Probability and Counting Techniques

Concept and important of probability Probability is one of the most important mathematical concepts that we use/come across in our day-to-day life. Particularly important in business and economic situations, probability is also used by us in us in our personal lives.

a) The probability that an individual student of B.Com will clear the CAT
b) The chance that a candidate chosen at random will clear an interview,

UNDERLYING FACTORS FOR REAL-LIFE ESTIMATION OF PROBABILITY

The factor underlying an event often affect the probability of that event's occurrence. For instance, if we estimate the probability of India winning the 2007 World Cup as 0.14 based on certain expectations of outcomes, then this probability will definitely improve if we know that Sachin Tendulkar will score 800 runs in that particular World Cup.

BASIC FACTS ABOUT PROBABILITY For every event that can be defined, there is a corresponding non-event, which is the opposite of the event. The relationship between the event and the non-event is that they are mutually exclusive, that is, if the event occurs then non-event does not occur and vice versa.

SOME IMPORTANT CONSIDERATIONS WHILE DEFINING EVENT

Random Experiment an experiment whose outcome has to be among a set of events that are completely known but whose exact outcome is unknown is a random experiment (e.g. Throwing of a dice, losing of a coin). Most questions on probability are based on random experiments.

Sample Space This is defined in the context of a random experiment and denotes the set representing all the possible outcomes of the random experiment. [e.g. Sample space when a coin is tossed is (Head, Tail). Sample space when a dice is thrown is(1, 2, 3, 4, 5, 6.)]

Event The set representing the desired outcome of a random experiment is called the event. Note that the event is a subset of the sample space.

ANOTHER APPROACH TO LOOK AT THE PROBABILITY PROBLEMS

The probability of an event is defined as

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$$\frac{\text{Number of ways in which the event occurs}}{\text{Total number of outcomes possible}}$$

This means that the probability of nay event can be got by counting the numerator and the denominator independently.

Hence, from this approach, the concentration shift to counting the numerator and the denominator.

Thus for the example used above, the probability of a number > 2 appearing on a dice is:

$$\frac{\text{Number of ways in which the event occurs}}{\text{Total number of outcomes possible}} = 4/6$$

The counting is done through any of

a) The physical counting as illustrated above,
b) The use of the concept of permutations,
c) The use of the concept of combinati0ons,
d) The use of the MNP rule.