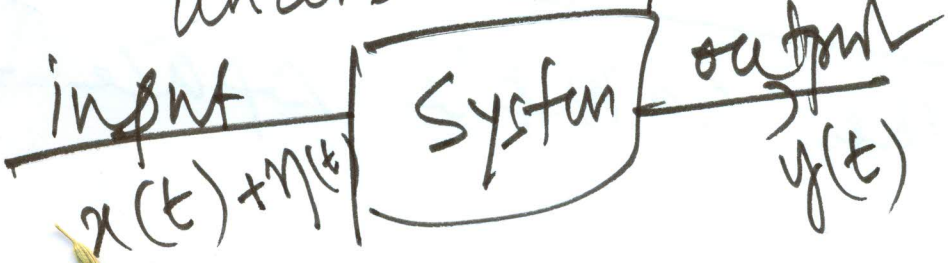
BIBHAS ADHIKARI

1- Mid Sem — 30 marks

1- End Sem — 50 marks

Class Test — 20 marks.
(1/2)

Prob — useful to model uncertain situations/ uncertain system.



Interpretations of probability.

(1) Frequency interpretation

(2) Subjective belief.

Probabilistic models.

A probabilistic model is a mathematical description of an uncertain situation.

Elements of a PM.

(1) The sample space -

Ω = the set all possible outcomes.

↓

mutually exclusive
collectively exhaustive

Exp. What are the sample spaces in the following games?

Ram. Consider two alternative games, both involving ten successive coin tosses.

Game 1. we receive ₹1 each time a head comes up.

$$\Omega = \{0, 1, 2, \ldots, 10\}.$$

Game 2

We receive ₹1 for every coin toss up to and including the first time a head comes up. Then we receive ₹2 for every coin toss up to the second time a head comes up. More generally, the rupee amount per toss is doubled each time a head comes up.

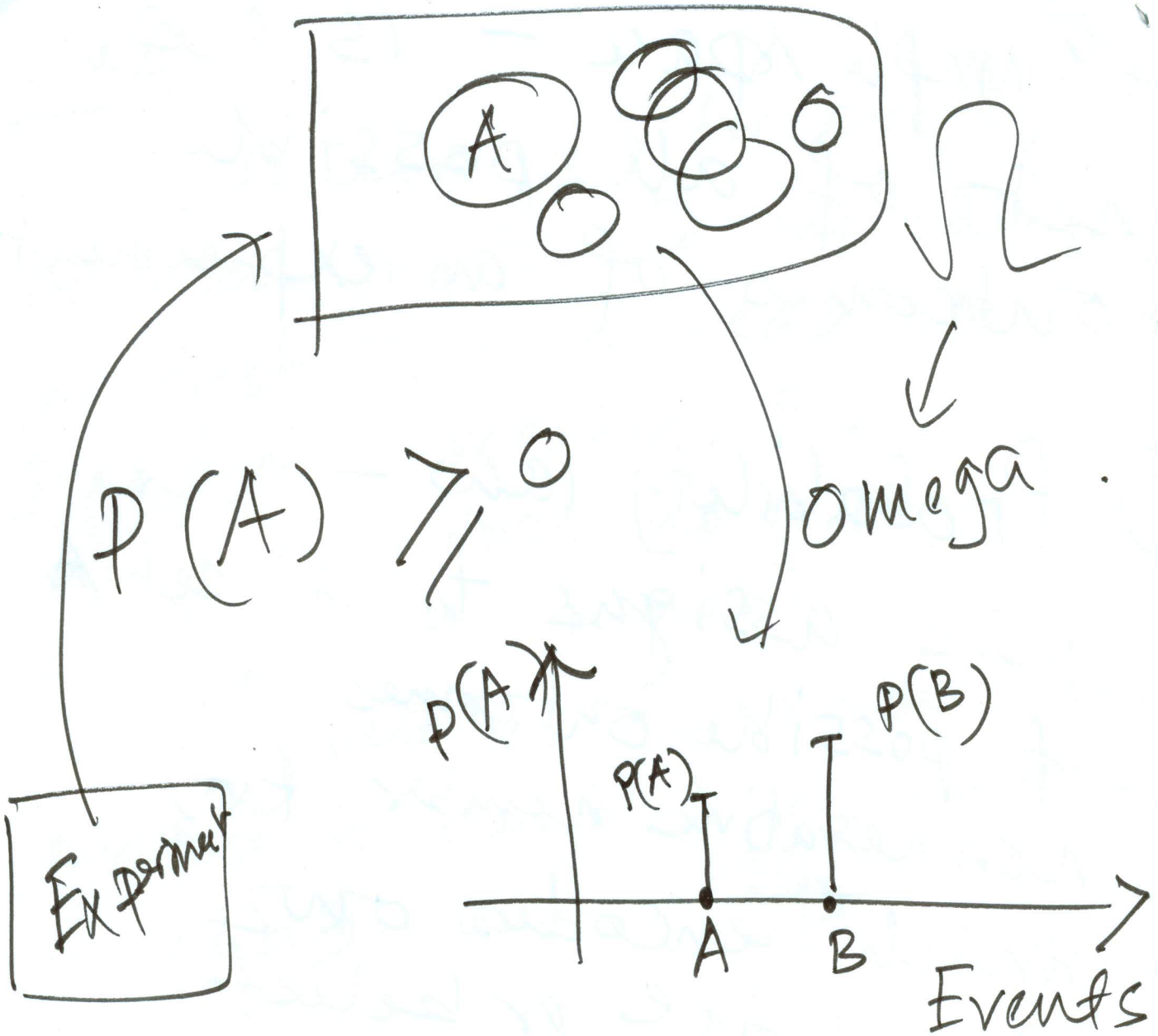
$$\Omega = \left\{ (x_1, \ldots, x_{10}) \mid x_i \in \{H, T\} \right\}$$

$$\begin{array}{ll} HHH\ldots H & 2^{10} \\ HTHT\ldots H & \\ TTTT\ldots T & \end{array}$$

A sample space – is the set of all possible outcomes of an experiment

(2) Probability law – this assigns to a set A of possible outcomes a non negative number $P(A)$ which encodes our knowledge or belief about the collection ~~of~~ likelihood of the elements of A.

(Ω, P)



P : Set of all events $\longrightarrow [0, \infty)$