Introduction

What and Why ?

Probability is chance of event occurring. It ranges between 0 and 1. There are few terms in probability to get familiar with,

1. Experiment : It is task on which probability is calculated, i.e., tossing a coin
2. Event : it is occurrence of particular thing, i.e., tossing a coin and getting head
3. Outcome : the result of experiment i.e., head
4. Search space : the set of all possible outcomes, i.e., {H, T}

In ML probability is widely used, algorithms like naive-bayes are completely based on probability theory. Apart from that probability distributions are widely used throughout the machine learning. Here you don't need to solve sum based on probability but you will need to make decisions based on probability concepts. Here are basic concepts of probability.

Margin, Joint & Conditional Probability :

Margin probability is the probability of independent event. Like probability of picking 3 from deck of 52 cards and probability of picking 7 from deck of 52 cards are independent (both have no relation). It is the normal probability that we often calculate.

Joint probability is the probability of occurrence of both events, like probability of picking red card and face card. Here the card should be red coloured and should be face card. So there are such 6 cards. So the probability will be,

$$P(A \cap B) = 6/52 = 3/26$$

Conditional probability is the probability of one event when another event is occurred. Like probability of event A when event B is known to occur of has occurred. It is given by the formula,

$$P(A \mid B) = P(A \cap B) / P(B)$$

Now the probability of picking red card then face card or probability of picking face card when red card is already picked is given by,
A - face card
B - red card

P(A | B) = (3/26) / (1/2) = 3/13

Bayesian Probability is the conditional probability, it is given by

$$P(A \mid B) = \frac{P(B \mid A)P(A)}{P(B)}$$

$$P(A \mid B)P(B) = P(B \mid A)P(A) = P(A \cap B)$$