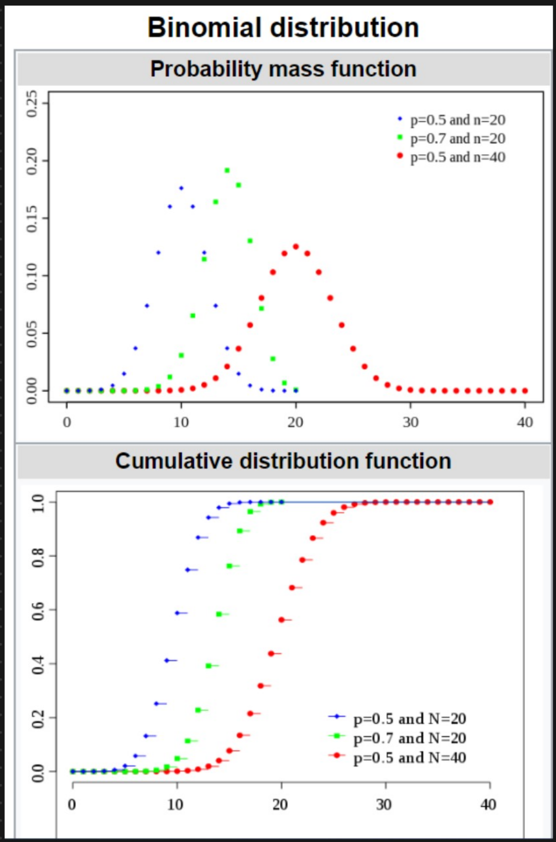
Binomial Distribution

In probability theory and statistics, the binomial distribution with parameters n and p is the discrete probability distribution of the number of successes in a sequence of n independent experiments, each asking a yes–no question, and each with its own Boolean-valued outcome: success (with probability p) or failure q=1-p. A single success/failure experiment is also called a Bernoulli trial or Bernoulli experiment, and a sequence of outcomes is called a Bernoulli process; for a single trial, i.e., n = 1, the binomial distribution is a Bernoulli distribution. The binomial distribution is the basis for the popular binomial test of statistical significance.



(i) Discrete Random Variable.

(1) Every experiment outcome is binary

(2) These experiment is performed for n trials.

Eg: Tossing a coin 10 times

Notation : $B(n,p)$

Parameters : $n \in \{0,1,2,\dots\}$ → no. of trials

$p \in [0,1]$ → success probability for each trial

$q = 1-p$

Support : $k \in \{0,1,2,\dots n\}$ → Number of success

PMF :

$$Pr(K, n, p) = {}^{n}C_{K}\, p^{K} (1-p)^{n-K}$$

for $K = 0, 1, 2, \ldots n$ where

$$\boxed{{}^{n}C_{K} = \frac{n!}{K!(n-K)!}}$$

Mean

$$\text{Mean} = np$$

Variance

$$\text{Var} = npq$$

Std

$$= \sqrt{npq}.$$