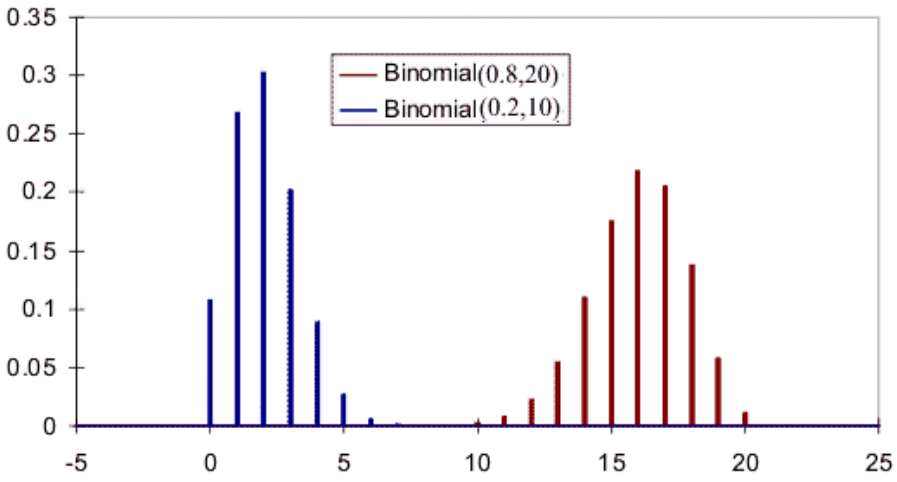
Binomial

Binomial(p,n)

Binomial Equations

Crystal Ball parameter restrictions

A Binomial(p,n) distribution returns discrete values between 0 and n. Examples of the Binomial distribution are shown below:



Uses

The Binomial distribution models the number of successes from n independent trials where there is a probability p of success in each trial (as explained in the section on the Binomial process).

The binomial distribution has an enormous number of uses. Beyond simple binomial processes, many other stochastic processes can be usefully reduced to a binomial process to resolve problems. For example:

Binomial process:

- Number of false starts of a car in n attempts;
- Number of faulty items in n from a production line;
- Number of n randomly selected people with some characteristic;

Reduced to binomial:

- Number of machines that last longer than T hours of operation without failure;
- Blood samples that have zero, or >0 antibodies;
- Approximation to a hypergeometric distribution

The following links lead to just some of the examples and models in ModelAssist that use the binomial distribution:

Conditional logic

Sampling from a liquid

Distribution fitting of threshold data

Bayesian prior

Test result

Comments

The Binomial distribution makes the assumption that the probability p does not change the more trials are performed. That would imply that my aim doesn't get better or worse. It wouldn't be a good estimator, for instance, if the chance of success improved with the number of trials.

Another example: the number of faulty computer chips in a 2000 volume batch where there is a 2% probability that any one chip is faulty = Binomial (2%, 2000).

The Binomial distribution was first discussed by Bernoulli (1713). It is related to the Beta and Negative Binomial distributions, all of which have their basis in the Binomial process where the Binomial distribution is also derived. The Bernoulli distribution is a special case of the Binomial with n = 1 i.e.: Bernoulli (p) = Binomial(p,1) that is used to model risk events.

The Binomial distribution has the property Binomial(p, n) + Binomial(p, m) = Binomial(p,n+m) which makes sense if one thinks of n and m being two sets of independent binomial trials, all with the same probability of success.

The Excel function BINOMDIST(s,n,p,**0**) returns the binomial probability mass function, and BINOMDIST(s,n,p,1) returns the binomial cumulative distribution function.