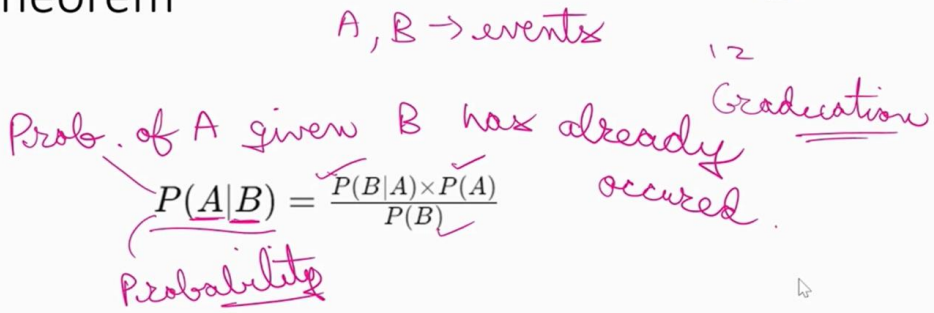
# Naive Bayes Classifier

## Bayes' Theorem




## What is Naive Bayes Classifier?

1. Prior Probability (P(Class))
2. Likelihood (P(x|Class))
3. Posterior Probability (P(Class|x))

$$P(A) = \frac{\text{Number of instances in class A}}{\text{Total number of instances}}$$

$$P(B) = \frac{\text{Number of instances in class B}}{\text{Total number of instances}}$$

$$P(Class|x_1, x_2, x_3) = \frac{P(x_1|Class) \times P(x_2|Class) \times P(x_3|Class) \times P(Class)}{P(x_1, x_2, x_3)}$$

# Types of Naive Bayes Classifier

There are mainly three types of Naive Bayes models, chosen based on the distribution of data:

- Gaussian
- Multinomial
- Bernoulli

# Working

- Model Training
- Prediction

$P(x_1|A)$ – P. of $x_1$ appearing in A

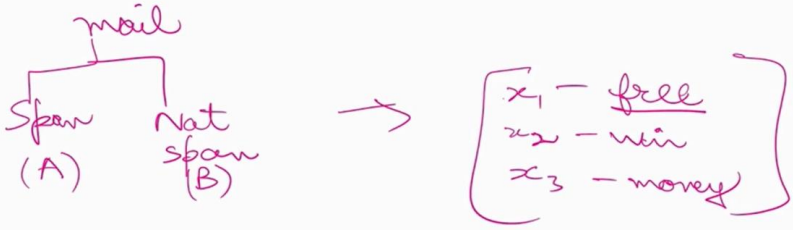
$P(x_2|A)$

$P(A)$ – email being spam

$P(B)$ – email being not spam

$$P(A|x_1, x_2, x_3) \propto P(x_1|A) \times P(x_2|A) \times P(x_3|A) \times P(A)$$

$$P(B|x_1, x_2, x_3) \propto P(x_1|B) \times P(x_2|B) \times P(x_3|B) \times P(B)$$




$$P(Class|x_1, x_2, x_3) = \frac{P(x_1|Class) \times P(x_2|Class) \times P(x_3|Class) \times P(Class)}{P(x_1, x_2, x_3)}$$

P(spam|—)

A/B

mail